

Marx and Non-Equilibrium Economics

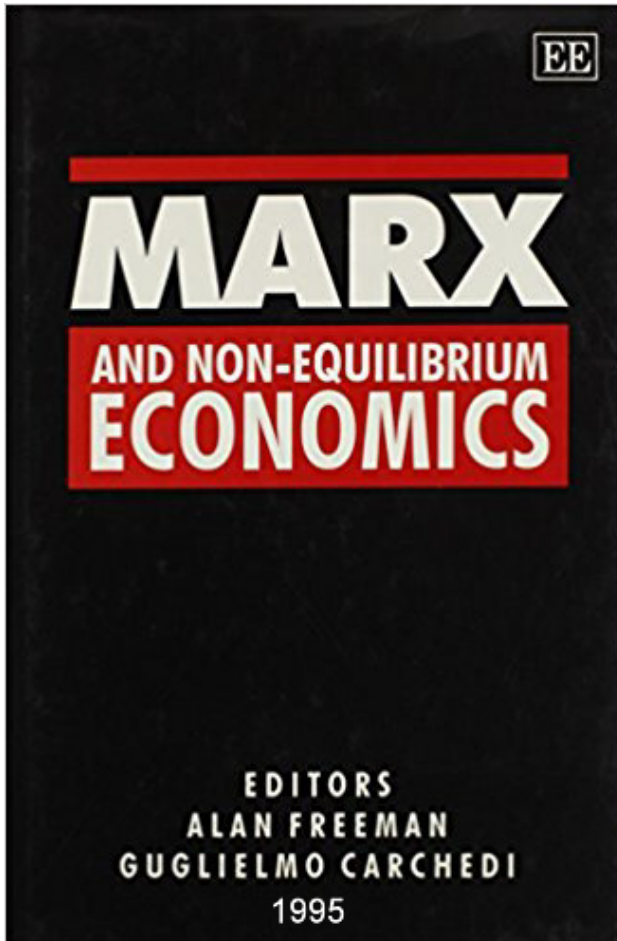
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Contents

Foreword

Alan Freeman and Guglielmo Carchedi

Introduction

1 The psychopathology of Walrasian Marxism

Alan Freeman

2 One system or two? The transformation of values into prices of production versus the transformation problem

Ted McGlone and Andrew Kliman

3 The transformation of values into prices of production: a different reading of Marx's text

Alejandro Ramos-Martínez and Adolfo Rodríguez-Herrera

4 Money, the postulates of invariance and the transformation of Marx into Ricardo

Adolfo Rodríguez-Herrera

5 Time, money, equilibrium: methodology and the labour theory of the profit rate

Michele I. Naples

6 The value of money, the value of labour power and the net product: an appraisal of the 'New Approach' to the transformation problem

Alfredo Saad-Filho

7 The transformation procedure: a non-equilibrium approach

Guglielmo Carchedi and Werner de Haan

8 Non-equilibrium market prices

Guglielmo Carchedi

9 Demand, supply and market prices

Paolo Giussani

10 A value-theoretic critique of the Okishio theorem

Andrew Kliman

11 Price, value and profit – a continuous, general, treatment

Alan Freeman

12 Bibliography

Foreword

Alan Freeman and Guglielmo Carchedi

The essays in this book reflect an intensive process of critical reappraisal of neoclassical economics and its relation to Marx's theoretical work. They represent a radical departure from the almost universally accepted „correct“ representation of Marx's value theory first formulated by Ladislav von Bortkiewicz at the beginning of this century. This introduction attempts to explain what is at stake in this process. The views expressed here are those of the editors and do not necessarily in whole or in part reflect the views of the contributors.

The Twentieth Century has been nothing if not innovative. Its technological miracles would have astonished the Victorians. Cosmology has reshaped space and time; physics has abandoned determinacy and biology defies the laws of evolution. There are, however, two exceptions to this pageant of revolutions: religion and economics. Adam Smith has been re-instated as prophet of the market, Ricardo as the oracle of trade, and economic gospel reduced to the following: the market satisfies all and wastes nothing; no-one could be better off without it, and no-one goes without work who takes the going wage.

The foundation of this catechism is a dogma: that supply equates itself to demand. Its formal basis, despite the beatification of the classicals, was laid in the 1870s and bears the name of General Competitive Equilibrium. Since then Arrow, Debreu, Hahn and others have added some rigour, time preferences have been tacked on, and the elastic distinction between short and long run has tied down some loose ends. But the basic instruments are as Walras, Jevons and Menger bequeathed them. Keynes's brief excursus has been assimilated into what Arestis (1992) calls the „Grand Neoclassical Synthesis“ and today's economics is a theory of supply curves, demand curves and simultaneous, instantaneous market clearing.

It is buttressed against threat by an important property: its internal consistency. It is hermetically sealed by the widespread view that the leading critique – that of Karl Marx – is inconsistent. This is not only endorsed, but energetically promoted, by the great bulk of writers in the Marxist tradition. Contemporary doctrine has thus been immunised against criticism; since the only serious alternative is on its own admission illogical, neoclassical theory is by definition the best.

This triumphalism is less appropriate by the criterion of normal science, namely, how well it explains observed reality. Orthodoxy's claim to success has a

unique basis: its adoption by policy-makers. It is true, we are told, because communism has fallen, markets have opened, and the welfare state is in retreat and disarray. Yet though new fads come and go, and ever more sophisticated mathematics prove ever more implausible propositions, each actual outturn is a surprise. Black Wednesday, the economic collapse of Eastern Europe, unimaginable world poverty, famine on a scale approaching genocide; this is just so much unexplained data for a theory which is right for no other reason than that it rules. Small wonder its more thoughtful theorists are prophesying its death.

In a world out of balance the principle of equilibrium is neither a valid foundation nor a real result. Practising economists are driven to study change, time and disequilibrium. Cyclic crisis, unemployment, debt, underdevelopment, and financial chaos are the real phenomena which command attention, but they receive no explanation. Orthodoxy either defines them out of existence or labels them exceptions. Official economics is stuck with an unworkable paradigm – applying to an unstable world concepts derived from the assumption of stability.¹

This presents a striking contrast with the theory which saw capitalism from its inception as *inherently* contradictory and self-disequilibrating, that of Karl Marx; a theory rooted in the understanding that economic movement, like all social forces, is driven by continual change and evolution, racked by violent storms and catastrophes, that inequality and uneven development are its very life force, and above all that these phenomena are not external to the market but generated by it, the outward expression of its internal law of motion.

That this system figures neither in official doctrine nor in digressions from it is itself a notable fact which should tell us something about the way professional economists go about their business. It is more notable still that Marx answers the very questions the official economics cannot deal with.

Of course in every field older thinkers are displaced from the textbooks to the histories as their discoveries are superseded and facts explained better. But Marx's discoveries have not been superseded and the observed facts have not been explained better. Maybe one day someone else will explain why the market does not clear, why there are periodic economic crises, why the profit rate falls when productivity is rising, or even why classes exist, why poverty and inequality is growing both within and between societies, and why there are wars and revolutions. But as yet they have not.

In any other science, where failures to explain observed reality are supposed to provoke root and branch examinations of concepts and principles, this would provoke a serious appraisal of Marx's thought. Yet twentieth century economics, for so long ridiculing his system as outmoded, has on the contrary disinterred the principles of his predecessors: the hidden hand, comparative advantage, the quantity theory of money and above all market clearing.

This is a double irony. Marx has been rejected for inconsistencies which are not, as the contributions to this volume show, present in his thinking. Yet these and many more inconsistencies *are* present in the writings of his predecessors,

and were identified and overcome by Marx himself. Orthodoxy resolves this in a typically eclectic fashion, promoting what it finds attractive and ignoring the underlying conceptual structure of these writers – and hence the real problems they struggled with. It shows a shallow contempt for theory to embrace Smith's views of the market and Ricardo's ideas on trade and money, even founding institutes and banks to inflict them on people, while systematically ignoring either's writings on value.

There are material reasons for this conduct which will be assessed shortly. The theoretical basis, however, is an accusation repeated stridently and unremittingly in over four hundred papers since Volume III of *Capital* first appeared in print a century ago: that Marx's analysis is *logically* unsound. Moreover these charges are echoed and endorsed, and indeed most cases levelled, by the Marxists themselves. Marx's own supporters have announced the failure of his project, the premise of *Capital* itself: „to reveal the economic law of motion of modern society“.²

This has had an incalculable impact on the perception of Marx by the nonspecialist, the militant, the partisan and the merely honest disinterested observer of his work. The received view among intellectuals is that whatever Marx's towering political and social insights, his economics is wrong.

The contributions to this book demonstrate these charges to be manifestly and profoundly false. Not only are the accusations of inconsistency unfounded, but it is not necessary to „revise“ or „correct“ Marx to show this. In this sense it constitutes the definitive answer to Ian Steedman's (1981:48) famous challenge:

One can derive from the physical picture of the economy a coherent theory of profits and prices. In doing so, however, one finds that in general profits and prices *cannot* be derived from the ordinary value schema, that $S/(C+V)$ is *not* the rate of profit and that total profit is *not* equal to total surplus value. Thus not only can one build the theory of profits and prices around the physical schema rather than the value schema but one is forced to do so ... [this is] the conclusion of an argument in logic; should anyone wish to challenge it, they must do so either by finding a logical flaw in the argument or by rejecting explicitly and coherently one or more of the assumptions on which it is based.

In this respect it differs from all other attempts to defend Marx's theory from the critics by modifying or „correcting“ this theory. None of the contributors claim Marx is immune from error or that further development of his thinking can be avoided; nevertheless he did not make the mistakes he has been accused of.

A further question is however posed by this conclusion. How, for nearly the whole of this century, could Marx have been systematically misrepresented even by those with every reason not to?

From orthodoxy, misrepresentation is to be expected for reasons Marx himself discussed.³ Official economics, for deep material reasons, is an ideological endeavour. It sanctions what is; if it fails to do so then sooner or later it does not get paid. This lends it a deeply apologetic character. The search for truth rarely takes precedence over the pursuit of money; twentieth century economics does not even understand the difference.

The very fact that the triumph of neoliberalism in Eastern Europe is celebrated as „proof“ of Marx’s errors shows what the profession has become. One might as well judge Socrates’ logic by his survival skills. We witness the end product of a veritable Counter-Reformation, complete with its Inquisition and Torquemadas. It is a Jesuitical system, logical, consistent and intricate in its internal connections, furnishing irrefutable answers to all discrete questions but no coherent account of the world as it is. Like the actual Counter-Reformation, its function is to sustain patrons, not explain events.

But though official economics is intrinsically unable to endorse or apply analysis that contradicts its own existence, this does not on its own account for the parallel failure of „unofficial“ economics and above all the reaction of economists supposedly working in a Marxist framework. This is to be explained differently. *What has been understood as Marx’s economics is in fact something else.* Academic economics has assimilated Marx to neoclassical General Equilibrium theory. His alleged inconsistencies are the crop from an unviable hybrid. This is not a maturation but a sickness of the theory, a perversion induced by its absorption into an alien system. To understand this sickness the editors sought to establish both how the accusations of error arise from a radically false understanding of a capitalist economy, and how a proper understanding of Marx’s theory of value can liberate this body of theory from a century of captivity.

For the editors this book is therefore far from defensive. The goal of „revealing the economic law of motion of modern society“ remains on the agenda. Without it the basic premise of rationalism – that humans can understand their condition and thus become conscious agents of their own destiny – would have to be abandoned, and in the most cruel manner: we would have to conclude that we could understand any aspect of nature except ourselves.

What are the theoretical roots of the enterprise? The editors have attempted to bring together two lines of investigation, neither of which, we believe, can live without the other and each of which has hitherto been undertaken in isolation.

Their aim can be summed up as a twofold recognition of Marx’s value theory as *sequential* and *nondualistic*. Sequential (chronological, successivist or historical)⁴ because it rejects the simultaneous equation approach and its implicit assertion that economic movement consists of the simultaneous, rather than successive, determination of all variables. Non-dualistic (unitary, or redistributive) because it considers that prices and values *reciprocally determine* each other in a succession of periods of production and circulation. Prices are not determined independent of values but neither are values determined independent of prices. Against the idea that prices and values constitute two distinct systems of determination it seeks to understand their mutual relation.

The first line of investigation, as the title implies, is thus a thoroughgoing rejection of equilibrium. The traditional formulation of Marx’s theory of value was initiated by Tugan Baranowsky (1905), popularised to the German-speaking

world in 1906-7 by Bortkiewicz (1952, 1984) and approved for the English-speaking world in 1942 by Sweezy (1970). This tradition holds that his calculation of both value and price can be represented as a system of simultaneous equations. This implies that the values and prices of commodities serving as inputs at a given point in time are equal to the values and prices of the same commodities serving as outputs at a later point in time. But this in turn disregards both movement and time, the very stuff of which reality is made.

The work of Carchedi, Freeman, Giussani, de Haan, Kliman, McGlone and Naples demonstrates that this universally-accepted procedure is fundamentally flawed, incorporates the assumption of equilibrium and market-clearing, and has to be abandoned. This is the first conclusion which can be drawn from this book.

The second conclusion, however, is just as vital. All interpretations of Marx agree that both the value and the price of any commodity are made up of two components: the value of constant capital and the value-product, or the value added by living labour. But virtually all modern presentations further propose that the value transferred by constant capital is equal to the value of the elements which make it up, that is, the value of the consumed means of production and raw materials.

This view was not Marx's. Ramos and Rodríguez, and McGlone and Kliman argue and explain that this is not only incoherent but incompatible with Marx's own presentation. In fact the value transferred by constant capital is equal to the value as measured by the *money advanced to purchase* the elements of this capital. Likewise the value of variable capital is measured by the *money advanced to pay the labourer*, not the value of the products she or he consumes.⁵

These two conclusions, amply supported by Marx's own writings, utterly invalidate the traditional refutation of Marx's transformation of value into price. They also permit a further decisive development: a recuperation of *money* in Marx's analysis of value and price in particular, and economic movement in general. This is central to the rejection, emphasised by Rodríguez, of the „dualistic“ or two-system view which permeates twentieth century presentations in which prices are fixed independent of values, and values independent of prices. The relation between the two then violates either or both of Marx's famous „two equalities“. In the framework presented here such a conception is impossible since values in each period depend both quantitatively and qualitatively on prices in the previous period.

Money therefore plays an altogether different role than in neoclassical thought; it is not a „veil“ introduced *post hoc* but an integral part of the analysis of the commodity and hence of the process of capitalist production itself.

Throughout Marx's writings he maintains a clear distinction, introduced in his earliest (1970, 1973) work, between two distinct measures of value, the form of appearance of socially necessary abstract labour. Its intrinsic or immanent measure, as he calls it, consists of hours of abstract labour time. But value can only be expressed in a universal equivalent, a commodity in which the value of

all commodities is realised – money. Exchange itself presupposes what Marx terms the extrinsic measure of value, namely its money price.

Thus as Ramos, Rodríguez and Naples all explain, the *exchange value of money* – the quantity of money in which a given number of hours of socially necessary labour time are expressed – is not constant, is not given externally to the exchange relation, and is not determined by the conditions of production of the commodity which serves as money as assumed by the authors who founded and perpetuate official academic Marxism.

This highlights an important issue. In the writings of Marx, as opposed to his correctors and detractors, money is not only pivotal but is introduced and defined without any presuppositions as to the conditions of production and reproduction. It appears in chapter I of *Capital* immediately after value. Like all Marx's key concepts it is developed independently of and prior to any discussion of social reproduction. It even precedes the discussion of exchange.⁶

Money thus plays an utterly distinct role in Marx, without parallel in any version of neoclassical economics, equilibrium or otherwise. It is not only independent of any requirement that supply and demand should balance, but in general rules it out, as Marx repeatedly stresses.⁷ It is therefore completely logical and coherent to use it to analyse an economy which is not in equilibrium.

The same is not true of neoclassical systems which are constantly blocked in their attempts to escape the deadening effects of the equilibrium assumption by the fact that their basic concepts have already been derived from this assumption. It is a well known feature of General Equilibrium that money plays no necessary role in it.⁸ Keynes' work is in effect a vain attempt to escape this. It leads to the distinctive feature of modern economics: money, eliminated by General Equilibrium, is reintroduced *post hoc* as the subject of a distinct branch of theory, monetary economics, so that the economy is neatly divided into two self-contained and allegedly self-determined sectors, the „real“ economy or „goods“ market and the „nominal“ economy or „money“ market.

The contributions to this book which relate to this question thus differentiate it from all non-Marxist attempts to depart from equilibrium, such as Kalecki's (1936, 1969) and more recently the Post-Keynesians. Precisely because equilibrium concepts cannot provide a theoretical foundation for non-equilibrium economics, a coherent break from General Equilibrium is impossible without a theory of value.

This becomes clear once one asks the simplest questions: for example if people buy and sell at non-equilibrium prices, *what* is it that they exchange? If people acquire stocks, *what* do they accumulate? The neoclassical answer, as is well known,⁹ is circular. It must know the price of capital in order to define the concept of price on which the concept of capital is based. It cannot even pretend to escape this without the dual assumptions of market clearing and simultaneity, the cornerstones of the equilibrium dogma. But price is then defined as the

hypothetical ratio at which goods exchange when supply equals demand. This tells us nothing about what happens when supply does *not* equal demand.

Marx's original answer has no trace of circularity. It consummates and supersedes the classical tradition. Whether or not supply equates to demand, capitals exchange and accumulate *value*: past labour. An economist who is not allowed to give this answer is like a physicist deprived of energy; she or he has no generic concept with which to explain interactions between heterogeneous systems. Everything has to be studied in isolation from everything else.¹⁰

Value, moreover, is not an ideal unknown but a known determinate quantity, created chronologically and logically prior to the act of exchange. This means that, whereas Kalecki assumes a markup but cannot say what determines its magnitude or indeed prevents the firm setting any arbitrary markup, as Kliman and Freeman argue Marx deals with a definite rate of profit determined prior to the circulation process, and explains the process of its determination.

In its style the book is necessarily exploratory, and in parts polemical, whether necessarily or not. The contributions express a wide variety of views which are inevitably and rightly not in full agreement. The authors are breaking from a century-old tradition and this involves groping for new ideas, settling accounts with the old ones, and understanding the historical evolution of both theory and ideology since Volume III of *Capital* appeared one hundred years ago.

However the editors believe that a strong common theme differentiates the contributions in this book decisively from previous attempts to recuperate Marx's thinking, some of great merit, which have concentrated on only one of the two weaknesses of official academic Marxism defined above. It is insufficient merely to break free of equilibrium or develop a nondualistic account of price and value. *Both* developments have to be integrated so that the dynamic relation of money and labour can be fully comprehended as a succession of determinations of price and value, both operating in the spheres of both production and circulation.

Any writer who sets out to outline the basis of a theoretical approach needs to explain her or his relation to the previous development of the theory both negative and positive. We found ourselves in a difficult position. A single work cannot trace a century's evolution of the subject, particularly when this subject has on the whole regressed rather than advancing.

Nevertheless some minimal account of the relation between these and previous writings is essential. As should be clear, we think the formalisation of Marx's theory of value which descends from Bortkiewicz is a dead end which has served primarily to assimilate Marx to General Competitive Equilibrium. Bortkiewicz himself did not disguise this aim. A lifelong admirer of Walras who corresponded with him from the age of nineteen,¹¹ he openly acknowledged this debt and his avowed aim was to formulate Marx's transformation procedure in Walrasian terms. He criticised Marx as „successivist“ (see Naples in this volume) for determining prices and values through a succession of phases of the circuit of reproduction, and substituted Walras' approach which simultaneously determines

prices and/or values once for all. He was a part of the academic milieu emerging at the turn of the century which overturned the Ricardian legacy, creating neoclassical economics. This included Max Weber and Werner Sombart in whose journal Bortkiewicz's first (1952) article appeared in 1906; Böhm-Bawerk, who published Komorzynsky's (1897) article in which the „inconsistency“ charge was first laid, of course Walras, and Bortkiewicz himself.

The system found support among academics, partly because it permitted a dialogue on apparently common terms with non-Marxist theory, partly because many twentieth century writers saw linear equation systems as the theoretical basis for technocratic planning. The Bortkiewicz system appears to express a direct, immediate and apparently inviolable relation between technology and prices. If prices are no more than the expression of an underlying technical relation, then it appears to support an interpretation of Marx in which the „forces of production“ reduce to the technical coefficients of the production matrix and the „relations of production“ to the distributional struggle between wages and profits. And if equilibrium (that is, optimal) prices and quantities are given uniquely by technology and the socially-determined allocation of the net product then the effects of supply and demand are redundant. The whole cumbersome apparatus of the market is unnecessary and can be supplanted by a planned pricing system in which the application of the net product is determined by the government. The simultaneous linear equation representation thus provides an attractive and simple justification for state intervention.

Valuable insights may have been obtained from such systems. But the outcome has been to assimilate Marx's theory of value to General Equilibrium. Ninety years of work with them have not enriched, but impoverished and distorted, his original contribution and above all been responsible for the entirely unfounded view that his economics are wrong. The time has come to lay them to rest.

We are in a different relation to preceding partial attempts, many of which represent a marginalised and forgotten aspect of Marxist thinking in this century, to construct an alternative to this dualistic and simultaneous framework. Full acknowledgement is long overdue. We apologise where it is missing in this work.

This volume would not have appeared were it not for Robert Langston, whose pioneering work in the late 1970s was tragically ended by his death. The few writings he left were the basis for the collaboration which led to the *Marx, Ricardo and Sraffa* (Mandel and Freeman 1984) volume in which many early critiques of equilibrium were aired.

Despite differences with them we recognise the important contribution of „iterative“ solutions to the transformation problem, to our knowledge first set down in a little-known paper by Shibata (1933). His approach has been either knowingly or unknowingly reproduced in key subsequent contributions of which the best known are that of Bródy (1970), Okishio (1972), Shaikh (1973, 1977), and Morishima and Catephores (1978a). Less well known is the pioneering work

of Panizza (1981) and Pala (1982). All these authors show that the passage from „values“ (as defined by them) to prices of production can be conceived not as a pure calculation outside of time but as a succession of transformations in logical time, converging on a magnitude interpreted either as the Marxian price of production or the neoclassical long-run equilibrium price (or both).

A further set of authors have explored non-dualistic accounts of price and value. Pioneering but widely-ignored articles by Wolff, Roberts and Callari (1982, 1984a) and by Roberts (1987) have been followed by a growing number of authors such as Moseley (1993a, b) who work in this tradition but in a simultaneous framework. Not the least achievement of this young tradition is that it sets the scene for empirical measurements of value magnitudes that are theoretically well grounded, not based on a simple naïve equality of price on value, but on a series of determinate calculations yielding values from prices.¹²

Indebted though we are to these two traditions, the editors consider that their weakness lies in the very fact that they have not been brought together.

First, we think static solutions in a nondualistic framework are insufficient. Not the least reason is that the economy itself is in motion, and the task of analysis is to uncover the law of this motion. More important still is the fact that many of the determinations of price and value which are purely qualitative in a static framework, can be seen to be quantitative in a non-equilibrium framework.

Thus as Freeman, McGlone and Kliman show, a sequential calculation yields *quantitatively different* magnitudes for values and, most significantly, for the profit rate. On this basis we believe we have furnished, for example, a fully general refutation of the theorem of Okishio, showing that just as Marx asserted, it is possible and in fact the general tendency for the profit rate to fall continuously, despite rising productivity and in the absence of a rise in real wages, as a result of the rising organic composition of capital. This result cannot be demonstrated in a static framework, although it happens, and is acknowledged to happen, in reality.

These quantitative differences refute the second logical accusation against Marx: that of redundancy. The allegation that values are redundant because prices can be calculated directly from technology is based on a universal assumption of the Surplus Approach school, the foundation of Sraffa's critique of marginal theory, that to a single technology there necessarily corresponds a single set of prices. This requires that one set of prices correspond to each set of physical magnitudes, provided these include the real wage. But as McGlone/Kliman and Freeman show, there is no necessary correspondence between technology and prices once the time dimension is introduced – and as Naples shows there is not even any necessary process of convergence.

As Freeman's final chapter shows, once the assumption of equal profit rates is dropped *any* arbitrary sequence of prices (and values) is compatible with a given technology. Trying to understand the movement of an economy as if it were a robot, driven only by its machines, is theoretically without any basis.

In a purely static framework, in which profit rates are equal and prices do not change, such distinctions cannot be made. The process of determination is not visible because quantitative changes in prices from one period to the next cannot be demonstrated. This has robbed static contributions of much of their potential impact, since it is extremely difficult to grasp qualitative distinctions which never give rise to quantitative differences.

In a genuinely non-equilibrium framework, when „simplifying“ assumptions are dropped – equal rate of profit, invariant and uniform technology, no fixed capital, fixed turnover period, homogenous labour, an equal rate of exploitation, constant value of money (it is a long list) – the mind is freed of the deadening impact of these ideologically-motivated and arbitrary assumptions, and the often abstruse distinctions made by Marxists working in a static framework become obviously necessary practical differences. Freeman further argues that if the break is not made with the simultaneous equation framework, „simplifying“ assumptions make their way into the higher cerebral processes where they mutate into postulates. Since they are in fact the only way to get any solutions out of such systems, they become fetishised and appear as if they were an aspect of external reality; as if, because equal profit rates are needed to solve our equations, profit rates in the world can never diverge.

But if static solutions with a nondualistic price calculation are inherently limited, „iterative“ approaches with a dualistic price calculation are also crucially flawed. First, they are proposed as a sequence of approximations or „logical contributions“ to the prices or values which would hold for an economy in equilibrium. But as Naples, Carchedi, Freeman and Giussani all point out, this equilibrium is never achieved. It is a hypothetical construction which has misled generations into believing that Marx’s concept of price of production is nothing but the neoclassical long-run equilibrium price.

Second, in such iterative models the sequence of values and prices which lead to equilibrium are not perceived as an attempt to model actual prices and values, but a „hidden“ or „logical“ movement behind the actual prices. This perpetuates the false idea that there are two worlds in the economy, the hidden world of values and the exposed world of prices. This is rightly perceived by those new to Marxist analysis as a mystificatory philosophical game. Value may be an abstraction but it is not a secret. The concept of a woman, a man, or food is an abstraction but every day real men and women eat real food or really die for lack of it. This is apparent¹³ without knowing their names. Value may differ quantitatively from price but the difference is observable and in principle measurable. The task is to explain the *actually observed* movement of society; our perception of these iterative models is therefore that they are a first step in this direction, but cannot complete their journey because of their dualistic vision. The focus of this work, like that of Marx, is not on how equilibrium comes about but on why it cannot exist. We cannot rest content, therefore, with a purely logical account of „what happens in between“.

A further recent development in economic theory is the important work generically known as the „New Approach“ or the „New Solution“. Diverse workers in this framework, notably Duménil, Lévy, Foley, Lipietz, Glick and Ehrbar have reraised vital issues such as the value of money, and in certain cases have begun experimenting with non-equilibrium models. Saad-Filho's chapter is dedicated to an evaluation of this school.

The difficulty with the approach is twofold. First of all, although there are several different emphases, the concept of value usually remains separate from and prior to the concept of price and is calculated using equilibrium assumptions, that is, using a simultaneous equation formulation. This starting point can be dispensed with but the approach then loses of much of its force.

Most contributors also disagree with the interpretation of „double counting“ introduced by Duménil's reading of Marx, according to which the equality of total price and value applies to the net, and not the gross output of society. We do not agree that the net product alone participates in the redistribution of value brought about by changes in the value of money. Constant capital figures in the goods which are exchanged against money, and its value and price are altered as a result. The exchange value of money in our view is given by the value of all goods which are measured in money in each period, that is, the whole stock of social capital. A detailed critique of the „double-counting“ interpretation of the New Approach is offered by Ramos and Rodríguez as part of their article on Bortkiewicz.

Finally, a few words may clarify the function of the second part of the work which deals with some important unsettled issues in Marx's relation to modern economics, above all economic dynamics. Carchedi, de Haan, Giussani and Freeman demonstrate that the central category of Marx's concept of price is not, as widely believed, the concept of price of production but of *market* price, the actual price goods are sold at. The neoclassical assimilation of Marx rests, to a degree, on one false idea: that prices of production are the real essence, and market prices the accidental form of appearance, of Marx's concept of price. According to this view, market prices are a random short-term fluctuation about a long-run equilibrium which comes into being independently of them.

To reduce Marx's thinking to the idea that prices of production are the *cause* of market prices, or that prices of production are real and market prices unreal, is as absurd as it is false. As Carchedi and de Haan argue, prices of production are a tendency produced by the actual movement of market prices. It is an inversion of reality to treat the tendency as if it produced the actual. Bees tend to be found in swarms, but no-one has yet found a swarm with no bees in it. Marx describes the process by which the price of production is formed as follows:

Between these spheres that approximate more or less to the social average, there is again a tendency to equalization, which seeks the „ideal“ mean position, i.e. a mean position which *does not exist in reality*. (Marx 1981:273, our emphasis)

The question for him is then posed thus:

The really difficult question here is this: how does this equalization lead to a general rate of profit, since this is *evidently a result and cannot be a point of departure?* (Marx 1981:274, our emphasis)

It is the movement of market prices which gives rise to price of production, not the other way round. This is the reverse of the neoclassical conception according to which long-run equilibrium prices are the real and causal phenomenon. The dynamic character of Marx's analysis results because market prices and their fluctuations, in pursuit of surplus profit, are for him the real motor force of the economy. The forces that drive them together are the very forces that drive them apart. The interaction between prices, investment, and the movement of both sectoral and average profits, is the core of Marx's understanding of the economy.

The second issue concerns the most important modern deduction in static analysis: the Okishio theorem. This theorem, through which, we understand, Okishio hoped to prove that there was no practical limit to the wage rises that workers could secure provided these rises were matched by improvements in technology, establishes (in a static framework) that continuous improvements in technology must necessarily give rise to a rising profit rate unless offset by rising real wages. This result was widely held in countries less often visited by rising productivity – such as Britain and America – to reinforce the view, politically expedient for the governments of the day, that falling profits were caused by rising wages. It also apparently confirmed the often-made accusation that Marx failed to understand how cheapening of constant capital could indefinitely offset the rise in its volume.

Kliman's chapter decisively refutes this theorem and furnishes a simple illustration in which productivity rises continuously but profits fall. Freeman's final chapter establishes the general form of the result first advanced by Marx.

The final chapter confronts the question: is there an alternative *general* formalisation of Marx's theory of value – that is, a different paradigm for economics in Marx's framework? It concludes that on the basis of Marx's own analysis of individual and market value, of fixed and circulating capital, and money and the succession of periods of production and circulation, such a formalisation is indeed possible using the mathematical techniques of difference and differential equations. It can explain the basis of some of the most permanent and pervasive features of the capitalist economy since the industrial revolution: unequal exchange and the alternating cycle of booms and slumps.

This formalisation not only proves in completely general form the propositions which Marx has been accused of getting wrong, but shows that static analysis is in fact a *special case* of this more general form, in which the necessary distinctions between concepts such as money-price and relative price, or stocks and flows, are annihilated, and in which the concepts necessary for analysing dynamic behaviour are excised.

The editors would not claim that the results of this book are a final answer to any question, let alone the criticisms of Marx. Nor do we believe the results to be

complete or perfected. Nevertheless we believe three not unimportant things can be shown, if the lines of our suggestions are followed. First, that the most essential phenomena of a market economy cannot be understood in an equilibrium framework, and are therefore impenetrable both to neoclassical economics and to equilibrium Marxism; second that within the theories of Marx himself a superior basis exists for understanding these phenomena, and finally, that a century of sophisticated reasons for ignoring these theories have produced precisely and exactly nothing. All we can now do is invite those of an unprejudiced mind to tread with us the road along which we have tentatively set out.

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NOTES

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- ¹ „The problems of achieving equilibrium within [the Grand Neoclassical Synthesis] are bypassed by the method of comparative statics ... it normally begins with an equilibrium position and then assumes a change in an exogenous variable or parameter to arrive at a new stable equilibrium; it then merely compares the equilibrium points before and after the change ... Keynes was very categorical on the notion of equilibrium which he described, in a very well known passage as “one of those pretty, polite techniques which tries to deal with the present by abstracting from the fact that we know very little about the future”” (Arestis 1992:70).
 - ² Marx 1976a:92
 - ³ „In the domain of political economy, free scientific inquiry does not merely meet the same enemies as in all other domains. The peculiar nature of the material it deals with summons into the fray on the opposing side the most violent, sordid and malignant passions of the human breast, the Furies of private interest” (Marx 1976a:92).
 - ⁴ The authors are not fully agreed on terminology. The terms in brackets are offered as alternatives.
 - ⁵ In the same vein, Carchedi and de Haan argue that, due to technological competition, the value transferred by the means of production to the product and the value newly created by labour power is not the original value but the value they have at the moment the product is sold. Tendentially, this value converges towards the constant and the variable capital actually invested by those capitals operating under conditions of average productivity as measured at the moment of the product’s sale.
 - ⁶ Incidentally it does not depend on the assumption of a capitalist economy, which is important since money and prices existed before capitalism. The transformation of values into prices in general, not prices of production, is introduced in chapter 3 of Volume I (Marx 1976a:196) before capitalist production on the basis of the commodity labour power.
 - ⁷ „The conception (which really belongs to Mill) adopted by Ricardo from the tedious Say (and to which we shall return when we discuss that miserable individual) that *overproduction* is not possible or at least that no *general glut of the market* is possible, is based on the proposition that *products* are exchanged *against products*, or as Mill puts it, on the “metaphysical equilibrium of sellers and buyers”, and this led to [the conclusion] that demand is determined only by production, or that demand and supply are identical” (Marx 1969b:493, emphasis and insertions in original). „In actual fact, supply and

demand never coincide, or if they do so, it is only by chance and not to be taken into account for scientific purposes: it should be considered as not having happened" (Marx 1981:291).

⁸ „Any commodity [in a Walrasian system – eds], whether a good or money, can be offered directly in trade for every other commodity. But an economy that admits of this possibility clearly constitutes what any classical economist would regard as barter rather than a money economy. The fact that fiat money is included amongst the set of tradable commodities is utterly irrelevant; the role of money in economic activity is analytically indistinguishable from that of any other commodity" (Clower 1967:204).

⁹ See for example Harcourt (1972), Eichner (1979), Arestis (1992).

¹⁰ „It is one of the chief failings of classical political economy that it has never succeeded, by means of its analysis of commodities, and in particular of their value, in discovering the form of value which in fact turns value into exchange-value ... We therefore find that economists who are entirely agreed that labour-time is the measure of the magnitude of value, have the strangest and most contradictory ideas about money, that is, about the universal equivalent in its finished form ... Let me point out once and for all that by classical political economy I mean all the economists who, since the time of W. Petty, have investigated the real internal framework [*Zusammenhang*] of bourgeois relations of production, as opposed to the vulgar economists who only flounder around within the apparent framework of these relations, ceaselessly ruminate on the materials long since provided by scientific political economy, and seek there plausible explanations for the domestic purposes of the bourgeoisie" (Marx 1976a:174).

¹¹ Gattei (1982) chronicles aspects of the Bortkiewicz-Walras correspondence. Bortkiewicz's first letter to Walras on 9 November 1887 ends with the following words: „Your writings, sir, have awakened in me a lively interest in the application of mathematics to political economy, and has pointed out to me the road to travel in my researches into the methodology of economic science." This letter is reproduced in Jaffé (1965 Vol II p230).

¹² Carchedi, who like Freeman has already worked on the measurement problem, expands its theoretical basis with de Haan in their chapter in this work.

¹³ To all but economists.

Introduction

This section, mainly contributed by the authors themselves, describes the function of each chapter.

Alan Freeman's opening chapter outlines the sequential and nondualistic approach in non-mathematical terms. It shows that, as a result of the simultaneous equation approach initiated by Bortkiewicz and popularised by Sweezy, Marx's theory has been assimilated to General Competitive Equilibrium and replaced by 'Walrasian Marxism' – a theory which passes for Marx's but is in fact a variant of general equilibrium theory. It argues that the alleged contradictions of Marx's economics belong not to his theory but to this representation of it.

The chapter then attempts to deal with the following, central problem: if indeed Marx's approach is sequential and nondualistic, how could this have been ignored for eighty years? It attempts to answer this by means of a critique – in the classical sense of speculative philosophy – of simultaneist Marxism; that is, a systematic examination of its presuppositions; of what its concepts and constructs necessarily entail. But whereas speculative philosophy embarked on the critique of reason, modern economics represents the triumph of unreason. The chapter demonstrates that the presuppositions of simultaneous Marxism are one and the same as those of general equilibrium; in short that the conceptual structure of general equilibrium has been imposed by the simultaneous equation method, and that this unavoidable consequence of the use of this method is unavoidable.

Freeman argues that this has so distorted the concepts of price and value that as currently used they no longer correspond either to Marx's own thinking, nor to the real world. In particular, by adopting a model in which 'products are exchanged against products', this system has effectively eliminated money, reducing price to a rate of exchange of goods for goods; that by eliminating variations in price and individual profits or fluctuations in supply and demand, it has excised the mechanisms of capitalist competition; and that by obliterating the distinction between stocks and flows it has removed the basis for accumulation. This has allowed neoclassical economists such as Samuelson to dismiss Marx's contribution by polemicising against what is, in effect, a variant of their own theory; and it has so warped the conceptual framework of academic Marxist economists that they read Marx with neoclassical eyes. The recuperation of Marx's political economy is thus sealed off by the mathematics used to represent it and an alternative paradigm is necessary.

McGlone and Kliman defend Marx's account of the value-price transformation in two ways. They argue that, for Marx, the transformation was a

‘further extension of that inversion of subject and object which already occurs in the course of the production process itself’ (Marx 1981:136), the reification of the worker and the personification of things. As a dialectical process of ‘transformation into opposite’, the contradictory terms, value and price, must be kept in a single relation as Marx had done, not separated into two opposed systems of calculation, as the Bortkiewiczian ‘transformation problem’ tradition has demanded.

The authors go on to refute the long-standing charge that Marx’s nonseparation of values and prices constitutes a logical contradiction. His critics suggested have that the ‘transformation’ of input prices in a manner that ensures social reproduction and the equality of supply and demand can only be accomplished by severing values and prices into two systems. However, McGlone and Kliman demonstrate that these conditions can be satisfied by Marx’s procedure itself, when continued into the next time period. They confirm Marx’s results that total price and profit are equal to total value and surplus-value, and that the ‘price’ and ‘value’ rates of profit are the same, results which two-system formalisations had apparently refuted.

The first objective of the contribution from Ramos and Rodríguez is a reading of Marx’s text in Chapter 9 of Volume III, in the light of a nondualistic interpretation. This reading establishes that Marx’s procedure is essentially correct; and also that the texts usually cited as proof that he was conscious of his ‘error’ have a different meaning from that usually attributed to them. This includes a particularly important critique of the interpretation given by the ‘New Solution’ to one of these texts.

Their second objective is to establish the original sources of the orthodox interpretation (Bortkiewicz, Tugan Baranowsky and Komorzynsky) and conduct a Marxist critique of them, particularly Bortkiewicz. Some of these sources, for example Tugan and above all Komorzynsky, are virtually unknown today.

In this chapter the important discussion about the value of money is implicit. The chapter by Rodríguez provides an explicit treatment. In the light of the nondualistic interpretation, Rodríguez presents an exposition of two concepts which tradition has assimilated in a completely uncritical form. He questions the ‘common sense’ surrounding the notions of the ‘value of money’ and the ‘postulates of invariance’ and shows Bortkiewicz’s manner of introducing these terms and its acceptance by Marxists has distanced the whole way in which the transformation problem is posed from the framework in which Marx resolved it. This critique makes it possible to show that apparently ‘technical’ concepts which the traditional presentation has deployed until now are completely erroneous.

Naples criticizes the neoclassical methodology of neo-Ricardian models on three counts: its approach to time, and how to incorporate reproduction over time; its treatment of the money-of-account; and its presumption that equilibrium, and in particular a uniform profit rate, are possible in capitalism. The chapter argues that equilibrium analysis and simultaneous-time models are neither

classical nor Marxian. Such rationality in capitalism is inconsistent with Marx's emphasis on contradiction. The essentialist reasoning of transformation algorithms falls short of Marx's structuralist approach to history, and is therefore revised. A structural approach implies that value is expressed as a distinct quality, nominal price, which must be denominated in a conventional money of account. It is demonstrated in detail that this is consistent with Marx's theory of money. The structuralist method is then applied to incorporating reproduction over time into the transformation from values into prices. The chapter shows how Marx's labour productivity theory is necessary to make sense of the determination of the real profit rate for a non-equilibrium capitalist economy.

Saad-Filho's article is devoted to an evaluation of the 'New Approach' to the transformation problem and to Marx's economics.

The increasing popularity of the New Approach has helped shift the terms of the transformation debate into more substantive issues, as far as Marx's value theory is concerned, such as the nature of value and price, the value of labour power and the value of money. Saad-Filho evaluates the New Approach from the point of view of its potential contribution for a non-equilibrium interpretation of Marx's theory of value. Therefore, he does not examine the New Approach as a pretext for proposing another solution to the transformation problem, nor to engage in eulogy or hairsplitting controversies. On the contrary, the objective is to scrutinise the New Approach, searching for its positive contribution, and the means to develop it further.

In his first two sections Saad-Filho makes a systematic presentation of the context and content of the New Approach. This establishes a general framework for the analysis of the New Approach, until now absent from the literature. The third critically analyses general equilibrium solutions to the transformation problem (especially the neo-Ricardian), argues for their rejection, and emphasizes the positive contribution of the New Approach in this respect. Sections four to six examine three of the most important contributions of the New Approach for value theory – the operation on the net product and the definitions of value of money and value of labour power. The seventh summarizes the discussion.

Carchedi and de Haan argue that Marx's transformation procedure is the core of the Marxist price (distribution) theory. As such, it is based on four specific features. First, it deals with, and theorizes, a real succession of production and distribution periods. This requires that this procedure must be embedded in a chronological frame of analysis and that all attempts to inject into Marx's transformation procedure a static, equilibrium approach should be rejected outright. Second, it follows that the theorization of prices of production should be a part of a theory of market prices. Or, there are two transformations and not, as is usually assumed, only one. The first is a transformation of the individual values of the products into actually realized values (market prices) and the second is a transformation of these latter into hypothetical, tendential values

(production prices). In short, there are two transformations: the actual and the tendential.

Third, there are two aspects to each of these two transformations, the quantitative and the qualitative. Qualitatively, individual values are only potentially social values. They become such only at the moment of, and through, sale. From this angle, there is first a transformation of individual values (potential social values) into actually realized social values (market prices) at the moment of sale, and, at that moment, a transformation of these latter into tendentially realized social values, production prices. Quantitatively, there is an actual and tendential redistribution of values. Both the surplus value produced and the value of the inputs are actually redistributed at the moment of sale through the price mechanism. It is through this redistribution that market prices arise. At the same time, at any point at which market prices arise, it is possible to compute the tendential prices, that is, the hypothetical reproduction price of their inputs and the average rate of profit computed on that reproduction price. It is on this basis that the production price of the outputs is computed. Finally, this article organically introduces the assumption of technological change into the theory of production prices, and its effect on the social value of the inputs. This notion is as fundamental as the hypothesis of capital movement. It is this which lends its dynamic character to Marx's transformation procedure. On the basis of this theoretical framework, this chapter submits a computational method for deriving values in labour terms from values in money quantities, that is, from prices.

To conclude, the basic points made here are (a) that the neo-Ricardian critique rests on an injection of an alien method in Marx's transformation procedure (b) that the so-called transformation problem simply does not exist once a method resting on a timeless dimension is replaced by a method based on a chronological succession of production and distribution periods, and (c) that this latter (Marx's) method, as opposed to other (neoclassical or neo-Ricardian) methods, can and does theorize a real process. It is because of this that Marx's price theory is superior to alternative theories.

Carchedi's chapter further amplifies the point that neoclassical price theory is inherently flawed and ideologically laden through a specific discussion of market prices. Their formation in Marxist theory should not be explained by grafting neoclassical price theory upon them. An alternative theory of market prices is needed.

After a short introduction a methodological and immanent critique of neoclassical partial equilibrium price theory is provided in sections 2 and 3. It is argued that the theory (a) contrary to what it claims, cannot theorize the determination of demand and supply by a multiplicity of factors and (b) that it is circular. Section 4 analyses the social content of neoclassical price theory. It is argued that supply and demand curves (a) imply an ideological notion of production (b) imply an ideological notion of exchange (c) elevate the capitalist price system to the role of the most rational and equitable distribution system and

(d) imply an equilibrium mechanism. The conclusion reached by sections 2, 3 and 4 is that an alternative price theory is needed. This is the task of section 5 which submits a dialectical theory of market prices, that is, a theory in which (a) the *ceteris paribus* condition is replaced by the notion of the simultaneous determination of prices by the structures of demand and of supply and overdetermination of the latter by the former and (b) the notion of equilibrium is replaced by the notion of tendency. Finally, section 6 compares the neoclassical and the Marxist approach as developed in the chapter.

Giussani's chapter further analyses the neglected question of supply and demand in Marx's theory of value, through a critique of the neoclassical concept of price formation. It poses the question: how and in what sense are values and prices the 'average over time' of fluctuations brought about by movements in supply and demand? Neoclassical theory, as presented in the standard textbooks, treats supply and demand schedules as given prior to and independent of price levels. This allows the theory to claim that it possesses a model of price determination. But demand in any period is itself a function of the incomes of different classes in the previous period. Moreover the neoclassical supply curve is even more problematic, being deduced from the assumption that aggregate social demand is simply a generalization of the supply curve of a 'representative individual'. This leads, for example, to the arbitrary assumption of decreasing returns to scale based on the technical conditions of a single supplier.

In reality there are numerous different suppliers operating under different technical conditions. Marx's theory of rent was specifically adapted to this. Demand determines not only the production levels of each individual producer but the surplus profit which each individual producer secures. A dynamic analysis shows how, in successive periods, this mechanism can bring about fluctuating market prices whose average corresponds to the predictions of classical Marxian value theory.

Kliman vindicates Marx's law of the falling tendency of the rate of profit by refuting the Okishio theorem. By rooting the falling rate of profit in capital's drive to subdue human power with machine power (mechanization), Kliman argues, Marx calls into question the viability of the capitalist mode of production, its labour process. Yet Okishio purportedly demonstrated that the rate of profit cannot fall due to mechanization itself, and the near-universal acceptance of his theorem has helped turn radical theorists' attention away from capitalistic production. Emphasising that even most prior critiques of the theorem attribute falling profitability to something other than mechanization itself, Kliman contends that they fail either to criticize capitalistic production or to defend Marx's own theory against Okishio.

As Kliman demonstrates, however, the theorem depends crucially on a physicalist concept of value and/or the assumption of static equilibrium. Once the dominant formalisations of value are rejected and value is reconceived as a quantum of dead labour existing in historical time, the profit rate may indeed fall

due to the adoption of mechanized techniques, and profit-maximising firms may well adopt such techniques. These conclusions hold even if real wages do not rise. Indeed, if the extraction of living labour fails to increase as the economy grows and capital accumulates, then the rate of profit must approach zero over time, irrespective of any and all increases in productivity and the rate of surplus value.

Freeman's final chapter constructs an alternative, non-equilibrium paradigm for the discussion of Marxist value theory in which the 'simplifying assumptions' of the simultaneous equation approach are removed. These assumptions, which are in fact disguised postulates, are the means by which the apologetic concepts of general equilibrium have been imposed on Marx's value theory, namely – at least – an actually equal rate of profit, invariant and uniform technology, no fixed capital, fixed turnover period, homogenous labour, an equal rate of exploitation, a barter economy, and a constant value of money.

It shows that a truly general approach must first incorporate the 'successivist' method of Marx, according to which reproduction consists of a succession of alternating periods of production and consumption. The appropriate mathematical techniques for this are the use of difference equations. This is nevertheless insufficient unless relations between stocks and flows of capital are properly represented, which is in general impossible in an equilibrium framework. Since the length of the 'period' in which the economy reproduces itself is itself arbitrary, the representation of stocks and its relation to price and value must be valid for any arbitrarily small period, which means that a consistent treatment of stocks and flows should not depend on the length of this period. This permits a passage from a discrete time formulation to a continuous time formulation. In this way a further simplification is eliminated, namely that the production periods of different capitals do not coincide. Instead of requiring all capitals to purchase their inputs at the same time at the beginning of a year, and sell their outputs at the end, the activities of production and circulation 'intertwine', as Marx puts it. This is the formally correct, dynamic presentation of Marshall's and Bortkiewicz's requirement that the 'mutual determination' of economic magnitudes be represented mathematically, but without the constraint of simultaneity; the proof of its superiority is that it produces a better account of observed reality and that simultaneity is a special degenerate case of it.

A truly general approach must also take as its starting point the transformation from values to market prices, of which prices of production are the result and not the cause. Consequently sectoral profit rates are in general not equal, which permits the laws of motion of a capitalist economy to be framed in terms of the effect of profit differentials on investment behaviour. A formalism based on market prices also integrates money directly instead of *post hoc* as in the Bortkiewicz formalism.

In this alternative formalism, of which all previous formalisms are a special case, the resultant values and prices systematically differ from the predictions of

equilibrium theory. Marx's theory, properly formulated, thus yields quantitatively different results in a non-equilibrium framework.

1 The psychopathology of Walrasian Marxism

Alan Freeman

Some Marxist economists will, of course, be reluctant to concede the irrelevance of the ‘labour theory of value’ but it is now generally recognised that the demonstration of that irrelevance is logically impeccable.

Ian Steedman (1981:11)

As productivity increases, the amount of producers’ goods handled per man-hour of labour increases; therefore, she [Luxemburg] says, the proportion of c to v must increase. This is an error.

Joan Robinson (1951:22)

This of course is what is known in the Marxist literature as the transformation problem. As is by now well known, the way proposed by Marx himself is faulty.

Paul Sweezy, in Steedman (1981:25)

1.1 INTRODUCTION

There are persons naïve enough to read Marx as a source of knowledge. To such a reader – perhaps idealistic, discontent with oppression or injustice, wanting to change the world and desiring for this reason to understand how it works – Marx says, in summary: there are people who own property for its own sake, and people who do not. The latter create wealth, without which the former would not exist. The wealthy maintain this injustice with oppression, deceit, corruption and force. They fight over the spoils, visiting on the world its ills and suffering. And the object of their desire periodically escapes control, wreaking havoc on guilty and innocent with tragic or comic indifference. However, the process gives those who create wealth, if they consciously organise to do so, the opportunity to overturn this order and found a better one.

The otherwise lifeless equations which summarize Marx’s analysis of a capitalist economy encompass all these statements, except perhaps the last. This illustrates McLellan’s (1980:77) statement that ‘The reading of Marx as an economist among economists is bound to falsify to some extent his thought. For Marx, as he himself proclaimed as early as 1844, economics and ethics were inextricably linked’. Marx’s economics offers an integrated social, political, and ethical understanding.

‘Economic’ categories, appearing as inhuman things with a mind of their own – prices, money, interest rates – are for Marx the disguised form of relations between people. He explains not just why they rise or fall but their social meaning: who gains, who loses and who rules. It is the key to how people act and

are acted on; why workers are pitted against employers, poor against rich countries, and why there is inequality, oppression, war, pollution, in short the most vital issues of life on this planet.

This is the source of his enormous impact on the world. As a consequence, his economic analysis plays a special role in his system of thought. If it is proved flawed, a service is performed for all whose interest lies in appealing to the impersonal market as the arbiter of personal disputes – in rationalizing the world as it appears, rather than is.

The history of economics as well as its theory shows that where a service is required, a supplier emerges. Modern professional academics present Marx's naïve account as appealing but false. In this, the economists play a special role. Even when Marx's political and social views are grudgingly recognized his economic theory is said to be logically flawed. Clearly, since his work rests on his political economy, this amounts to the charge that however perceptive his insights, his theory as a whole is simply wrong.

It is a commonplace among dissident and radical economists that neoclassical economics – and economists – have an interest in discrediting Marx. But the bulk of Marxists themselves also accept the charges, and many have taken the lead in drawing them up. Since a naïve observer would not expect Marxists to have an interest in discrediting Marx, this lends tremendous weight to the view that there are genuine and insurmountable flaws in Marx's economic reasoning.

This chapter serves two functions. First, it proves theoretically and from Marx's own writings that he is not guilty as charged. Being human, he was fallible, but he was *not* wrong on the relation of values to prices, on the origin of profit, or on its tendency to fall. Therefore the naïve reader, whose reading of Marx was summarized above, has a better grasp of economics than the expert. There is a sensible, logical account of a market economy which conforms precisely to what Marx says and explains the observed movement of the economy better than any other existing theory.

Others have presented this account, at least in part,¹ and this aspect of the chapter is not entirely new. Its second function, however, is to explain why the case for the defence has gone unheard. We deal with a question implicit in Steedman's (1977:49n) comment:

The present type of argument has been examined in various forms, by many different writers over the last 80 years. The same conclusions have always been reached and no logical flaw has ever been found in such arguments.

If there is a logical flaw in the arguments against Marx, why has no-one, even the Marxists, recognized it for eighty years?

We intend to prove that the charge of error has been posted to the wrong address. It is directed against a theory which is not Marx's. The guilty party is what we call *Walrasian Marxism*, after Léon Walras (1834-1910), founder of General Equilibrium theory. This, we maintain, is equilibrium in a Marxist guise, an apologetic adaptation of Marx to neoclassical theory. As a result, Marx's

scientific political economy has lain buried while economics as a whole, including most of its ‘Marxist’ component, has been less and less able to account for the main developments in the world economy.

Scientific political economy – the characterization Marx gave to his own work – must account not just for its own theory but the theory of others. Walrasian Marxism is a self-contained, rational and coherent system with clear conclusions. Why have three generations of writers taken these conclusions to be Marx’s? I argue that the use of simultaneous equations, a formalism which properly belongs to General Equilibrium theory, has distorted not just the calculation of price and value but the concepts themselves. It has reversed the progression from concepts to systems which is normal in scientific thinking and instrumentalized a retrogression from systems to concepts.

This retrogression is the reason for the theme of this chapter. If we could expect the discipline of economics to respond to evident truth, then theory could just state what is and pass on. The history of this debate shows that the discipline of economics has evolved effective and sophisticated mechanisms to defend itself against truth. Marx adopted two procedures. First, he recognized the limitations of pure theory. If he and Engels had not played their part in the First and Second Internationals, their written works would probably be reduced to a footnote in the history of economic thought. Second, however, theoretical study can ‘shorten the birth pangs’ of practical solutions through the *critique* of existing theory, since in the absence of a theoretical alternative, practical activity uses whatever it can lay its hands on. Our aim is to disentangle the unstated axioms of equilibrium theory, in the pure form of the simultaneous method, from their explicit conclusions.

The target of a modern critique is different from Marx’s day when young, classical theory still expressed an early rationalist respect for truth, however far it remained from it. It was not unreasonable to treat it, as Marx did, as a body of knowledge marching forward with occasional backward glances. The opposite is now true. The occasional enforced recognition of reality by a Keynes or Kalecki is quickly smothered and incorporated into what has become one of the most cynical of all occupations.

The critique of pure reason must give way to the critique of pure unreason. By this we do not mean criticism, as the word has come to mean, but a systematic logical exploration of the *presuppositions* of its foundations. We want to understand what concepts the simultaneous formalism *necessarily demands* – of the way the equilibrium thinker is obliged to conceive the world in order to apply his or her system to it.

We think it can be shown that the simultaneous equation formalism introduced by Bortkiewicz, and adopted by all subsequent writers, necessarily suppresses the variation of prices and the divergence of supply from demand and imposes market clearing at constant prices as an a priori postulate. It enshrines in mathematically pure form the dogmatic and false proposition of Jean-Baptiste Say that supply creates its own demand. Competition, the movement of surplus

value in search of higher profits, is necessarily absent from simultaneous equation systems. The normal scientific concept of causation, as a relation between events succeeding each other in time, is replaced with a timeless concept of determination by a mathematical postulate.

The formalism necessarily replaces price as it really exists – the rate at which goods exchange for money, a distinct commodity – with exchange-ratios determined prior to and independent of money, thereby making it impossible to theorise money. Value as a social relation, the form in which human labour manifests itself in exchange, is replaced by a fetishised concept of value as an property of things determined by the technology which produces them. Finally we propose to show that the resulting concepts can neither express or explain capital as self-expanding value, nor above all accumulation, the subordination of all human endeavour to the production of relative surplus value.

On the basis of these non-Marxist concepts of value, price and determination, Marx's simple, transparent interpretation has been rejected by three generations of Marxists, because they have deprived themselves of the means to make sense of it.

1.2 THE EQUATIONS OF THE LABOUR PROCESS

We begin with the equations of the naïve view of Marxism. The sophisticated reader is advised to suspend reflex scorn and disbelief. The pain may be eased by noting that the equations and supporting explanation are taken directly from Marx, and that the derivation is omitted. A naïve reading is literal but not simple-minded. Four equations describe the production of commodities for the market – the labour process.

$$M = C + V \quad (1)$$

$$C' = C + L \quad (2)$$

$$S = L - V \quad (3)$$

therefore

$$C' = C + V + S \quad (4)$$

In English: a capitalist starts with money, the extrinsic measure and pure form of value. This is divided into constant capital C and variable capital V . Hence equation (1). C buys goods which are turned into other goods by the commodity labour power, which is owned by workers, irreducibly bound to their persons and costs V . In production labour power creates new value L which it adds to the original value C so that the new product is worth C' . Hence (2). The longer, harder and better the work, the bigger is L .²

The labour process creates gross wealth C' which is bigger than the money $C + V$ spent to produce it, unless the capitalists make a serious miscalculation, in which case they soon cease to be capitalists. The difference S , called surplus value and given by (3), is therefore normally positive. C' is thus given by (4).

What workers may do within the laws of the land and economics is circumscribed by these equations. They may increase V . S falls but nothing else changes. They may decrease L , whereon C' and S both fall. In either case the capitalists still own the whole final product C' , but command less of its fruits, S .

The capitalists are equally circumscribed. They can increase L by making workers perform longer, harder, or better, within the limits of biology and the laws of space and time. They can decrease V . Decreasing C achieves nothing for the class as a whole, though individuals may transfer value from other capitalists by reducing their costs without cutting their prices, as discussed in part 2 below. This all remains true whatever the actual riches, that is material wealth or use values, that these values represent.

1.3 THE EQUATIONS OF CIRCULATION

In circulation, goods are bought and sold for amounts of money as follows:

$$M' = M + m \quad (5)$$

$$M' = C + V + m \quad (6)$$

Each capitalist sells output (worth C') for a sum of money M' , the market price of the product at the time of the exchange. The difference is a sum of money m , the profit. Now M' may differ from C' : a person can sell something worth £60 for £70, making £10 on the deal. But £10 is lost elsewhere, so that gains and losses equal out in any closed set of exchanges. Total value is thus unaltered by exchange:

$$\Sigma M' = \Sigma C' \quad (7)$$

Thus for all of society the total of M' equals the total of C' , although individual capitalists may receive less or more than their individual C' . It follows from (6) and (4) that if something is sold at its value ($M' = C'$) then $m = S$, that is profit equals surplus value. But whether or not $M' = C'$ or $m = S$ for any individual capital, subtracting (6) from (4) and summing over all capitals gives:

$$\Sigma S = \Sigma m \quad (8)$$

That is, the total profit realized in any period is equal to the total surplus value created. Hence exchange cannot transfer any value from workers to capitalists or vice versa; moreover any set of prices transfers value from one capitalist to another. If M' is higher than C' for one seller, then the difference must be made up by sales below value somewhere else. Competition between capitalists is thus a struggle between brother enemies for a share of ΣS , expressed in a fight to increase income and reduce spending by whatever means succeed. Its most extreme known forms are war and fascism.

What we have just said assumes that during the given period the same sum of money represents the same quantity of value. On this basis equation (7) is true by definition and equation (8) a deduction from it. It follows that a discrepancy between the sum of values and the sum of prices can arise only if exchange

modifies the amount of value expressed in a given sum of money. In this case, the equality of total values and prices in exchange is more complex but still valid. In particular, money must itself be included in the sum.³

1.4 THE EQUATIONS OF ACCUMULATION

In any period the capitalists can dispose of S , surplus value, in two ways. They can consume value or add to the capital stock from which C comes. These two sources of demand add up to the sum of S – or the sum of m , profits, which is the same. Adding to the capital stock – investing – normally lets capitalists produce more goods. If it also raises productivity, these goods can be produced for less money. The greatest mystery of the market, unexplained by neoclassical economics, is how this technical progress engenders social regress: how more goods for less money beget less profits and more poverty; how liberation from nature results in enslavement to machines; how private fortune fathers social catastrophe and how the invasion of the market throws whole peoples into chaos, war and starvation. This process, accumulation, governs the life of every human on the globe. It is the highest source of irrationality yet known, the birthplace and graveyard of the ideal of progress.

Accumulation changes the composition of capitalist stock. This is because its driving force is the production of relative surplus value – raising the productivity of labour by converting surplus value into capital. No individual capitalist can bypass this result of competition. Innovation and accumulation are therefore inseparable.⁴ Producers who invest become more efficient than others. For the same or a smaller investment in money employing the same or a smaller amount of labour, they can produce more of the same output. Its value per unit is therefore lower. If they sold the product for this new value – its individual value – then they would undercut their competitors. But the price system brings about a single price and a single value for each product, which forms as an average over all producers of this product. The more efficient get a higher than average or surplus profit. This averaging is neither transient nor ideal but persistent and real, because a single technology is never achieved. The pursuit of surplus profit is the real motor of economic development.

Even though the composition of the stock changes, its value rises as long as the capitalists invest. Let K be its price. Suppose the capitalists advance $K = £1000$ and withdraw $C = £100$, $V = £100$ for production. If L is £200 they end up with:

- capital stock K , reduced by the withdrawal of C and V to £800;
- new product $C' = £300 = C + L$.

Their total capital is therefore now $£800 + £300 = £1100$. Of this, £100 is the surplus of the past period. Their stock will therefore grow if they consume less than £100 in for their private purposes, no matter what this stock is composed of.

The less they consume, the more it grows. Let B represent the money spent by the capitalists on consumption, and I on investment. Thus

$$S = B + I \quad (9)$$

In general if the capitalists convert surplus value into capital, I will be positive. K increases in any period by I . To describe this we have to add a time suffix to the equations of the labour process, thus:

$$C'^{t+1} = C^t + V^t + S^t \quad (10)$$

then

$$K^{t+1} = K^t - (C^t + V^t) + I^t \quad (11)$$

hence

$$K^{t+1} = K^t + S^t - B^t \quad (12)$$

Equation (12) expresses a fundamental law of accumulation. Capital stock K grows by the difference between surplus value and capitalist consumption. It thus rises except and unless capitalists consume more than their profits; that is, capital stock can be reduced only by transferring value from it to consumption.

1.5 THE PROFIT RATE

The average or general profit rate r is the ratio between total profit Σm ($=\Sigma S$) and the capital stock K .

$$r = \frac{\Sigma S}{K} \quad (13)$$

As long as capitalists do not disinvest – consume the value of stock – this falls unless ΣS rises, but ΣS cannot exceed the value added in any period, namely L . This is limited by the laws of biology and time. Therefore, assuming a constant value of money, the fall in the profit rate can be offset by greater human endeavour but can be halted only by devouring capital stock or destroying it – in practice the same thing.

1.6 COMPETITION

In competition individual capitals seek the highest rate of profit. The more developed the credit system and the less obstacles there are to capital transfers, the more rapid and pronounced this process. This systematically modifies prices so that C' differs from M' (for individual capitals) even when averaged over time to eliminate chance fluctuations.

This quantitative difference has a double origin. The first is the production of relative surplus value, described above, which applies within a given branch of production. But a second effect of competition exists only as a tendency, towards an ideal or hypothetical average profit which capitalists take into account in determining, for example, the rate of interest. An ideal price for any good arises:

the price of production, which the good would sell at if the sector producing it received the average profit. This average profit is the general rate r in equation (13); applied to any portion of the total capital stock it yields a sum of money which, added to costs, gives a hypothetical price

$$P = C + V + Kr \quad (14)$$

where P is the (total) price of production of sales, r the profit rate given by equation (13), and where C , V and K now refer to a sector, not the whole of society. Equations (7) and (8), Marx's 'two equalities', remain valid as they do for any market prices.

Profit as given by equation (14) becomes the general public perception of a 'normal' rate of return. Competition appears to consciousness as a struggle for a rate of return which is higher than this normal rate. But as much as some capitalists achieve a higher return, others are driven below it. These differences in profit rates are the visible form of the competitive struggle.

1.7 THE EXPERT REFUTATION

The refutation of the naïve view, monotonously repeated for ninety-eight years, rests on two assertions:

Assertion 1 Marx failed to 'transform inputs'. In the equation

$$C' = C + V + S \quad (4)$$

the quantities C and V cannot be the same as in

$$C' = C + V + m \quad (6)$$

because inputs must be purchased at the prices for which outputs sell. Marx knew this but either glossed over it, or failed to deal with it. This assertion was first made in 1897 by J. V. Komorzynsky, a supporter of Böhm-Bawerk. Tugan Baranowsky, a Russian legal Marxist, went further, 'correcting' Marx's 'errors'. His modification was popularized by Ladislav von Bortkiewicz, and brought to the English-speaking world's attention by Paul Sweezy. It consists of an alternative price calculation based on three premises:

- ☐ All commodities are purchased at the price for which they sell
- ☐ The rate of profit is everywhere equal
- ☐ The value of money is determined simultaneously with prices.

The modification includes a new definition of both value and price. Nevertheless it is accepted as the standard interpretation of Marx's value theory and is the basis for the critique of this theory codified in Ian Steedman's *Marx after Sraffa*. It supports three conclusions regarded as damning for Marx's economics:

- ❑ The two ‘equalities’ (7) and (8) cannot both be true.
- ❑ Values and prices are given by two different sets of equations with no obvious relation between them
- ❑ Marx’s profit rate differs from the ‘real’ one. His denominator, K , is the value of the commodities in K ; but the denominator of the real profit rate is their price.

The first conclusion is held to show that Marx’s approach is logically inconsistent. The second is held to show his profit rate is not the real one. The third is held to show values are logically redundant since they do not enter the ‘determination’ of prices, where the word ‘determination’ is implicitly the same as ‘calculation’.

Assertion 2 The falling rate of profit calculation does not account for the cheapening of capital stock. The value (and price) of the commodities making up this stock can fall because of technical advance and so permanently offset any rise in their quantity.⁵ Coupled with conclusions 1 and 2 above, this is held to reinforce the conclusion that Marx’s value theory provides no effective guide to what happens in the real world.

1.8 MARX’S TRANSFORMATION OF INPUTS

Marx’s transformation procedure is given on page 167 of *Theories of Surplus Value*, Volume III:

The conversion of value into cost-price⁶ works in two ways. First, the profit which is added to the capital advanced may be either above or below the *surplus-value* contained in the commodity itself, that is, it may represent more or less *unpaid* labour than the commodity itself contains. This applies to the variable part of the capital and its reproduction in the commodity. But apart from this, the cost price of constant capital – or of the commodities which enter into the value of the newly-produced commodity as raw materials and machinery [or] labour conditions – may likewise be either above or below its value. Thus the commodity comprises a portion of the price which differs from value, and this portion is independent of the quantity of labour newly added, or the labour whereby these conditions of production with given cost-prices are transformed into a new product. It is clear that what applies to the difference between the cost-price and the value of the *commodity* as such – as a result of the production process – likewise applies to the *commodity* insofar as, in the form of constant capital, it becomes an ingredient, a precondition, of the production process ... On the other hand, the difference between cost-price and value, insofar as it enters the price of the new commodity independently of its own production process, is incorporated into the value of the new commodity as an antecedent element (emphasis and insertions in original).⁷

This is totally clear. It states that if an input to production is priced above or below its value, it transfers correspondingly more or less value to the output from production. Equally, if wage goods are priced above or below their value, the *value* of variable capital is correspondingly higher or lower. Thus

- ❑ the value transferred to C' by the constant capital C is equal to its price, that is, the value of the money paid for it.
- ❑ the value of variable capital V , consistently with the last statement, is equal to its price, that is the value of the money paid for the wage.

This is identical to the controversial passage in Volume III of *Capital* on pp308-309, often cited as evidence that Marx was aware of the issue but proposed no answer.

We have already seen that the divergence of price of production from value arises for the following reasons: (1) because the average profit is added to the cost price of a commodity, rather than the surplus-value contained in it; (2) because the price of production of a commodity that diverges in this way from its value enters as an element into the cost-price of other commodities, which means that a divergence from the value of the means of production consumed may already be contained in the cost price, quite apart from the divergence that may arise for the commodity itself from the difference between average profit and surplus value ... Let us assume that the average composition is $80c + 20v$. It is possible now that, for the actual individual capitals that are composed in this way, the $80c$ may be greater or less than the value of c , the constant capital, since this c is composed of commodities whose prices of production are different from their values. The $20v$ can similarly diverge from this value, if the spending on wages on consumption involves commodities whose prices of production are different from their values. The workers must work for a greater or lesser amount of time in order to buy back these commodities (to replace them) and must therefore perform more or less necessary labour than would be needed if the prices of production of their necessary means of subsistence did coincide with their values.

Of course, any economic theorist may argue that this procedure is incorrect, and that both constant and variable capital transmit their value, and not their price, to the outputs. Such theories are open to the criticisms levelled at Marx during ninety years' discussion of the transformation problem. However, they are not Marx's.

Market prices and the transformation of inputs

This procedure is not confined to the purchase of goods at their price of production. It applies whenever inputs or wage goods are purchased at a price differing from their value; in short for exchange at arbitrary market prices. It follows from Marx's analysis of exchange and is to be found not in Volume III but in *Capital* I, Volume I, Chapter 1, the foundation of the entire opus, as Suzanne de Brunhoff (1976:27) has pointed out. It is an explicit consequence of the existence of money. Marx did not have to transform inputs in Volume III because the transformation is already given in Volume I.

The magnitude of the value of a commodity therefore expresses a necessary relation to social labour-time which is inherent in the process by which its value is created. With the *transformation* of the magnitude of value into the price this necessary relation appears as the exchange-ratio between a single commodity and the money commodity which exists outside it ... The possibility, therefore, of a quantitative incongruity between price and

magnitude of value, i.e. the possibility that the price may diverge from the magnitude of value, is inherent in the price-form itself. (Marx 1976a:196, our emphasis)

The assumption that goods sell at prices equal to their values in Volume I has been to a certain degree mythologized. Actually it is far more important in Volume II, which abstracts (unlike Volume III) not only from deviations of price from value, but also from changes in value. In Volume I the deviation of price from value is always present in the background and the great majority of its formulations remain true if the assumption is dropped. In particular the *derivation* of the category of value and the category of price does not depend on this assumption. Therefore, if it is dropped, the transformation of inputs is simply unpacked, as it were, from the theory of Part I. One need *only* assume that the value advanced by capitalists is represented by the money they pay instead of the value of what they buy, and the theory becomes completely coherent.

Where the assumption does matter is in Marx's dispute with those economists of his day who sought the origin of profit in exchange, in 'profit on alienation'. His argument is that exchange can only redistribute existing value between the parties to circulation:

The consistent upholders of the mistaken theory that surplus-value has its origin in a nominal rise of prices or in the privilege which the seller has of selling too dear assume therefore that there exists a class of buyers who do not sell...Let us therefore keep within the limits of the exchange of commodities, where sellers are buyers, and buyers are sellers ... A may be clever enough to get the advantage of B and C without their being able to take their revenge. A sells wine worth £40 to B, and obtains from him in exchange corn to the value of £50.⁸ A has converted his £40 into £40, has made more money out of less, and has transformed his commodities into capital. Let us examine this a little more closely. Before the exchange we had £40 of wine in the hands of A, and £50 worth of corn in those of B, a total value of £90. After the exchange we still have the same total value of £90. The value in circulation has not increased by one iota; all that has changed is its distribution between A and B ... However much we twist and turn, the final conclusion remains the same. If equivalents are exchanged, we still have no surplus-value. Circulation, or the exchange of equivalents, creates no value ... We have shown that surplus-value cannot arise from circulation, and therefore that, for it to be formed, something must take place in the background which is not visible in the circulation itself. (Marx 1976a:267-8)

In this passage we find the germ of Marx's entire concept of the transformation, as we shall show in the final chapter of this book. The equality of the sum of prices and the sum of values is a *consequence of the conception that value cannot be created in exchange* and not an ad hoc normalization condition. It is an effect of circulation, which cannot create value. Production, in which value originates, must first be isolated from circulation, which redistributes it. Therefore in Volume I

the formation of capital must be possible even though the price and the value of a commodity be the same, for it cannot be explained by referring to any divergence between price and value. If prices actually differ from values, we must first reduce the former to the latter, i.e. disregard this situation as an accidental one in order to observe the formation of capital on the basis of the exchange of commodities in its purity, and to prevent our

observations from being interfered with by disturbing incidental circumstances which are irrelevant to the actual course of the process. (Marx 1976a: 269n)

Disregarding something is not the same as denying its existence. The question with which Marx confronts his adversaries is this: you say that surplus value originates in circulation. Very well, let us eliminate all the effects of circulation and see what happens. If you are right, then there should be no profit and no surplus. But even under such a hypothesis, there is a profit and there is surplus value.

Hence Volume I does not present a hypothetical society in which goods cannot exchange at prices from values: it *separates* the effects of circulation from those of production. The other side of this coin is that circulation, and the deviation of price from value, is not forgotten but set aside. Its effects are explained in order that we may know exactly what it is that has to be disregarded. The effect of the price-value transformation is presented in Part I of Volume I as a process in which goods may exchange at any arbitrary market price and not at all at the hypothetical price of production. It is only when dealing with the immediate production process that Marx imposes the restriction that goods must sell for a price equal to their value. It should not be forgotten that in Volume I Marx assumes that the capitalists ‘find what they need in the market place’ so that the fact they sell their outputs at their value by no means imposes that they purchase their inputs at their value.

Once it is grasped that the transformation of inputs is valid for market prices in general, the procedure is seen to be supported by many other remarks in Marx’s work which refer to prices other than the price of production. Thus for example:

If the price of cotton should fall, e.g. as in the result of an especially good harvest, then in most cases the price falls below its value, again through the law of demand and supply. The rate of profit – and, possibly, as we saw above, the total amount of profit – increases, consequently, not only in the proportion in which it would have increased had the cotton which has become cheaper been sold at its value; but it increases because the finished article has not become cheaper in the total proportion in which the cotton-producer sold his raw cotton below its value, that is, because the manufacturer has pocketed part of the surplus-value due to the cotton-grower. (Marx 1972:223)

A monopoly price for certain commodities simply transfers a portion of the profit made by the other commodity-producers to the commodities with the monopoly price ... If the commodity with the monopoly price enters into the necessary consumption of the labourer, it increases wages and thereby reduces surplus-value. (Marx 1981:1001)

and indeed any product of the land, which attracts rent, must sell at a price which, in general, permanently differs from its price of production; this, for Marx, modifies the value transferred by such products to the consumers of this product.

The ‘controversial’ text in *Capital* Volume III (p261) also expresses this idea:

As for the variable capital, the average daily wage is certainly always equal to the value product of the number of hours that the worker must work in order to produce his necessary means of subsistence; but this number of hours is itself distorted by the fact that the production prices of the necessary means of subsistence diverge from their values.

This analysis is the same whether the results are presented in terms of abstract labour or in pounds. The difference is this: if presented in hours then it is unaffected by changes in the value of money, whereas if presented in pounds then a further correction is needed or it appears that value has been created in exchange when only its monetary measure has altered. We deal with this in the final chapter. It is why the monetary measure of value, if isolated from its origin in labour, is incomplete and illusory. But it is an enormous confusion to conclude, as many have done, that when values are transformed into prices there is a change of units; that value consists of hours and price consists of money.

Throughout Marx's work, as Ramos and Rodríguez point out in this volume, values are given in money terms. This represents neither a confusion of units nor a careless introduction of Volume III categories into his Volume I analysis. These are absurd errors to impute to a writer of Marx's intellectual rigour. For Marx, money is a measure of value, its form of appearance:

The labour contained in the means of production is a *specific quantity of general social labour* and it may be represented, therefore, as a certain *amount of value* or *sum of money*, the *price* in fact of these means of production. (Marx 1976a:994-5, original emphasis)

A definite quantity of money represents at any given time a definite number of labour hours. The sale of goods for money represents nothing more or less than a redistribution of these labour hours between sellers and buyers, the difference between the money paid for the goods and the money-expression of their value. If I pay £11 for goods whose value is £10, then £1 of value is redistributed from me to the producer. Before the exchange s/he had £10 in value and I had £11; afterwards I have £10 and s/he has £11. If £1 represents 1 hour, then 1 hour of socially necessary abstract labour has passed from me to the producer as a result of the operation of the market. The two statements are different aspects of the same thing.

Finally, the transformation of inputs does not contradict a word of section 1 of this chapter. The passage from sale at values to sale at prices calls for the relaxation of one assumption made in *Capital* Volume I: that C and V are numerically equal to the value of the goods they purchase. It is replaced by the assumption, clearly stated in Volume I but then set aside for the discussion of production, that C and V are numerically equal to the *value of the money used to purchase these goods*. The much-maligned two equalities are then self-evidently true. They apply to any set of market prices whether or not profits are equalised, and certainly hold for the special hypothetical case where market prices equal production prices, on which twentieth century economists have lavished so much care and attention.

The circuit of capital and the price-value distinction

The modern reader's reaction to the above can be expressed, approximately, as follows; if the value contributed to inputs is equal to their price, what has become

of the transformation of values into prices? Are not all relations of production now expressed in price terms and is value not now a redundant concept?

As we shall later try to show, this view is conditioned by the now deeply-ingrained idea that the prices of inputs and outputs are determined simultaneously, an idea alien to Marx and indeed all economists until Walras. This outlook is one of the main reasons that the formally correct presentation of Wolff, Roberts and Callari (1982, 1984a) has not had much wider acceptance. Once it is acknowledged that prices and values in any period are determined from prices and values in the *preceding* period the issue becomes completely different. As posed by Marx it is as follows: at the beginning of a period of production, capitalists advance capital represented by the sums of money they spend, added of course to the money already spent on fixed capital, of which more shortly. Labour power transmits this value to the product and adds its own contribution, the value product. The product emerges with a new value, different from that of the previous period. Averaged over the whole output of the commodity, this new value is the socially-necessary labour-time that was required to produce it under the historically-given conditions. This new value, not some eternal equilibrium value, is redistributed in circulation to form the market price of the output.

Prices and values at all times remain distinct both conceptually and quantitatively. Their relation indeed obeys Marx's famous two equalities in each period, and is uniquely determined by the prices and values of the previous period.

1.9 MARX'S RATE OF PROFIT

A logical corollary of the procedure we have just discussed is to measure K , the capital stock, by the money paid for it. This is of course what the capitalists do. If I pay £2000 for a computer my advanced capital is £2000, regardless of the computer's original or subsequent value. It is the value of the money, not the machine, that determines my profit rate. Why should Marx contemplate anything else? His object of study was the self-expansion of *money* capital. His method is profound, but not perverse. This sheds a different light on his errors with the falling rate of profit. First and not least (always assuming the value of money constant) his rate of profit is equal to the observed one. He is discussing actuality, not some fantastical reflection of it.

But further. Consider the endlessly repeated charge: capital stock can fall in value if its elements get cheaper, restoring the profit rate. Excuse me: suppose the computer which cost me £2000 is now worth £500. How does this make my invested capital equal to £500? I paid £2000. That is what my bank manager wants. That is how my rentiers calculate their returns. It is very unfortunate my computer has depreciated because it forces me to find the lost £1500 from somewhere, but find it I must, or go bankrupt. As for my rate of return, it is a proportion of my advanced capital, that is what I paid in the past, not what my investment is now worth.

But this gives the naïve explanation of Part 4 its full force. It is only possible to offset the falling rate of profit permanently by disinvesting; by *using up* the value invested in production, or, which is a less socially-useful form of the same thing, depreciating it suddenly through bankruptcy, wiping it out. As Marx stressed, this is the objective indispensable function of slumps and crisis in a market economy

1.10 MARX'S CONCEPT OF DETERMINATION

The reader who takes Marx at his word will not find the contradictions which four generations have earnestly debated in 400 learned papers. The real question is, therefore, why does the tribe of experts ignore Marx's own solution? How has the understanding of value, even of sincere Marxist academics, got so far from Marx's that they cannot even read what he says? We now address the sophisticated reader, whose unease has probably reached breaking point. The main objections we expect are:

- ❑ The fundamental distinction between value and price no longer exists. Value originates in production and price in circulation. You have reduced value to price, confusing two different concepts.
- ❑ You hopelessly confuse use values with exchange values, money and hours, in a dimensionless mishmash. How can a sum of money be added to a value?
- ❑ As a result there is no longer any account of determination. If value is no longer determined independent of price, then you cannot say what determines price.

We submit that these objections are the fruit of a flawed vision shaped by General Equilibrium, which screens the mind from the concepts required to understand what a market economy really is. This is expressed in an understanding of value, absorbed uncritically from Bortkiewicz, which has so shaped the conceptual universe of the economists that even the Marxists can no longer understand Marx.

Our point of departure is a highly significant remark of Bortkiewicz's:

Alfred Marshall said once of Ricardo: 'He does not state clearly, and in some cases he perhaps did not fully and clearly perceive how, in the problem of normal value, the various elements govern one another *mutually*, not *successively*, in a long chain of causation'. This description applies even more to Marx ... [who] held firmly to the view that the elements concerned must be regarded as a kind of causal chain, in which each link is determined, in its composition and its magnitude, only by the preceding links ... Modern economics is beginning to free itself gradually from the successivist prejudice, the chief merit being due to the mathematical school led by Léon Walras.⁹

This is an honest statement of Bortkiewicz's intentions, and of Marx's own approach. Immediately after the passage on transformation already cited from *Theories of Surplus Value* Marx writes:

Every commodity which enters into another commodity as constant capital, itself emerges as the result, the product, of another production process. And so the commodity appears alternately as a pre-condition for the production of other commodities and as the result of a process in which the existence of other commodities is the pre-condition for its own production. (Marx 1972:167)

This conception is indeed a succession of determinations, located in real chronological time, expressed in Marx's well-known description of the circuit of capital

$$M—C—P \dots C'—M'$$

The circuit expresses the passage of time. Each event succeeds the previous one. In Volume II this is made even more explicit in a passage which directly polemicalises against simultaneous determination:

value, says Bailey, ... 'is a relation between contemporary commodities, because such only admit of being exchanged with each other.' ... This derives from his general misunderstanding, according to which exchange-value equals value, the form of value is value itself; thus commodity values cease to be comparable once they no longer actively function as exchange-values, and cannot actually be exchanged from one another. He does not in the least suspect, therefore, that value functions as capital only in so far as it remains identical with itself and is compared with itself in the different phases of the circuit, which are in no way contemporary, but rather occur in succession. (Marx 1978:186)

Causation for Bortkiewicz and Equilibrium theory is simultaneous. Causation in Marx is chronological. But Marx's concept is the normal method of all sciences.¹⁰ As far as I know, General Equilibrium is alone in proposing a concept of cause independent of time. It is contradictory, and illustrates the ideological and unscientific nature of their activities, that the positivists, with their instinctive attachment to Kant as the philosophical guardian of the scientific method, pay no attention to his views on this:

The principle of the causal connection among appearances is limited in our formula to their serial succession, whereas it applies also to their coexistence, when cause and effect are simultaneous. For example, a room is warm while the outer air is cool. I look around for the cause, and find a heated stove. Now the stove, as cause, is simultaneous with its effect, the heat of the room ... Now we must not fail to note that it is the *order* of time, not the *lapse* of time, with which we have to reckon; the relation remains even if no time has elapsed. The time between the causality of the cause and its immediate effect may be [a] *vanishing* [quantity], and they may thus be simultaneous; but the relation of the one to the other will always still remain determinable in time. If I view as a cause a ball which impresses a hollow as it lies on a stuffed cushion, the cause is simultaneous with the effect. But I still distinguish the two through the time-relation of their dynamical connection. For if I lay the ball on the cushion, a hollow follows upon the previous flat smooth shape; but if (for any reason) there previously exists a hollow in the cushion, a leaden ball does not follow upon it. *The sequence in time is thus the sole empirical criterion of an effect in its relation to the causality of the cause which precedes it.* (Kant 1933:288, final emphasis added)

C' is determined by what preceded it – M and C – because they came into existence before it. It is a natural and minor substitution to say that C and hence C' are modified if, in a previous circuit, M and hence differ from the value of the

previous C' which they paid for as inputs. This has no implications for the relation of C' to M' in the current circuit. They are two unconnected determinations. Today price may exceed value by £10 and tomorrow fall below it by £20. So what?

Circulation ($C-M-C$) is itself a succession since the act of selling a product is distinct from the act of buying inputs to the next stage of production. Price and value are the same thing in different phases of the existence of capital¹¹ and determine each other in succession, like all other things related as causes to each other. In one phase of its existence, circulation, every capital in its entirety passes through a stage as money and *in this form* ($M-C$) determines the value to which this capital then gives rise in production ($C-P \dots C'$). This value in turn interacts with society through the laws of supply and demand ($C'-M'$) to determine the price for which it sells.

The value-price distinction is quantitative, chronological and well-defined; between the magnitude C' at one time and the magnitude M' at a succeeding time. It is far from redundant: it gives rise to superprofits, the motor force of the movement of capital, and thus of the entire economy. The roles of production and circulation are equally distinct; production determines the values which are to be distributed by circulation. The value C' is *prior* to the price M' chronologically and therefore logically.

Finally note an important emphasis to which we shall return, since it is a crucial modification to Marx's structure for which Walrasian Marxism is responsible. Commodities in Marx are bearers of value which is not intrinsic to them. Value is a social relation, not a property of things and no contradiction arises if the commodities C transfer more or less value to the product than they themselves contain.

1.11 BIRTH OF A FIXATION: THE PRESUPPOSITIONS OF SIMULTANEOUS DETERMINATION

Bortkiewicz's concept of determination, he freely acknowledges, is taken direct from Walras, whom he greatly admired and with whom he conducted an extensive correspondence from the age of nineteen. He wants the magnitudes M , C , C' and M' to be determined *simultaneously* instead of *successively* so that M' can condition not only the C which comes after but the C which went before. This idea, which Walrasian Marxism has taken for its own, is 100° proof General Equilibrium. It leads down a rocky road with ruin at the end. Consider the basic Walras/Tugan/Bortkiewicz postulate:

All commodities are purchased at the price for which they sell

This bare form is very plausible, the obvious missing link in Marx's construction. Let us follow where it leads. Join the production process on, say, Monday. Machines are in place, materials have been bought, workers have

clocked on at the agreed rate. K, C and V are thus determinate. Now roll forward to, let's say, Friday. Out comes the product and hits the market. Now M' is determinate. We can apply the postulate.

But the postulate says that Monday's inputs should have been purchased at Friday's prices. Shame we didn't know that on Monday. That's the problem with them there economists, never know if they're coming or going. Why we pay taxes I don't know. Sorry Joe, can't help it, just have to run the whole dang thing through again backwards.

This is ridiculous. Monday's inputs were purchased *in the past*, last week. Why should they sell at this week's prices? The postulate thus means something entirely other than what it says. It actually demands that the sale price of a commodity at one point in time should determine the purchase price of the same commodity at a *previous* point in time, and should be reworded accordingly:

Commodities are purchased at the price for which they are going to sell

The only way to make sense of this, without introducing either clairvoyance or psychokinesis, is to detach it from its pseudo-Marxist wrapping and understand it for what it is mathematically, namely a constraint on *output* prices. If time moves forward, the postulate is the inverse of its usual presentation. Actually, Bortkiewicz's postulate, in common with General Equilibrium, has the following presupposition:

Commodities are sold for the price at which they were purchased

This is the secret, ideological form of the basic Equilibrium postulate, which has the most profound impact on the internal logical structure of every variant of it.

The next problem is that though it enforces the equality of input and output prices it does not fix what these prices actually are. In all General Equilibrium systems prices are therefore actually determined by a further postulate. In classical neoclassical systems this is the requirement that marginal revenues be proportional to marginal returns or marginal utility as appropriate. But the *algebraic* work is done by the postulate that all profit rates be equal. Whatever the outward differences between the two systems, as far as the mathematics are concerned – and therefore as far as real internal content is concerned – this is the same postulate found in Walrasian Marxism, which transforms a *result* of Volume III into an *axiom*, without which prices are indeterminate:

All profit rates are equal

The problem is now as follows: if prices are already fixed by the requirement that profit rates be equal, how do they get to be equal? In Marx, as in the real world, profit rates are equalised through price movements.¹² But in this Walrasian hospital for sick Marxists prices have been etherized. After all, what's special about a period of one week? The output prices of *any arbitrary future time* must be the same. Prices can never change. The remedy is a new economic medicine:

All prices are constant

Swallow this and it transports you to a different place from the planet earth: a timeless wonderland in which life repeats endlessly and unchangingly; the world of the dormouse and the white rabbit: the world of General Equilibrium. This is not a hospital but an asylum: Marxism has been sectioned; it has flown over the cuckoo's nest.

You may think it a short visit but you're in forever. The simplification cannot be conveniently dropped at a later date. It is of a piece with the equal profit rate assumption. Without it there would be n equations connecting $2n$ unknown prices and n unknown profit rates. Of these, n are removed by fixing output prices to be identical to input prices. A further $n-1$ are removed by the equal profit rate assumption, and the system is then determinate to within a ratio, the famous 'numéraire'. No constant prices, no solution. It is an axiom masquerading as a simplification.

The treatment produces the sickness. It eliminates all indeterminacy by *assuming away all external determinations of price*. How, within such a system, can we conceive of a price which deviates even for an instant from its Bortkiewicz-appointed magnitude? All the equations in which this price figured would be instantly violated and the entire system would break down. The real world has been surgically excised. Marxists can no longer understand Marx because their equations have lobotomised the organ of imagination.

Demand, Supply, and Say's Law Marxism

This is just the beginning. What demand and supply conditions could correspond to such a system? Suppose any commodity to be temporarily in excess supply or demand. All economists agree that this should produce a rise or a fall in one or more prices, provoking capital movements tending to adjust supply to demand. But in the Walrasian asylum, prices are straitjacketed. They cannot move. The only way such a set of prices can exist is if supply is automatically and at all times perfectly adjusted to demand. Walrasian Marxism is a market-clearing system. In Sraffa's version this is made explicit as a postulate, but it is in any case implicit in the equations.

The postulate of constant prices is thus interchangeable with, and logically equivalent to a different postulate, more recognizable as the founding principle of General Equilibrium¹³ namely

The supply of every output is exactly equal to the demand created by the production of all outputs

Such a postulate is well-known to economics as Say's Law, in opposition to which Keynes constructed his system. It is equivalent to the *a priori requirement that the rational allocation of resources by the market is actually attained, as a prerequisite and indeed as the point of departure for determining prices, values*

and the (unique) profit rate. This is not logic but ideologic, mathematically pure ideology.¹⁴

1.12 FROM FIXATION TO NEUROSIS: THE WALRASIAN CONCEPT OF PRICE

Equations express connections between variables which themselves represent concepts. Powerful manifestations of the human spirit, they cannot coexist in the mind with concepts that do not correspond to the relations they express. As a result, the concepts now used by Walrasian Marxism are alien to Marx.

Though a healthy concept of value is logically prior to a healthy concept of price, we confront a diseased system. A critique of this system therefore begins from its ideologically prior concept of price. The analysis of Walrasian value arises from the psychoanalysis of Walrasian price, of which it is the neurotic expression.

Our starting point is a well-known feature of General Equilibrium systems, the pivot of Keynes's reaction against them: in them money does not exist. This is expressed in such propositions as *'money is a veil'*. Hence the vast literature explaining money as a convenience, an invention to make life easier, in short a thing to be explained exogenously because it is not there in the equations. The reign of neoclassical theory begins with the murder of money; the cost of this Oedipal act is self-imposed blindness.

Walrasian prices are derived from a fantasized economic activity: barter. The solution to a simultaneous system is a set of price ratios, rates at which goods can exchange for each other. These price ratios are therefore *determined* by the requirement that goods exchange for each other so as to produce or reproduce a certain distribution of goods.

In real life goods exchange for money, a distinct commodity, and cannot in general be exchanged for each other without ending capitalism. I cannot in practice exchange either my labour or my products for my direct requirements – I'll work for you if I get fed, I'll make you a house if I get a car, and so on – unless I reorganize the whole of society for this purpose, in which case we have a different society.

Real money is thus not just a unit of measure but a means of relating humans to each other, in fact the only means under capitalism. It is not a convenience but a necessity. After all, what is convenient about going to a bank? It follows, as Marx says many times, that purchase and sale must necessarily be separate acts. There is hence no guarantee that society's aggregate supply will match its aggregate demand, and in general it won't. Society may at any time exchange at money prices which leave goods unsold, and normally does so.

It follows that if a simultaneist allows money into his or her system as anything other than a numéraire, s/he confronts an insuperable problem. If agents are allowed to accumulate money in exchange, then *any* set of price ratios are

compatible with *any* required distribution of products. If I have a sweet and you have a biscuit and we want to strike a deal, then under barter we can only exchange at the rate of one sweet to one biscuit. But if money can change hands, you can sell me the biscuit for £2, buy the sweet for £1, and end up £1 richer. That's all there is to it. The determinacy of a simultaneous system is wrecked by this simple calculation. If, therefore, we require prices to be determined by the necessary set of exchanges they are to effect, we cannot allow money, as a store of value, to play any operational role. The absence of money, like the equality of supply and demand, is a hidden presupposition of the method. Money is the first casualty of market clearing; money prices are the second.

This comes out clearly in Marx's polemic with Jean-Baptiste Say, against whom Keynes, who plays Tiresias in this tragedy of errors, also constructed his system. Say imposes market clearing in a particularly crass argument which has not only attached his name to an unenforceable law but causes Marx the most intense irritation.¹⁵ Economists uneasily dismiss the argument but its logic is present in every simultaneous system. In barter, it runs, one party is always the seller and the other the buyer; therefore every sale is necessarily a purchase and the sum of sales must equal the sum of purchases. Hence demand must always equal supply.

This argument obliterates the most essential phenomenon of a market economy, that which truly distinguishes it from a consciously organised society: People sell goods for money, and then hang onto the money. Keynes, who understood and observed this fact, offers an essentially psychological construction – a preference – to explain it. For Marx it is a matter of logic. In monetary exchange as distinct from barter there are three parties, not two. If I have sweets and need biscuits, I sell to a sweet-lover, distinct from the biscuit-seller. Then I buy the biscuits. As far as the biscuit is concerned, it was bought when it was sold. As for me, I *first* sell and *then* buy.¹⁶

This is what commodity fetishism is all about. Say's impeccable logic, instead of asking what happens to a capital, concentrates on the commodities which compose it. Their prices are given by a pre-defined requirement that the aggregate of commodities in society must exchange in a given proportion. Price does not therefore arise from the relation of exchange, from the private relation between the humans who take part in it. The commodity is no longer something purchased by a human but a thing purchased by other things. Say's Law is a neurosis of the relations of humans to humans which presents them as relations between things. Political economy studies the human; neoclassical theory takes the biscuit.

Simultaneous equation systems are the pathological form of this neurosis: they cannot even locate the biscuit. What really happens when a seller abstains from purchase? Clearly, its counterpart is an unrequited sale. The rebuffed biscuits lie pining for a purchaser. From a flow they are converted to a *stock* and as such cease to function as use value. They become unwanted social riches, sleeping

labour awaiting Money's golden kiss. This is the phenomenal form of a crisis, a general glut, in which all lie as in a dream while King Money pays court to Queen Capital.

The economists have murdered King Money to wed Queen Capital. Their systems are an idealisation in which supply always equates to demand and the market always delivers. Crisis cannot exist because it cannot appear in the equations. If it is even contemplated, it must be a breakdown of the equations, an external mystery, an 'exogenous shock'. But the cost of this idealization is a system in which *money itself* does not exist. Stocks are apotheosized, profit rates impaled, prices narcotized; crisis is unthinkable and accumulation inconceivable. Into this Fimbulwinter Bortkiewicz in 1906 ushered Marxist economics.

1.13 FROM NEUROSIS TO PERVERSION: THE BORTKIEWICZIAN CONCEPT OF VALUE

Neo-Ricardianism, the psychotic variant of Walrasian Marxism, has pursued the irrational logic of this system to its bitter end and killed off value. It has drawn the correct ultimate conclusion from this system: in it, value plays no role. However, the life history of the value concept until its untimely death has great therapeutic interest. What we wish to try and say is not directed against the efforts of the many sincere and honest people who have striven against the odds to wring Marx's social and political conclusions out of this delusional system. It is on the contrary a rescue operation. What we want to explain is how the internal logic of the system necessarily gives rise to a perversion of value; when this is understood, the true nature of value will be to hand.

Anyone who wrestles with a simultaneous equation system with the aim of extracting from it a concept of value finds themselves, whether or not they wish, passing along a chain of reasoning containing the following links:

- 0 Every commodity has a unique price. As a simplification assume this is constant.
- 1 We need to show how values determine this unique fixed magnitude.
- 2 Marx showed how to determine the price of any commodity if its inputs are purchased at values.
- 3 However inputs are not really purchased at values
- 4 If inputs are not purchased at values, we can still perhaps calculate output prices from input prices
- 5 But then we are not calculating prices from other prices and not from values. Therefore prices are undetermined by Marx's procedure.
- 6 Values are necessary to explain class society. Therefore, even if they do not determine prices, let us determine them independently from the same data.

- 7 Finally, we can now understand the real problem Marx was trying to grapple with: what is the relation between the values we have just calculated and the prices we have just calculated?

The first step in the death of money is thus its separation into two completely distinct systems of determination, the price system and the value system, actually derived from two different economies. Let us see step by step how these assumptions create the theoretical scene we survey today.

The initial error lies in step 0: the issue is not how to determine a constant price (or a constant value). Given prices and values at one point in time, the problem is to determine prices and values at a subsequent point in time. The question as posed is utterly insoluble. It is like asking ‘Why is the moon where it is?’ The ‘simplification’ of constant prices renders everything enormously more complicated, because it amounts to asking for the price of each commodity at every point in time instead of just one point in time. It replaces a quite manageable particular question with a totally intractable universal one, like calculating the moon’s orbit by assuming its distance from the earth to be constant. This is a Ptolemaic system of prices. Its job is to sustain an ideology.

Price now becomes a *relation between things*: because each commodity ‘possesses’ a unique price, it ceases to be a relation between the commodity and the humans who buy it. It becomes an invariant, an intrinsic property like weight, determined only by the commodity’s role in the reproduction of all other commodities. The hidden hand of Adam Smith becomes the dead hand of Jean-Baptiste Say.

The constant price hypothesis next invades the concept of value, which has to be redefined as a special price that can reproduce an imaginary society where profits do not even try to equalise – the polar opposite of the price system in which they equalise perfectly. Commodities acquire the ‘properties’ of their constant price and constant value, which follow them everywhere like Mary’s lamb.¹⁷ Marx’s incessant reminders that value is a social relation which the commodity *enters* at definite points in time are forgotten. We have made the fetishistic transition which leads to the death of money; in the passage of things from human to human, we follow the thing and not the human.¹⁸

Determination is next reduced to *relations between the intrinsic properties of things*: a totally new issue surfaces; namely, how to ‘determine’ these ‘properties’ of these things from *each other*. We have to determine the prices of commodities from the values of commodities, independent of what is happening to them. This is like trying to establish if someone is a grandmother from the fact that they are an aunt. Value is no longer assigned to the commodity by the process of reproduction but resides within it; therefore the starting point of all determinations must be the intrinsic properties of commodities, not the social relations from which they receive these properties.

But in fact prices and values of outputs are determined by the value of the capital which produces them: the link with the circuit of capital, with the

particular function that the commodity is playing at the time of the measurement, has thus been broken. It becomes unthinkable to determine the prices or values from the money form of capital because commodities are produced by things, not capitals. Unlike Mary's lamb, the commodities substitute for the properties of their owner. We reach absurd conclusions; for example, technical change is instant and costless. The money spent on the old technology – representing, we should recall, the real social effort that produced this technology at the time – is an irrelevancy as bankrupt capitals are each day born again in the Great Equilibrium In The Sky.

1.14 THE DISSOCIATION OF PRICES FROM VALUES

This system now disintegrates. Capital dissociates into the two separate personalities of Value and Price. Correspondingly, two main schools of thought emerge.

Variant a of Step 7: the Price System is primary.

There is a difficulty since prices, it appears, are determined by themselves. The reasoning seems circular. However, it turns out (praise Perron-Frobenius) that only *one* set of price ratios will result in reproduction, that is, will allow producers being able to purchase their inputs with the proceeds of their outputs and receive equal profits. Therefore, since we know that society in fact reproduces, these prices are determined, at least their ratios are, which is good enough for us.

This creates a problem: it now appears that the two equalities of Marx are not satisfied by any other than a very restricted set of conditions (equal organic compositions, various peculiar invariance postulates. and so on). Therefore Marx was wrong in asserting these equalities: the Transformation Problem is born.

This leads to a further two possible developments.

Variant 7a.I: the economist as cynic

Price means a definite multiple of value which is the same at all times. Value remains the foundation of price, since price is a simple multiple of value. In fact, however, this is a double-edged weapon. If price is just a multiple of value, then value is a multiple of price. So why not say that price determines value? But in this case value is redundant and can be dispatched. An economist, to paraphrase Wilde, is someone who knows the price of everything and the value of nothing

Variant 7a.II: the commodity as dalek

Since value is just a multiple of use-value, everything is in fact determined by use value. From here it is a tiny step to say ‘everything is *actually* determined by use values and their ratios, and values are therefore completely redundant’. It escapes such philosophers that price is equally redundant. The ultimate destiny of this system is a world of self-reproducing use-values, robots built by robots. Why pay them? The concept of ‘shadow prices’ is not a description but an epitaph: Here Lies Money.

Variant b of step 7: the Value System is primary.

We know values are primary because of all Marx’s qualitative arguments concerning the nature of exchange, because of a wealth of empirical evidence, and because of the many philosophical and socio-political arguments on the role of human labour. Let us therefore take the ‘primary causal’ role of value as an axiom. Let us postulate that, against substantial evidence from the texts, Marx unconditionally asserted that the value of every commodity is determined without the mediation of money.

This leads to a veritable garden of forking paths. We can discern at least the following variants

Variant 7b.I: philosophico-mystical

The determination of price by value takes place behind our backs. It is part of the internal workings of the capitalist system which are ever so mysterious and can only be understood by reciting *das Kapital* six times before breakfast and joining my group. There is no such thing as the transformation problem and it doesn’t matter that the figures don’t add up, but you wouldn’t understand that because you are a bourgeois revisionist.

Variant 7b.II: pseudo-dialectical

The determination of prices takes place as the Sraffians describe it, and the determination of values takes place as Marx describes it. This can only be understood by reciting *das Kapital* twelve times before breakfast and joining my study circle. It is true that the figures don’t add up, but that is because capital is inherently contradictory, and you should learn to live with it. You can’t understand that because you haven’t read Hegel.

Variant 7b.III: fake materialist

As Marx explains, the forces of production determine everything.¹⁹ This as Plekhanov explains is the basis of historical materialism. What Marx meant by the determination of value by labour time was the determination of value by

technology²⁰ as you will realize if you read Sraffa and buy my newspaper. The figures do add up.²¹ You don't understand this because you are not a worker.²²

The merit of all these positions is that faced with quantitative difficulties they have stoutly defended the scientific proposition that labour time is the magnitude of value. But as with the post-Ricardians, they have retreated into logic-chopping as a means of avoiding the quantitative relation between price and value.

1.15 MARXISM, MONEY AND THE DEMENTIA OF MODERN ECONOMICS

Money like Banquo's ghost returns to haunt the guilty about their normal business. Keynesianism, the first practical variant of neoclassical economics, comprised a vacillatory struggle to reinstate dead King Money as Prince Liquidity Preference. Neoclassical economics metamorphosed it into the perversion of a separate discipline of monetary economics, and the fiction of a separate goods and money market. The Neoclassical Synthesis rests on the idea of a real market for goods and a nominal market in money. Behind this is a systematic drive to quarantine money from the real world. Agents seek equilibrium in an idealized market untainted by monetary influences – the goods market – and money intervenes as an external factor, a sickness to be treated by government intervention. This separation is conventional and mythical. As the Post-Keynesians rightly exclaim, no-one bargains for real wages. Political economy's job is to integrate money at every level of the economy's functioning, for the simple reason that money is the mediation of every actual social relation in a market economy.

This is Marxism's distinctive contribution. The redundancy of value is an ideological expression of the redundancy of money. In any system where money plays a real as opposed to a fictitious role, the question arises what does money purchase? to which the only possible answer is value, that is, some other thing of which price is composed. Every economic system gives this answer, even if it makes no deference to the labour theory of value. The first thing an undergraduate learns in any practical encounter with economic statistics is to manipulate price indices to measure real as opposed to nominal price. The most basic monetary theorem – the Quantity Theory of Money – involves a variable P, the general price level. But in order to have a price level, that is, a price which is a multiple of something else, one must have a concept of the something it is a multiple of. This something is value, no matter how many theoretical treatises against value. *In Walrasian Marxism value is the ghost of money.*

Thus the unfinished task of non-Walrasian economics is the systematic exposition of the laws governing the movement of real value in the above sense; starting as Marx did from an axiomatic definition of value derived from the private exchange relation, to derive an analytical framework in which not

only the general process of production, circulation and accumulation can be expressed in terms of value, but in which *no* a priori assumptions concerning supply, demand or the movement of prices are imposed.

This brings me to the conclusion, but also the real point of this study: in what direction can the real development of economics proceed? There are two essential steps. One is a proper integration and development of the concept of money. I would certainly not be the first to attempt this; however, my distinctive view developed in the last chapter of this book, is that *money can only be properly integrated in a successivist framework*. All the ‘simplifying’ – in fact stultifying – assumptions which Walrasian economics has grafted on the Marxist stem should be left to wither in their chosen fashion. Economics must be situated in real time and the real world. The fiction of a uniform profit rate and rate of exploitation, production without machines, capital without money and determination without time: all these are baggage foisted by an uninvited benefactor on an unwilling guest in an unnatural place. They do not belong to a science of political economy. It is time to pack and leave.

NOTES

- ¹ See for example, on the transformation problem Wolff, Roberts and Callari 1984a, Carchedi 1984, Roberts 1987, Kliman and McGlone 1988, Freeman 1991, Ramos 1991, Ramos and Rodríguez 1993, Giussani 1991 and on the tendency of the rate of profit to fall Kliman 1988, Freeman 1993b.
- ² The total value added by all workers in society is measured by the number of hours that they work; the value added by the workers in a particular labour process is also measured by the number of hours they work, but may be a larger or smaller multiple of this time (that is, a larger or smaller proportion of total labour time) if the workers are more or less skilled, or work harder or less hard, than average.
- ³ This issue is treated rigorously in the final chapter of this book.
- ⁴ This has a further consequence noted by Marx which we cannot elaborate on here but must be recognized as part of accumulation. Suppose, through innovation, the capitalists can restart production on the same scale for less outlay: for example at a cost of £50 in labour and £50 in raw materials. Of their liquid capital (sales of the product C') of £300, only £100 is necessary to resume production on the same scale. In addition to the surplus value $S = £100$, therefore, a further £100 in freed-up capital is available to expand production. Changes in labour productivity therefore impact directly on accumulation as well as indirectly through the rate of surplus value. See Marx (1994:219).
- ⁵ This was given extremely elegant expression in N. Okishio's theorem discussed in Andrew Kliman's chapter, which states the rate of profit must rise continuously if individual capitalists always invest in cost-reducing technology. Profits can fall only through a rise in wages.
- ⁶ In the *Theories of Surplus Value* Marx uses the term ‘cost-price’ in place of ‘price of production’.
- ⁷ Although several authors have independently noted and referred to this passage, to my knowledge the first to draw public attention to it were Wolff, Roberts and Callari (1984a).
- ⁸ Note once again that this exchange at prices different from values appears in Volume I, where Marx has allegedly not considered the transformation of value into price. Note also that money is the measure of value, and finally that the rates of exchange have nothing to do with production but are a pure phenomenon of exchange.
- ⁹ Bortkiewicz (1952:23-24). I am indebted to Michele Naples for pointing out this passage.
- ¹⁰ Only neoclassical economics is sufficiently convinced of its superiority to defy the normal laws of time.
- ¹¹ ‘Price, after all, is the value of a commodity as distinct from its use-value (and this is also the case with market-price, whose distinction from value is not qualitative but merely quantitative, bearing exclusively

on the magnitude of value)‘ (Marx 1981:476); ‘Price, in its general concept, is simply value in its money form‘ (Marx 1981:295).

- ¹² Marx recognized this extremely early on: ‘It is not the sale of a given product at the price of its cost of production that constitutes the ~~proportional~~ relation” of supply to demand, or the proportional quota of this product relatively to the sum total of production; it is the *variations of supply and demand* that show the producer what amount of a given commodity he must produce in order to receive in exchange at least the cost of production. And as these variations are continually occurring, there is also a continual movement of withdrawal and application of capital in the different branches of industry ... If M. Proudhon admits that the value of products is determined by labour time, he should equally admit that it is the fluctuating movement alone that makes labour the measure of value. There is no ready-made constituted ~~proportional~~ relation” but only a constituting movement‘ (Marx 1976:56). Engels in his introduction to the same work writes ‘the continual deviation of the prices of commodities from their values is the necessary condition in and through which alone the value of the commodities can come into existence’. The same applies *mutatis mutandis* to prices of production. Marx and Engels, who supposedly failed to comprehend the role of supply and demand, recognise that supply and demand can only operate as a force in the real world through *deviations* of market prices from values and from prices of production. Neoclassical economics and Walrasian Marxism alike *require that these deviations be eliminated before prices can exist*.

- ¹³ ‘Ainsi, le moment est venu de fermer, pour ainsi dire, le cercle de la production en introduisant la condition, conforme à la réalité, que les produits s’échangent contre les mêmes quantités de service qui entrent dans leur confection‘ (Walras 1984:585).

- ¹⁴ Although both Walras and Sraffa were perfectly clear that the price and quantity requirements (input prices equal output prices, input demand equals output supply) are interchangeable and mutually imply each other, this necessary logical relation is obscured by some later presentations. Leontieff’s (1953, see also Pasinetti 1977 and Cameron 1952) input-output formulation is framed in terms of output proportions rather than magnitudes. Systems of linear inequalities beginning with von Neumann (1937) and developed by Morishima (1973) suggest that price and quantity determinations are independent. The illusion vanishes as soon as one asks what happens to the excess product when supply does not match demand. Farjoun (1984) demonstrates that the price and quantity systems are separated by the technical trick of labelling all excess products as *waste* which has a zero price. This is already a violation of the price postulate since commodities now have *two* prices, their ‘normal’ and their ‘waste’ price. One has only to enquire what would happen if people were actually entitled to purchase all excess products for nothing to see that this is an artificial construction.

- ¹⁵ ‘The conception (which really belongs to James Mill), adopted by Ricardo from the tedious Say (and to whom we shall return when we discuss that miserable individual), that overproduction is not possible or at least that no general glut of the market is possible, is based on the proposition that *products are exchanged against products*, or, as Mill put it, on the ~~metaphysical~~ equilibrium of sellers and buyers”, and this led to the conclusion that demand is determined only by production, or also that demand and supply are identical‘ (Marx 1969b:493).

- ¹⁶ ‘Money is not only ~~the~~ medium by which the exchange is effected” but at the same time the medium by which the exchange of product with product is divided into two acts, which are independent of each other, and separate in time and space. With Ricardo, however, this false conception of money is due to the fact that he concentrates exclusively on the *quantitative determination* of exchange-value, namely, that it is equal to a definite quantity of labour time, forgetting on the other hand the *qualitative* characteristic, that individual labour must present itself as *abstract, general social* labour only through its alienation‘ (Marx 1969b:504).

- ¹⁷ For the benefit of readers who lack an English nursery education:

Mary had a little lamb/ It’s fleece was white as snow
And everywhere that Mary went/ The lamb was sure to go.
It followed her to school one day/ It was against the rules
And all the children laughed and played/ To see a lamb at school.

- ¹⁸ ‘Once all things that can be appropriated (that is, all scarce things and nothing else) have been appropriated, they stand in a certain relationship to each other, a relationship which stems from the fact that each scarce thing, in addition to its own specific utility, acquires a special property, namely, that of being exchangeable against any other scarce thing in such and such a determinate ratio‘

(Walras 1984:67) ‘As values, commodities are *social* magnitudes, that is to say, something absolutely different from their ~~properties~~” as ~~things~~”. As values, they constitute only relations of men in their productive activity. Value indeed ~~implies exchanges~~”, but exchanges are exchanges of things between men, exchanges which in no way affect the things as such’ (Marx 1972:129).

¹⁹ In the last analysis.

²⁰ In the last analysis.

²¹ In the last analysis.

²² In the last analysis.

2 One system or two?

The transformation of values into prices of production versus the transformation problem

Ted McGlone and Andrew Kliman

2.1 INTRODUCTION

We here defend Marx's oft-refuted account of the transformation of values into prices of production in two ways. First, we argue that it was appropriate to his purpose, that of showing the transformation to be part of the process by which workers' subjectivity is transformed into an antagonistic economic 'objectivity'. To comprehend this process of transformation into opposite, we suggest, values and prices must be retained in one relation, not separated into opposed systems of calculation. Second, we show that, once values and prices are held in a single relation, Marx's account is logically coherent.

Like most contributors to this book, we contend that static equilibrium formalisations distort Marx's value theory. Our work, however, is not intended to develop an alternative, non-equilibrium political economy. Rather, we conceive our defence of Marx's account of the value-price transformation as an attempt to combat an ideological attack on his body of ideas and thus to create a place for its renewal, and as contributions to the *critique* of political economy on the foundations laid by Marx.

The difference between political economy and Marx's critique of it is, in our view, twofold. Firstly, whereas rival schools of economics primarily argue over which gives the best account of the functioning of existing society, *Capital* does not merely criticize others' *conceptions* of reality. It is a philosophical critique of economics, which critiques the existing reality of capitalism *itself*, including its thought, from the standpoint of an envisioned new, human society, the conditions for which develop through the struggles of revolutionary subjects within existing society. Because its projects and concepts – and not only Marx's own opinions – are thus inherently critical, Marx's work becomes subject to distortion when forced into the mould of economic theory.

Secondly and relatedly, whereas internal critiques within economics focus on others' inaccuracies, we believe that *Capital* is primarily a critique of the scientific, disinterested, and (largely) 'correct' political economy of the classicals. Following Dunayevskaya (1988:98-102; 1989:76-94; 1991:143-45), we regard Marx's theory of commodity fetishism as primarily not a critique of illusion and inaccuracy, but as a critique of conceptions that are topsy-turvy because they reflect accurately the inverted relations that characterize capitalism – the reification of persons and the personification of things. Thus it was precisely because the classical economists' categories did correspond to capitalist reality that Marx considered them to be, at one and the same time, both 'absurd' and 'socially valid' (Marx 1976a:169)

Although this chapter reiterates themes we have addressed earlier (Kliman and McGlone 1988), the dialogue our first paper has generated (see, especially, Naples 1993 and Kliman 1993) has convinced us of the need to sharpen and clarify our arguments. In particular, the present chapter (1) seeks to clarify further *how and why* the price of the means of production and labour power becomes the value of capital, and (2) illustrates the transformation in a slightly different and, we hope, clearer way. Also, it contains the mathematical Appendix (slightly revised) that accompanied our earlier paper but was not published due to space limitations.

Since Bortkiewicz, Marx's nonseparation of values and prices has been regarded as a logical inconsistency; Marx 'fails to keep separate rigorously enough the two principles of value- and price-calculation' (Bortkiewicz 1952:8). What has often been overlooked is that the relation between values and prices is a *methodological* issue. This was clear to Böhm-Bawerk. At the same time that he complained of a 'Great contradiction' between Volumes I and III of *Capital*, he argued that

Marx has not deduced from facts the fundamental principles of his system, either by means of sound empiricism or a solid economical-psychological analysis: he founds it on no firmer ground than a formal dialectic. This is the great radical fault of the Marxian system at its birth: from it all the rest necessarily springs. (Böhm-Bawerk 1984:101)

The nondialectical 'understanding' (*Verstand*) perceives each object as isolated, uniquely itself, a whole unto itself (Hegel 1991:126-28). Thus, for instance, separate systems of value- and price-calculation are demanded, systems in which value equals value, and price of production equals price of production. Conversely, dialectical 'reason' (*Vernunft*) comprehends a judgement such as 'value is price of production' because this judgement, like every other proposition taken singly, is inadequate. It must continue to be developed until the original statement has undergone so much differentiation that we now fully comprehend *how* value becomes price of production.

To comprehend that process, we adopt neither the 'technological' nor the 'social' value paradigm (de Vroey 1982). The former confer upon technological relations a crucial role in the valuation process; the latter stress the role of money

and the market.¹ Our own approach is neither technological determinist nor market oriented, but is informed by the Marxist-Humanism of Raya Dunayevskaya, who restated the centrality of Marx's humanist philosophy of labour to his critique of political economy (see McGlone 1994). We owe to her the recognition that capitalist technological relations are themselves social relations, class relations of dead to living labour in production. '[L]abour is expressed in value' because 'the process of production has mastery over man, instead of the opposite' (Marx 1976a:174-75). Thus Dunayevskaya contended that 'it is more correct to call the Marxist theory of capital not a labor theory of value, but a value theory of labor' (Dunayevskaya 1988:138).

Neither the technological determinist conception of value, which separates value from price, nor the market centred approach, which holds that price *is* value, have been able to resolve the value-price problem. Since the early 1980s, however, a variety of authors have advanced the discussion by arguing in different ways that the total value of output equals the value added by living labour plus the *price* (rather than the *value*) of the means of production (for example Duménil (1983); Wolff, Roberts and Callari (1984a); Carchedi (1986); Glick and Ehrbar (1987); Kliman and McGlone (1988); Giussani (1991); Moseley (1993b); and several chapters in the present volume). Although we agree with this view, we wish to point out that, by itself, it does not vindicate Marx's account of the value-price transformation. Indeed, several of the authors who hold this view contend that Marx's account is incomplete or even self contradictory, precisely because the price of the means of production deviates from its value.

To defend Marx against this hoary charge, it is therefore insufficient to *assert* that the price of means of production is identical to the value of constant capital. One must show *how* – on the basis of the law of value, that is, the determination of value by labour time – the value of constant capital *comes to differ* from the value of the means of production. Our earlier paper (Kliman and McGlone 1988) demonstrated this, but failed to make explicit the conceptual basis of the demonstration. We now wish to make explicit that Marx's concept of embodied labour is the ground of that demonstration.

Marx (1976a:128) identifies *abstract* labour as the 'social substance' embodied in commodities' values. One can twist and turn a use value forever without finding any (concrete) labour lurking within. It is thus fetishistic to regard labour 'embodiment' as a suprahistorical technological reality, that is, as the expenditure of labour common to all production. The labour embodied as value is instead a '*phantom-like* objectivity' that 'arises from the *peculiar* social character of the labour that produces [commodities]' (Marx 1976a:128, 165; emphases added). As Marx (1964:122-23) wrote in 'Alienated Labour':

The worker puts his life into the object, and his life no longer belongs to himself but to the object ... The *alienation* of the worker in his product means not only that his labour becomes an object, assumes an *external* existence, but that it exists independently, *outside*

himself, and alien to him, and that it stands opposed to him as an autonomous power. The life which he has given to the object sets itself against him as an alien and hostile force.

That which is called ‘embodiment’ in *Capital* is here referred to as life that ‘belongs ... to the object’, labour that ‘exists independently, *outside himself*’, and life ... given to the object’. It should be clear that Marx’s embodied labour theory is a theory of abstract, alienated labour.

Because the embodiment of abstract, alienated labour is a peculiar social process, not a technological requirement as such, the abstract labour embodied in a commodity need not equal the amount of (concrete) labour needed to (re)produce it. Although exchange does not alter the quantum of value in existence, it does redistribute it. Because abstract labour is redistributed through exchange, some commodities *embody* more abstract labour than they would otherwise, some less. On the basis of this notion of labour embodiment, one can comprehend how the capital advanced to production does not cease to be a sum of value merely because it differs from the value of its material elements (means of production and subsistence). The illustration in Section 3 should be read with this in mind.

2.2 THE TRANSFORMATION NON-PROBLEM AND THE NON-TRANSFORMATION PROBLEM

Marx’s account of the value-price transformation

It is well known that classical political economy adhered to two opposing principles which it was unable to reconcile and that, in Marx’s view, this failure led to its disintegration. On the one hand, it discovered that labour is the substance of value and that the magnitude of a commodity’s value is determined by the labour time needed for its production. On the other hand, it adhered to the *prima facie* contradictory view that profit rates tend toward equality and that a commodity’s price therefore tends to be equal to the costs of its production plus an average profit. Even Ricardo failed to account for the determination of the level of the profit rate and held the disproportionality of prices and values to be an exception to the law of value.

It is also well known that Marx insisted that, rather than attempting to ‘rescue’ the law of value by means of a ‘violent abstraction’ (Marx 1976a:421) of this sort, the existence of prices of production and a general rate of profit ‘have to be explained through a number of intermediate stages’ (Marx 1969b:174). However, this stipulation is often interpreted as a call for successive relaxation of assumptions, for an even stricter adherence to Ricardo’s method – the analytic method rooted in formal logic. In this view, the law of value is a ‘first approximation’ based on assumptions, such as equal compositions of capital, which do not hold in the real world and which must be dropped as the model becomes more realistic.

What Feuerbach had done in the analysis of religion,² Ricardo and the classicists had done in the analysis of economic life. They discovered by analysis the earthly kernel – labour – of the mystery of commodity value. The manifold phenomena of price relations were reduced abstractly, without mediation, to this undifferentiated substance, labour. Yet, the starting point in reality (prices) persisted in contradistinction to the starting point in theory (labour). The gulf between the ‘real world’ and the theoretical world, between appearance and essence, was not overcome.

Marx’s approach was ‘to do the opposite, i.e., to develop from the actual, given relations of life the forms in which these have been apotheosized’ (Marx 1976a:493-94n). The difference is not only that Marx maintained a consistent starting point whereas the classicals vacillated between two inconsistent principles. Rather, instead of being a method of reconciliation, Marx’s method is one of development through contradiction. His starting point thus contains within itself a duality – the dual character of labour revealed within its product, the commodity.³ The duality between the concrete potentiality of the living workers and the abstract, value producing character of their actual activity, that is, alienated labour, is ever present in capitalist production. It is as isolated, independent individuals that the workers ‘enter into relations with the capitalist ... Their co-operation only begins with the labour process, but by then they have ceased to belong to themselves’ (Marx 1976a:451). Their activity is not their own, but is subjected to the domination of dead labour. The social relations between persons at work have been *transformed* into thing-like relations (Marx 1976a:166).

Through a succession of ‘intermediate stages’, Marx traced the development of the fetishized forms in which this reification of labour manifests itself. The first of these forms is the commodity product, the materialization of the labour which is an ‘objective’ factor of production rather than the workers’ self-expression. Each subsequent ‘stage’ is still another transformation, an inversion in which the worker’s subjectivity takes on yet another form of a false ‘objectivity’, a ‘social relation between things’ (Marx 1976a:166). However, capitalism manifests itself not only in industrial relations, but in the market and in the categories of even ‘scientific’ political economy. Thus, in these realms which Marx examines in Volume III, still more transformations are revealed. As he writes in Chapter 2:

the way that surplus-value is transformed into the form of profit, by way of the rate of profit, is only a further extension of that inversion of subject and object which already occurs in the course of the production process itself. We saw in that case how all the subjective productive forces of labour present themselves as productive forces of capital. On the one hand, value, i.e., the past labour that dominates living labour, is personified into the capitalist; on the other hand, the worker conversely appears as mere objectified labour-power, as a commodity. This inverted relationship necessarily gives rise, even in the simple relation of production itself, to a correspondingly inverted conception of the situation, a transposed consciousness, which is further developed by the transformations and modifications of the circulation process proper. (Marx 1981:136)

Thus, in Chapter 9 of Volume III, Marx argued that the consciousness of capitalists and bourgeois economists, though ‘transposed’, is grounded in reality’s appearance. Even in the form of price of production (in which considerations of disequilibrium of supply and demand, interest, rent, and so on are excluded), price and profit for an individual capital differ quantitatively as well as qualitatively from value and surplus value. Because price appears to be determined by (not only equal to) the costs of production plus profit, and profit appears as a pure markup over costs, the law of value/surplus value seems false. Nevertheless, the alien reality of capitalist production relations remains the essential determinant of these new forms and makes its presence felt. Marx shows the determining role of the production relations by abstracting from intercapitalist competition and, via the concept ‘total social capital’, returning to the vantage point of capital versus labour:

It is necessary ... to avoid looking at things as if a society based on the capitalist mode of production lost its specific historical and economic character when considered *en bloc*, as a totality. This is not the case at all. What we have to deal with is the collective capitalist. (Marx 1978:509)

This was true not only of Volume II. Marx also made the total social capital the object of analysis in Chapter 9 of Volume III, viewing capital as if it ‘belong[ed] to one and the same person’ (Marx 1981:259). He was thereby able once again to see the capital/labour relationship through the appearance of ‘many capitals’.⁴ Total value and surplus value are proportional to total price and profit, respectively; the general rate of profit is the ratio of total surplus value to total capital advanced.

Throughout Volume III, rather than analysing market phenomena as self-subsistent, in their seeming independence from the sphere of production, these phenomena are developed as transformed forms of production relations. Thus, in Marx’s illustration of the ‘transformation of commodity values into prices of production’,⁵ value and price are conceived as contradictory terms in *one* relation. Value takes on a trans-formed appearance, a form of appearance that differs from itself.

The dialectical meaning of the term ‘transformation’ thus differs from its use as a synonym for a mathematical mapping. Many, if not most, of Marx’s critics view his transformation procedure precisely as a failed attempt to map a self-contained set of values onto another, self-contained set of prices of production (or general equilibrium prices). Curiously, however, what goes unrecognized is that this transformation is but one of many transformations into opposite discussed throughout the three volumes of *Capital*, none of which are mappings. Were this fact better understood, perhaps this particular transformation would not have been singled out for criticism.

Moreover, the failure to recognize that many transformations have preceded the transformation of values into prices of production is one factor that leads critics to charge Marx with logical inconsistency. Lacking this recognition, their

misconceptions regarding the latter transformation's starting point are significant. Firstly, some critics of Marx's procedure still interpret Volume III's reference to 'value' as a reference solely to labour and labour time, and thus claim that the dimensionality of values and prices of production are inconsistent (see, for example, Abraham-Frois & Berrebi 1979:26-27). Actually, after tracing the development of the value form into the price form in Volume I, Chapter 1, Marx regularly referred to sums of money as 'values'.⁶ Moreover, in a letter to Engels (27 June 1867) explaining the transformation of 'value' into price of production, Marx explicitly equates 'cost price' with the 'price of the constant part of capital + wages' and notes that this transformation 'presupposes' that various value magnitudes appear as sums of money.

The value congealed in a commodity is always expressed as a money price, a sum of money, because it is always related to the universal measure of value, money. Conversely, of course, a sum of money always represents a sum of value. As the *universal* measure of value, money is ever present, even in the absence of an exchange, since it 'serves only in an imaginary or ideal capacity' (Marx 1976a:190). Hence, the initial input 'values' in Marx's illustration of the transformation of 'value' into price of production are actually sums of money which, through the ideal presence of money, implicitly represent sums of value. Therefore, both before and after the transformation of magnitudes, inputs and outputs have the same, dual dimensionality, as will be illustrated in Section 3.

Secondly and relatedly, in Volume III 'commodities are not exchanged simply as *commodities*, but as the *products of capitals*', as results of capital's process of production (Marx 1981:275). Capital values, not the value of means of production and labour power, constitute the starting point of Marx's illustration. In circulation, capital is a sum of money which purchases means of production and labour power. The value of the *capital* is the value represented by that sum of money, not the combined value of the *means of production and labour power*. As we noted above, Marx's concept of value as embodied labour expresses the social relations of the capitalist mode of production, and is not a technological determinist conception. Thus, we reiterate that the capital advanced to production does not cease to be a sum of value merely because it differs from the values of its material elements.

At the beginning of Volume III, in discussing the transformation of value into cost price plus profit, Marx did assume that cost price equalled the combined values of the labour power and means of production used up in producing the commodity. This assumption was made in order to grasp the qualitative transformation in its 'purity', independently of any quantitative disproportionality. On the other hand, when he discussed the quantitative transformation of Chapter 9, Marx dropped this assumption, noting that '*if the cost price of a commodity is equated with the value of the means of production used up in producing it, it is always possible to go wrong*' (Marx 1981:265, emphasis added). Because they interpret his procedure as having wrongly

equated the two, his critics universally view this stipulation as an admission of error which, to be rectified, requires that values and prices be held apart in two systems.

The passage, however, continues: ‘even if a commodity’s cost price may diverge from the value of the means of production consumed in it, this error in the past is a matter of indifference to the capitalist. The cost price of the commodity is a given precondition, independent of his, the capitalist’s, production.’ Marx thereby indicated that he took the cost price as a *datum*, a given magnitude of value represented by a given price, without assuming that this magnitude equals the value of the means of production (and labour power) used up. Hence, neither his account of the transformation nor its resulting aggregate equalities depend on this assumption, as is often supposed. As we shall see in Section 3, his procedure accounts for prices of production and the aggregate equalities obtain even when inputs are purchased at their prices of production.

That the initial magnitudes of value and price are data, established in the immediate past, implies that Marx’s illustration was not a system which abstracted from time. Rather, it depicted *one particular period* of capitalist production and circulation within the process of history.

The non-transformation problem

Marx’s account of the transformation retains values and prices in one relation. In the transformation problem, they become separated into two opposed equational systems.

In the value system, values appear as a set of price relations (‘value prices’) opposed to equilibrium price relations. Rather than conceiving of price as a form of value, value becomes another form of price. The question to be answered thus becomes: in what way are these two pricing systems related? But, unlike Ricardo, Marx did not advance a labour theory of exchange ratios, that is, a theory of goods exchanging in proportion to the amounts of labour needed to produce them. The ‘value price’ system therefore has no basis in Marx’s theory and the question of its relation to equilibrium prices is, from this standpoint, moot.

Rather, Marx asked *how* value relations assert themselves (letter to Kugelmann 11 July 1868); his account of the value-price transformation was part of the answer to this question. When value is conceived as a form of price and isolated into a separate system, this question cannot be answered. The market and the factory never come into contact; the unity of production and circulation is broken, a priori; the analysis becomes focused on different market forms alone. Moreover, since ‘value prices’ are abstracted from real prices, there has arisen a tendency to view value relations as abstractions from price relations, rather than as the reality of the factory.

We now turn to the price system. Solutions to the transformation problem take for granted the existence of prices and the profit rate, and seek merely to calculate

their magnitudes. This is often referred to as ‘determining’ prices and the profit rate. Yet not only does this differ from the real process of determination (Shaikh 1982); far more importantly, it wholly disregards the need to investigate the meaning of these variables and their qualitative relation to values.

Moreover, the conception of the rate of profit as an unknown, to be solved within the price system, differs markedly from Marx’s conception. That the latter’s account of the transformation leaves the rate of profit unaltered has received little notice, as if this result were a mere ‘byproduct’ of that procedure. However, its significance for Volume III of *Capital* is crucial. At pains to dispel the illusions which competition creates, Marx sought to demonstrate that, given a certain advance of capital, the level of the profit rate depends only on the degree to which capital succeeds in pumping out surplus labour. It is therefore determinable upon the completion of the production process, before commodities go to market. Competition merely effects the equalization of profit rates *at this previously determined level*.

The mathematical results of simultaneous solutions seem to discredit these contentions. The rate of profit appears to be determined by technology and the real wage, and established through competitively determined prices or by planning which utilizes shadow prices. Since this rate differs from the profit rate obtained through the value system, its appearance as a magnitude relatively independent of production relations is reinforced. However, inasmuch as the value system is an irrelevancy, so too is the discrepancy between its profit rate and the equilibrium profit rate. As we seek to demonstrate in the next section, when the value of the capital advanced is not confused with the value of its material elements, the logical ‘existence’ of the general equilibrium profit rate no longer implies its determination outside of production relations.

Even if they are of the iterative form instead of the simultaneous form, solutions to the transformation problem must employ one or another ‘normalization condition’ or ‘invariance postulate’. Because the value and price systems are in themselves unrelated and the dimensionalities of values and relative prices are inconsistent, only the adoption of a normalization condition can create some relation between the two. It is generally recognized that, since ‘there does not seem to be an objective basis for choosing any particular invariance postulate in preference to all others ... the transformation problem may be said to fall short of complete determinacy’ (Seton 1957:153, emphasis omitted). This indeterminacy indeed turns the transformation problem into an endless exercise. The number of possible normalization conditions (and therefore solutions) is limitless and each is, objectively, as good as any other.⁷ Even in principle, then, the transformation problem cannot resolve the question of the relation of values to prices.

Even more significant is the fact that none of the ‘solutions’ actually *demonstrates* any relation of values to prices. Whereas Marx’s procedure obtains aggregate equalities on the basis of the given data, the value-price relationships

which result from transformation problem solutions come from the theorists' heads alone. Because normalization conditions are asserted a priori and imposed externally on the otherwise unrelated value and price systems, the resulting relations are only assumed ones. That a numéraire is needed to obtain absolute prices does not justify the arbitrary imposition of a normalization condition. While the price form itself entails that a commodity find expression in some amount of money, the declaration that a specific value aggregate must remain invariant when value is redistributed is only the theorist's whim imposed on the actual data. In short, first the theorists negate the internal relation of values to prices, then they substitute whatever arbitrary relation they choose. Marx characterized this 'tendency to form arbitrary unmediated connections between things that belong together in an organic union' as '[c]rudeness and conceptual nullity'.⁸

In the transformation problem, the external mediator is the theorist, who comes from outside of the problem bearing a normalization condition that dictates how values will be reconciled with prices. The external mediator in actual life, however, must be some social force, 'independent' of both capitalists and workers, that can dictate a reconciliation of production with the market – in other words, the 'classless technical intelligentsia' responsible for planning the economy and establishing social equilibrium. Indeed, use of input-output models and equilibrium shadow pricing form the foundation of state planning. Are not solutions to the transformation problem therefore the ideological representations of a harmonious, state planned economy?

Yet, in production itself, there has been no reconciliation. To those who remain inside the factory, the plan is not classless but represents a 'social formation in which the process of production has mastery over man, instead of the opposite ... production by *freely* associated men, [which] stands under their conscious and planned control' (Marx 1976a:175, 173, emphasis added). There is only the domination of labour by capital or the internal transformation of this reality, by those who live under it, into a new human society.

2.3 THE TRANSFORMATION OF INPUT PRICES: AN ILLUSTRATION

The foregoing discussion has indicated that Marx's concern was to show the transformation of values into prices of production to be only a 'further extension' of the transformation of workers' subjectivity into an antagonistic economic 'objectivity'. Comprehending this process of transformation into opposite requires that values and prices be retained in a single relationship, not separated into different systems of calculation. The charge of logical inconsistency, deriving from Marx's nonseparation of values and prices, is therefore misplaced.

While we reject this central criticism of Marx's account, often dubbed a 'failure to transform input prices', in another – quite real – sense the issue of

‘input price transformation’ remains. One capital’s output does become the other’s input and, in this interchange, the commodity’s price generally *does* diverge from its value. An adequate defence of Marx’s view of the transformation requires that one account for this process *without* separating values and prices into separate systems. We therefore show presently that a simple continuation of Marx’s own illustration, as interpreted above, can illustrate the transformation of input prices.

To illustrate this process, some output-input relations must be assumed. For simplicity, we assume simple reproduction, but adopt *Marx’s* conception of simple reproduction, not the conception formalised in the general equilibrium pricing models utilized by transformation problem solutions. Some marked differences between the two exist:

(1) ‘Buying back’ versus advance of capital. Were Marx to have assumed simple reproduction in his illustration of the value-price transformation, the aggregate *output* price of any component of social production (for example wage goods) generally would not have equalled the aggregate *input* price of that component (for example the total wage bill). This fact, originally noted by Bortkiewicz (1952:9), constituted his whole proof of logical inconsistency on Marx’s part. Such inequalities are indeed absent from transformation problem solutions; yet they entail disruption of simple reproduction only if one accepts the implicit underconsumptionist premise that the components of output must be ‘bought back’. For Marx, reproduction requires the *advance* of capital, investment. Money advanced for means of production and subsistence enables the previous period’s outputs both to be sold and to serve (directly or indirectly) as inputs in the *upcoming* period. The input prices of means of production and subsistence in any period need not equal their output prices in that *same* period.

(2) Stationary prices versus prices of production. Solutions to the transformation problem look for a set of *unique*, timeless (relative) prices, perhaps in the belief that such prices alone ‘support’ the necessary interdependence of the various industries, or perhaps because it is thought that prices of production must be stationary by definition. In contrast, we do not regard the prices of production to which Marx refers as stationary prices. Perhaps surprisingly, support for this view has come from Garegnani (1990:51-52). He notes that ‘changes in normal prices over time were ignored in traditional theory because they were considered sufficiently *small*’ (Garegnani 1990:52), and not because normal prices (prices of production) were required by *definition* to be stationary. Marx’s prices of production are equilibrium prices in the sense that they (a) permit each capital to achieve the average rate of profit, and (b) obtain when supplies equal demands. As we shall show, however, different sets of prices can at different times satisfy these conditions, even when technology and real wages remain unchanged.

(3) Reproduction of prices versus reproduction of use values. The relative prices obtained in transformation problem solutions are continually reproduced in

a timeless fashion. Again, these solutions assume either that material reproduction cannot occur under other prices or that stationary prices constitute an additional equilibrium condition. When Marx discussed reproduction, however, he was concerned with a prior question: in what quantities and proportions must the system produce two distinct use values, means of production and articles of consumption, to materially reproduce itself on a certain scale? Reproduction was thereby considered inseparably from the relation of dead to living labour in capitalist production, and irreducible to exchange relations among capitalists. Marx held prices fixed, not because reproduction requires fixed prices, but because changes in values and price-value deviations were irrelevant to the question at hand (Marx 1978:469-70). The simple reproduction of material relations can occur at *any* set of prices.⁹ If all profit rates are uniform at the prevailing prices, whether or not they are stationary prices, it is reasonable to suppose that no further incentives for capital flows exist, and that supplies and demands should therefore actually equilibrate at these prices.

We regard Marx's illustration of the value-price transformation as entirely correct and complete, and modify it to account for simple reproduction only to defend it against the Bortkiewiczian critique. To defend it against the charge of failing to transform input prices, another modification is also made: we continue Marx's one period illustration into the next period. Whereas the value-price transformation can be depicted in a single period, the transformation of outputs into inputs, and thus the 'transformation' of output prices into input prices, takes place between *one* period of production and the *next*.¹⁰ As Marx (1981:265) notes, the 'cost price ... is a given precondition'; inputs cannot be repriced *retroactively*. Hence, to depict this second 'transformation' together with the first, without severing values and prices into self-contained systems, Marx's illustration must be continued into the next period.¹¹

Table 2.1 presents a specific two department illustration. The symbols stand for:

m	capitalists' personal revenue ¹²
M	money capital before production
C	cost price; commodity capital before production
MP	(price of) means of production
L	(price of) labour power
P	productive capital; process of production
s	(price expression of) surplus value
C'	commodity capital after production
M'	money capital after production
π	profit
r	general rate of profit
LL	(price expression of) hours of living labour added; generation of new value (not shown in table)
AC	articles of consumption (not shown in table)

The illustration assumes that Department I uses 160 MP and 160 LL to produce 320 MP. Department II uses 160 MP and 320 LL to produce 480 AC. At the current intensity of labour, the real wage equals 0.4 AC per LL; thus $0.4 \times 160 = 64$ AC and $0.4 \times 320 = 128$ AC are indirectly purchased by Department I and II, respectively. The remaining $480 - 64 - 128 = 288$ AC are consumed by the capitalists representing the departments. We also assume initial input prices equal to £1 per unit in both departments. (As noted above, the appearance of values as sums of money is necessarily presupposed; and Marx takes cost prices, and thus unit input prices, as *given*; see Moseley (1993b) for development of this point. Finally, in Table 2.1, Part A, we assume that each £ is the monetary expression of one hour of socially necessary labour. Every number in Part A thus signifies both a money and a labour time sum.

Beginning with money (M), the collective capitalists of the two departments each purchase two commodities (C), means of production (MP) and labour power (L), at given prices representing given values. (Any initial values could be assumed. *Solely* to facilitate comparison with transformation problem solutions, the initial values here equal the values of the means of production and labour power).

Period	Dept	<div style="display: flex; align-items: center; justify-content: space-around;"><div style="text-align: center;"><div style="border-bottom: 1px solid black; width: 50px; margin: 0 auto;"></div><div style="margin: 0 5px;">m</div></div><div style="text-align: center;">M-C</div><div style="display: flex; align-items: center;"><div style="border-left: 1px solid black; width: 10px; height: 10px; margin: 0 5px;"></div><div style="text-align: center;">MP</div></div><div style="text-align: center;">P</div><div style="text-align: center;">s</div><div style="text-align: center;">C+s</div><div style="text-align: center;">C'-M'</div><div style="text-align: center;"><div style="border-bottom: 1px solid black; width: 50px; margin: 0 auto;"></div><div style="text-align: center;">Π</div></div><div style="text-align: center;">r</div></div>									
1	I	—	224	160	64	224	96	320	350	126	0.5625
	II	—	288	160	128	288	192	480	450	162	
	total		512	320	192	512	288	800	800	288	
2	I	115	235	175	60	235	100	335	368.02	133.02	0.5660
	II	155	295	175	120	295	200	495	461.98	166.98	
	total		270	530	350	180	530	300	830	830.00	

Table 2.1, Part A

Period	Dept	<div style="display: flex; align-items: center; justify-content: space-around;"><div style="text-align: center;"><div style="display: flex; align-items: center;"><div style="border-bottom: 1px solid black; width: 50px; margin: 0 auto;"></div><div style="margin: 0 5px;">M-C</div><div style="display: flex; align-items: center;"><div style="border-left: 1px solid black; width: 10px; height: 10px; margin: 0 5px;"></div><div style="text-align: center;">MP</div></div></div><div style="text-align: center;">P</div><div style="text-align: center;">s</div><div style="text-align: center;">C+s</div><div style="text-align: center;">C'-M'</div><div style="text-align: center;"><div style="border-bottom: 1px solid black; width: 50px; margin: 0 auto;"></div><div style="text-align: center;">Π</div></div><div style="text-align: center;">r</div></div></div>									
		m									
1	I	—	224	160	64	224	108.80	332.80	364.00	140.00	0.6250
	II	—	288	160	128	288	211.20	499.20	468.00	180.00	
	total		512	320	192	512	320.00	832.00	832.00	320.00	
2	I	119.60	244.40	182.00	62.40	244.40	104.00	348.40	382.74	138.34	0.5660
	II	161.20	306.80	182.00	124.80	306.80	208.00	514.80	480.46	173.66	
	total	280.80	551.20	364.00	187.20	551.20	312.00	863.20	863.20	312.00	

Table 2.1, Part B

In production (P), the means of production become constant capital and labour power becomes labour, the labourers' activity functioning as variable capital. Upon entrance into the sphere of production, no change in material or value occurs. But production results in new outputs of greater value (C + s), due to the extraction of surplus value (s) – labour for which no equivalent has been paid. These outputs are generally not priced at their values (C + s); prices *tend* to

fluctuate around prices of production ($C'-M'$), which equal cost price (C) plus an average profit (π). Average profit differs from the surplus value each department extracts; were exchange to take place at prices of production, each capital would obtain the general rate of profit – the ratio of (1) the price expression of the total surplus value extracted in production and (2) the total cost price. The general rate of profit is determined *in production*, before circulation commences, so that its magnitude is the same whether outputs sell at their values, prices of production, or market prices differing from both. For simplicity, we assume that prices of production prevail in this period. As Marx showed, the sum of values (total $C + s$) equals the sum of prices (total $C'-M'$) and the sum of surplus value (total s) equals the sum of profit (total π).

The first circuit of money capital is now completed. For simple reproduction to occur, the collective capitalist of each department must obtain $160/320 = 0.5$ of the total MP produced in Department I, requiring an outlay of $0.5 \times £350 = £175$. The workers in Departments I and II must obtain $64/480 = 0.133$ and $128/480 = 0.267$ of the total AC produced in Department II, requiring outlays by the collective capitalists of $0.133 \times £450 = £60$ and $0.267 \times £450 = £120$, respectively. The productive consumption of these means of subsistence reproduces these workers' labour power. Each department's total price ($C'-M'$) in period 1, minus the sum of its advances to production ($M-C$) in period 2, equals the revenue (m) that the collective capitalists consume unproductively on AC purchased from Department II. The sum of the revenue, though less than the sum of profit in period 1, nonetheless enables them to buy the remaining $480 - 64 - 128 = 288$ AC ($288/480 = 0.6$, and $0.6 \times £450 = £270$).

Bortkiewicz (1984:212-13) alleged that, if the values in Marx's illustration permitted supplies to equal demands, the prices of production would not. Yet here the entire social product was bought and sold at its price of production, and each department's sales equalled its purchases: £175 MP were purchased by Department II and $£60 + £115 = £175$ AC were purchased indirectly by Department I.

The activity of production can now recommence. The workers have received their necessary means of subsistence and again perform 160 and 320 hours of labour (the sum of necessary and surplus labour, L and s) in Departments I and II. The portion of this labour for which no equivalent has been paid is greater in this period, because means of subsistence are cheaper and capital can obtain the use value of labour power at a lower price.

Since the total price and the total value of the first period are the same ($£800 = 800$ labour hours), the wages and capitalists' personal revenue, totalling $£450 = 450$ labour hours, which exit the circuit of capital between periods of production, are sums of value as well as price. The remainder, $£800 - £450 = £350 = 350$ labour hours, is thus *both the value and price* of the constant *capital* – even though this diverges from the value of the *means of production*. Again, while this conclusion is incomprehensible when value is conceived of as technologically

determined, when value is conceived of as a quantum of labour extracted from the living labourer that exchange can only redistribute, it makes perfect sense.

The sum of the constant capital plus the $\pounds 160 + \pounds 320 = \pounds 480 = 480$ labour hours of newly generated value is $\pounds 830 = 830$ labour hours, the total value of period 2. This total differs from the total value of the first period, but only because an additional value of $\pounds 30 = 30$ labour hours has been incorporated into the social capital in the interim.¹³

The sum of the surplus value in the second period, 300 labour hours, does not equal the newly added labour hours minus the *value of labour power*. As the sum of the newly added labour hours for which no equivalent has been paid it is, nevertheless, a quantum of surplus *value*.¹⁴ And, since the value and price of the capital advanced in period 2 are equal, it follows that the general rate of profit in period 2 – the ratio of surplus value to capital advanced – is a ‘price of production rate of profit’, but also a ‘value rate of profit’. As in period 1, addition of the resulting average profits to the cost price in period 2 yields a total price that equals total value, and subtraction of the total cost price from the total price of production yields a total profit that equals total surplus value. (This process of determination does not necessarily imply the actual attainment of prices of production or an equalised rate of profit.)

Because these *three* aggregate equalities hold in period 2, even though the values of the constant and variable *capital* diverge from the values of their *material elements*, Marx’s illustration of the value-price transformation has been shown to be generally valid – his results hold even when inputs are purchased at prices deviating from values. The prices of production and general profit rate are correct in period 1, *given* its input values, and correct in period 2, *given* its different input values. In neither period did we invoke a normalization condition as an extra ‘closing equation’, because the known data in each period suffice to calculate prices of production (see the Appendix for the exact mathematical expressions). The difference between the total price ($C' - M'$) of period 2 and the total value ($C + s$) of period 1 is due, not to a deviation of total price from total value, but to the incorporation of additional value into the social capital in the interim, so that the total price and value *of period 2* are equal, just as in period 1. Having demonstrated these results, and having accounted for social reproduction with supplies equalling demands without severing values and prices into two systems, our defence of Marx’s illustration is complete.

We now turn to two related issues. First, it may be thought that our illustration invokes a normalization condition because we have arbitrarily assumed each labour hour is expressed as $\pounds 1$. In ‘two-system’ transformation problem solutions, however, normalization conditions dictate an arbitrary equivalence between price and value aggregates even when *both* are expressed in money, or *both* in labour time (see Adolfo Rodríguez’s chapter in this volume). Our illustration dictates no such equivalence independent of the data. In any case, the assumption of a constant money expression of value does not affect our conclusions. In Table 2.1,

Part B, we present monetary magnitudes corresponding to the labour time magnitudes of Part A. We assume that each labour hour is initially expressed as £1, but that, for whatever reason, the money expression of a labour hour *after* production in period 1 rises to £1.04. All output values ($C + s$) and prices of production ($C'-M'$) are thus 4 per cent greater than in Part A. Surplus value in money terms is found by subtracting cost price ($M-C$) from value ($C + s$), and profit in money terms is found by subtracting cost price ($M-C$) from price of production ($C'-M'$). Again, total value equals total price and total surplus value equals total profit.

The ‘*value*’ and ‘*price of production*’ rates of profit are equal, as ratios of labour hours (0.5625 in Part A), and as ratios of £s (0.6250 in Part B). The *labour time* and *money* measures of profitability are, however, unequal ($1 + 0.6250 = [1.04] \times [1 + 0.5625]$). This discrepancy is caused only by the change in the monetary expression of value over the production period. Assuming that the money expression of value remains £1.04 per labour hour over the second period of production, the bottom row of Part B gives the money magnitudes corresponding to the labour time magnitudes of Part A’s bottom row. Because no change in the monetary expression of value occurs over period 2, the monetary measure of the general rate of profit returns to equality with the labour time measure, 0.5660.

Finally, we wish to challenge the view, expounded by proponents of transformation problem solutions, that the price relations holding in general equilibrium contradict Marx’s three aggregate equalities and thus invalidate his account of the value-price transformation. Were simple reproduction without technical change to continue, *ad infinitum*, and were the collective capitalists always to continue exchanging exactly at prices of production, *ad infinitum*, then the social capital would asymptotically approach the static equilibrium presented in Table 2.2 (money figures, assuming the money expression of value were to remain £1.04 per labour hour, are in the top rows; labour time figures, in italics, are in the bottom rows).

Dept	<div><div>MP</div><div>M-C</div><div>L</div></div>				<div><div>s</div><div>P</div></div>		<div><div>C+s</div><div>C'-M'</div></div>		<div><div>Π</div><div>r</div></div>
	m								
I	133.12	266.24	199.68	66.56	266.24	99.84	366.08	399.36	133.12
	128	256	192	64	256	96	352	384	128
II	166.4	332.8	199.68	133.12	332.80	199.68	532.48	499.20	166.40
	160	320	192	128	320	192	512	480	160
total	299.52	599.04	399.36	199.68	599.04	299.52	898.56	898.56	299.52
	288	576	384	192	576	288	864	864	288

Table 2.2

Given the data of our illustration, an additional 34 labour hours and 12 labour hours would have become incorporated into constant and variable capital, respectively, the latter increase implying a 12 labour hour reduction in surplus value. Even if we imagine, for the sake of argument, that the stringent conditions needed for this static equilibrium terminus are somehow actually satisfied,

Marx's results still hold. The sums of price and profit equal the sums of value and surplus value, respectively, and the 'price of production' and 'value' profit rates are identical – and all three equalities hold both in money and in labour time terms.

2.4 CONCLUSIONS

We have not put forth the 'McGlone and Kliman solution to the transformation problem'. We have defended *Marx's own account* as internally consistent. If no self-contradiction is found within our interpretation of it, then one must reject the traditional claim that Marx's account is simply contradictory. One must at minimum concede that there is a defensible interpretation that finds it to be internally consistent (see especially, in addition to our own work, Giussani (1991), Carchedi (1991), and the chapters by Freeman, and by Carchedi and de Haan, in this volume).

We believe the issue of internal consistency must be faced squarely, irrespective of the truth value of Marx's *Capital* or the relative merits of our interpretation and the traditional approach. Marx's critics, not his defenders, are the ones who have made his alleged errors the ground upon which the economics profession has debated his work. It is a matter of simple intellectual honesty that they now either demonstrate that our defence of Marx is itself internally inconsistent, or renounce claims to have refuted him on logical grounds.

Marx's work has seemed obscure and incoherent in part because theorists have too quickly jumped to conclusions, rejecting or revising it before taking care to internalize it, learn from it, and thus work out the apparent contradictions. Precisely because such tendencies have characterized the history of post-Marx Marxism, the Marxism of Marx remains largely unexplored; much can still be learned from it. We and others have begun to find meaning and coherence in aspects of Marx's work commonly thought to be obscure or incoherent. This encourages us to continue the attempt to rediscover and learn from Marx's body of ideas.

2.5 APPENDIX

The first two sections of this Appendix present the relations depicted in Table 2.1, Part A in a general form, one applicable not only to the restrictive conditions assumed in the table (simple reproduction, two departments, no outputs used as both means of production and consumption), but to any set of single-output sectors without fixed capital. The third section shows that Marx's three aggregate equalities always hold. The proofs refer to a single period and thus do *not* require technology or input-output relations to be constant through time.

I. In period t , the physical relations are expressible by:

$$A = [a_{ij}] \quad n \times n \text{ matrix of } i^{\text{th}} \text{ input used per unit of } j^{\text{th}} \text{ output}$$

w	$= [w_i]$	column vector of real wage components per unit of living labour extracted
l	$= [l_j]$	row vector of living labour extracted per unit output
K	$= [k_{ij}]$	$n \times n$ 'augmented input-output' matrix; $K = A + wl$
q	$= [q_i]$	column vector of gross outputs

and the variables to be determined are:

p_{t+1}	$= [p_{j,t+1}]$	row vector of unit prices of production (output prices)
v_{t+1}	$= [v_{j,t+1}]$	row vector of unit values of outputs
r_t		a scalar, the general rate of profit.

Initial unit input prices, p_t , are given (or determined in the prior period). ε , a scalar measured in £ per labour hour, indicating the initial monetary expression of value, is also given.

II. We now 'translate' the symbols in Table 2.1 into matrix form, assuming for simplicity that the monetary expression of value remains constant over the production period, t . The following scalar magnitudes express sums for the *total social capital*, and are amounts of money. When divided by ε , each is converted into a number of labour hours.

$$MP_t = p_t A q \quad (1)$$

$$L_t = p_t w l q \quad (2)$$

$$M_t = C_t = P_t = p_t K q \quad (3)$$

$$LL_t = \varepsilon l q \quad (4)$$

$$s_t = \varepsilon l q - p_t w l q \quad (5)$$

$$(C + s)_t = \varepsilon v_{t+1} q = p_t A q + \varepsilon l q \quad (6)$$

$$r_t = (\varepsilon l q - p_t w l q) / p_t K q \quad (7)$$

$$C'_t = M'_t = p_{t+1} q = (1 + r_t) p_t K q \quad (8)$$

$$\pi_t = (r_t) p_t K q \quad (9)$$

$$m_{t+1} = p_{t+1} q - p_t K q \quad (10)$$

Let \hat{q} be an $n \times n$ diagonal matrix, with gross outputs along the main diagonal. By substituting \hat{q} for q , except where q appears as an argument in the rate of profit, the corresponding *sectoral aggregates* are obtained.

By eliminating each q (except, again, where it appears as an argument in the rate of profit), the corresponding *unit magnitudes* are obtained. For example, as expressed in money the unit values of output are

$$\varepsilon v_{t+1} = p_t A + \varepsilon l \quad (6')$$

and unit prices of production are

$$p_{t+1} = (1 + r_t) p_t K \quad (8')$$

III. It is easy to show that Marx's three aggregate equalities hold in each period, again assuming for simplicity a constant monetary expression of value. First, the sum of prices in period t , equation (8), is

$$(1 + r_t) p_t K q$$

which (using (7)) equals

$$p_t Aq + \varepsilon lq$$

the money expression of the sum of values in period t , equation (6). Second, the sum of profit in period t , equation (9), is

$$(r_t)p_t Kq$$

which (using (7)) equals

$$\varepsilon lq - p_t w lq$$

the money expression of the sum of surplus value in period t , equation (5). Third, the general ‘price of production rate of profit’ in period t is

$$(p_{t+1}q - p_t Aq - p_t w lq)/p_t Kq$$

and since $p_{t+1}q$, the sum of prices, equals

$$p_t Aq + \varepsilon lq$$

the ‘price of production’ rate equals the ‘value rate of profit’, equation (7). (In another sense, as a ratio of money magnitudes, (7) is a ‘price’ rate of profit. Division of both numerator and denominator by ε yields the ‘value’ (labour time) rate.

NOTES

- ¹ See De Angelis (1994) for a well developed critique, similar to our own, of both poles of the technological/social dichotomy.
- ² Cf. Marx’s fourth thesis on Feuerbach. Feuerbach ‘resolv[ed] the religious world into its secular basis. But that the secular basis detaches itself from itself and establishes itself as an independent realm ... can only be explained by the cleavages and self-contradictions within this secular basis [which] must then itself be destroyed in theory and in practice’.
- ³ ‘[I]f the commodity has a double character ... then labour contained in the commodity must also be of double character, while mere analysis of labour as such, as with Smith, Ricardo, etc., must everywhere come up against the inexplicable. This is indeed the whole secret of the critical conception’ (Marx to Engels, 8 January 1868).
- ⁴ For further discussion of the inner nature of capital and its relation to competition, see Andrew Kliman’s chapter in this volume.
- ⁵ This phrase (without emphases) is part of the title of *Capital*, Volume III, Chapter 9.
- ⁶ For just one example, see Marx (1976a:417).
- ⁷ For instance, one could let total value equal the total price of means of production and subsistence, thereby showing that profit is a pure markup on top of commodities’ real value. Though this would violate the entire spirit of Marx’s theory, it constitutes a ‘solution’ to the transformation problem which is no less legitimate than any other.
- ⁸ Marx, quoted in Lukács (1971:9). See Nicolaus’s translation in Marx (1973:88). Ironically, though Samuelson (1971) himself does not recognize the ‘organic union’ of values and prices, his suggestion that an eraser be used to effect the transformation indicates that he considers the use of normalization conditions to be an arbitrary way of relating values to prices.
- ⁹ Let q_{t-1} be a column vector of gross outputs produced in period $t - 1$. In a closed, purely capitalist society, its full realization requires the recommitment to production of one portion, K_t , as means of production and subsistence, and capitalists’ consumption of the rest, $N_t = q_{t-1} - K_t$. For *any* (row) vector of input prices, p_t (which are also the output prices of $t-1$), $p_t q_{t-1} - p_t K_t = p_t N_t$; that is, the revenue remaining after advances to production is sufficient to buy the remaining output. Note also that simple reproduction is just a special case of the above, so it can in principle take place at *any* prices, and not only prices that equate capitalists’ consumption expenditures to total surplus value.
- ¹⁰ It is clear that Marx (1976a:711, 716) regarded reproduction as a continuously renewed process taking place in real time. His verbal discussions of input price transformation (Marx 1981:265; and Marx 1972:167-68) treat it, too, as a historical process taking place in real time.

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- ¹¹ All attempts to prove internal inconsistency in Marx's account alter the *problem* his illustration is made to address without permitting the *illustration* to be modified accordingly. We therefore consider these proofs illegitimate.
- ¹² As a moment in the circuit of *productive* capital, its role in Table 1, m is used by Marx to denote 'the capitalist's revenue' (Marx 1978:149, also 152), 'the money that the capitalist spends, whether on commodities as such or on services, for his esteemed self and family' (Marx 1978:146). In the circuit of *money* capital, he uses m to denote surplus value. To avoid confusion, we use s instead.
- ¹³ In any period t , total value (and total price) equals $MP_t + LL_t$, so the change in total value (and total price) between periods t and $t+1$ equals $(MP_{t+1} + LL_{t+1}) - (MP_t + LL_t)$. Capitalists' revenue between periods is $m_{t+1} = (MP_t + LL_t) - (MP_{t+1} + LL_{t+1})$, so the change in total value (and total price) also equals $LL_{t+1} - m_{t+1} - LL_t$. Hence, the change in total value (and total price) between periods is due only to a difference between the quantum of new value entering the circuit of capital through extraction of living labour and the quantum of existing value exiting the circuit through capitalists' and workers' consumption.
- ¹⁴ 'The workers must work for a greater or lesser amount of time in order to buy back these commodities (to replace them) and must therefore *perform more or less necessary labour* than would be needed if the prices of production of their necessary means of subsistence did coincide with their values' (Marx 1981:309, emphasis added).

3 The transformation of values into prices of production: a different reading of Marx's text

Alejandro Ramos-Martínez and Adolfo Rodríguez-Herrera

The signs seemed the same but the words were different
E.L. Bennett

3.1 INTRODUCTION

Throughout the twentieth century, the transformation problem has been interpreted by Marx's critics as well as his defenders almost exclusively on the basis of the Ricardian approach established in 1906-7 by Bortkiewicz (1952, 1984).¹ The principal feature of this view is the methodological dualism established in the determination of values and prices. According to Bortkiewicz: 'the procedure employed by Marx for the transformation of values into prices is erroneous, since it fails to keep separate rigorously enough the two principles of value and price calculation.'² This separation involves the idea that 'prices' are dependent variables that must be 'derived' from 'values'. This approach – which will be called 'dualistic' here – ensues from a misunderstanding of Marx's dialectical analysis where the twofold nature of economic categories is always conceived of as a unity of opposites. Dualism misses such unity and replaces it with a cause and effect relationship wherein the poles of the categories are exclusively presented as separate realms.³ In the case of the price-value relationship, the dualistic approach was first clearly proposed – though set out inversely – by Tugan Baranowsky (1905). Based on Tugan's vision, Bortkiewicz obtains his own well known result:

It would not be permissible to equate total price with total value whilst simultaneously equating total profit with total surplus value. (Bortkiewicz 1952:12)

Once Sweezy (1970) gave the stamp of academic authority to this approach in 1942, it was developed by Winternitz (1948) and Seton (1957). In the 70s the debate intensified significantly because of Samuelson's article (1971) and Steedman's Sraffian reading (1977). These writers vigorously raised some of the issues established at the beginning of the century. The debate then involved many authors, such as Morishima (1973), Baumol (1974), Yaffé (1974), Gerstein

(1976) and Shaikh (1977). Soon after, Duménil (1980), Foley (1982) and Lipietz (1982) proposed the so-called New Solution.⁴ These authors essentially maintain the methodological dualism of the orthodox vision but consider that the transformation should be solved by only taking into account ‘the net product’.

However, there is another group of authors that has begun to re-examine the methodological terms by which the debate has become crystallized. With different frameworks, the contributions by Wolff, Roberts and Callari (1982, 1984a), Carchedi (1984), Roberts (1987), Kliman and McGlone (1988), Giussani (1991), Freeman (1993a), and other writers have begun to break down the dualistic approach to the transformation. This point of view, however, is fully overwhelmed by the orthodox vision whose influence is almost absolute.⁵

One of the strengths of the dualistic approach is that a superficial reading of the draft left by Marx might mislead the interpreter towards finding what is *apparently* textual support of the traditional interpretation. One supporting element is that, in the first numerical example presented by Marx in order to illustrate his procedure in Chapter 9, *Capital* III, the figures corresponding to the cost price elements remain unchanged after the transformation is conceptually accomplished. The second supporting factor encompasses a group of passages where Marx discusses whether the deviation of the prices of inputs from their values affects his conclusions.

On this basis, Bortkiewicz established the two *leitmotifs* of the debate. First, Marx had left the transformation conceptually unfinished. Second, Marx had been conscious of this flaw but considered it unimportant; in support of this assertion the above mentioned texts began being cited. Actually, these points were first made (and one of these texts quoted) by Komorzynsky (1897), who is a veritable ‘missing link’ between Böhm-Bawerk and Bortkiewicz.

The purpose of this chapter is to read systematically the procedure developed by Marx in Chapter 9 of *Capital* III in the light of the above mentioned methodological reworking of the transformation problem. A thorough reading of the text will show that the alleged evidence has a completely different meaning in relation to the interpretation put forth by Bortkiewicz. In the first section the thesis maintained by Marx will be followed; in the second section an interpretation of the methodological meaning of the transformation in Marx’s presentation is advanced; in the third section the main critiques of Marx’s procedure will be traced. In the fourth and fifth sections a method of carrying out the transformation will be presented, which, in contrast with conventional methods, tries to emphasize the Marxian conception of the relationship between value and its form. The conceptual transition achieved by Marx in the second and third tables of Chapter 9, *Capital* III, is the initial step of this procedure whose complete development will corroborate the soundness of Marx’s conclusions. The last section will carefully examine the passages where Marx tests the validity of his results. To clarify his reasoning, we will follow an observation made by Marx himself in one of these texts where he refers the reader to a method used in

Capital I and II. Thanks to this remark, completely neglected by subsequent literature, his texts can be read with a new and different meaning. Moreover, it will be shown that the passage quoted by Duménil (1980) does not support his interpretation of the transformation.

3.2 VALUE AND PRICE IN MARX

The terms of the transformation problem were presented by Marx in *Capital* I:

The masses of value and of surplus-value produced by different capitals – the value of labour-power being given and its degree of exploitation being equal – vary directly as the amounts of the variable components of these capitals, i.e. the parts which have been turned into living labour-power. This law clearly contradicts all experience based on immediate appearances. Everyone knows that a cotton spinner, who, if we consider the percentage over the whole of his applied capital, employs much constant capital and little variable capital, does not, on account of this, pocket less profit or surplus-value than a baker, who sets in motion relatively much variable capital and little constant capital. For the solution of this apparent contradiction, many intermediate terms are still needed.⁶

When commodities are exchanged at *prices* corresponding to their values, the surplus value *appropriated* by the different spheres – called *profit* by Marx – equals the surplus value *produced* by them. However, their exchange tends to be accomplished in proportions determined by the amounts of capital advanced in production, that is, according to the production prices rather than the values of commodities. Actually, they are exchanged at their market prices and production prices are only tendentially imposed in competition between individual capitals.

Grasping the contradiction which Marx discusses in the above passage requires comprehending the concept of value and, particularly, the relation between value and its form. It is usual to define erroneously value as 'labour', that is, to reduce value to its substance.⁷ Actually, value is a complex concept: value is the unity of abstract labour (its substance) and money (its form)⁸ and, thus, it has an immanent or intrinsic measure (socially necessary labour time) and an extrinsic measure (exchange value or price).

In capitalist society, labour is realised as social labour under the form of money. Marx always refers to value as a quantity of money because

[m]oney as a measure of value is the necessary form of appearance of the measure of value which is immanent in commodities, namely labour time. (Marx 1976a:188)

Measuring value in labour time units shows a misunderstanding of the 'internal, necessary connection between the *form* of value, the *substance* of value and the *magnitude* of value.'⁹ Therefore, the value of a commodity can only be expressed through a given quantity of another commodity's use value; when the latter is the money commodity, this expression – that is, the amount of the use value of the money commodity as measured in units determined by the standard of prices (for example an ounce of gold) – is called *price*. Yet, the value objectified in the quantity of use value which constitutes the commodity's price

may diverge from the value embodied in the commodity itself. Thus, the price of the commodity

may express both the magnitude of value of the commodity and the greater or lesser quantity of money for which it can be sold under the given circumstances. The possibility, therefore, of a quantitative incongruity between price and magnitude of value, i.e. the possibility that the price may diverge from the magnitude of value, is inherent in the price-form itself. (Marx (1976a:196)

Through his critique of Ricardo, Marx understood that the incongruity between price and value is not limited to occasional divergences but, rather, constitutes one of the key features of capitalist competition. By elucidating the rationale of these divergences, that is, explaining the contradiction between price and value, the analysis of the relation between value and its form is brought to a more concrete level and, at the same time, the presentation of how the law of value acts through competition is made more complex.

Marx deals with this issue in many passages¹⁰ and presents its solution in tabular form on five occasions, two of which are in Chapter 9, *Capital* III.¹¹ Since Komorzynsky and Bortkiewicz, the literature has been concerned with the first example of this chapter, where Marx presents a numerical example with five spheres of production developed in three consecutive tables. In the first table, each sphere advances a global capital of 100, which is completely consumed in production so that the value produced by each sphere can be broken down into capital advanced and surplus value. In the second table, all the spheres advance the same capital of 100, but a fraction of it is not consumed; in this case the value produced by each sphere is broken down into the consumed fraction of the capital advanced (cost price) and the surplus value.

In both tables, Marx assumes that the rate of surplus value is the same in all spheres (100 per cent) but their organic composition is different. This implies that, with the same advanced capital of 100, each sphere exploits a different quantity of living labour and thus produces a different amount of surplus value. Marx’s second table¹² is laid out as in table 3.1 below:¹³

	Constant Capital	Constant Capital Used Up	Variable Capital	Cost Price	Surplus Value	Value	Rate of Profit (%)
#1	80	50	20	70	20	90	20
#2	70	51	30	81	30	111	30
#3	60	51	40	91	40	131	40
#4	85	40	15	55	15	70	15
#5	95	10	5	15	5	20	5
Σ	390	202	110	312	110	422	22%

Table 3.1

It is important to note that Marx does not say what is the unit of measure of these magnitudes. This is one reason why many authors, once the transformation debate began, measure value in labour units and not money.¹⁴ Actually, the unit of measure can only be money because, as Marx states on many occasions,

money, as a measure of value is the necessary form of appearance of the measure of value which is immanent in commodities, namely labour time.¹⁵

This is confirmed, for instance, in passages of *Grundrisse, Theories of Surplus Value* and Marx's letter to Engels dated August 2, 1862, where he also explains the transformation of values into prices of production.¹⁶ In these examples all value magnitudes are expressed in money (£). The omission of units of measurement in the corresponding text of *Capital* III only shows the provisional and unfinished character of the draft published by Engels.

What does the sixth column of Table 3.1 represent?

[The] *money prices* at which [the] commodities would exchange if they were exchanged according to their *values*.¹⁷

Therefore, this column simultaneously depicts the *value* and the *price* of the product of each sphere, while the fifth column simultaneously represents the surplus value *produced* by each sphere and the *profit* or *surplus value* they have appropriated.¹⁸ Given the different organic compositions of the five spheres, this assumption would imply that the profit rate of the various spheres – calculated as the ratio between their profit and their invested capital and shown in the seventh column – diverge from one another. However,

in actual fact, ignoring inessential, accidental circumstances that cancel each other out, no such variation in the average rate of profit exists between different branches of industry, and it could not exist without abolishing the entire system of capitalist production. (Marx 1981: 252)

Instead of calculating the *value-price vector* presented in column 6 of Table 3.1, it is also possible to calculate another *price vector* which distributes the surplus value produced between all spheres in proportion to the invested capital; that is, a vector of prices of production. To do this, it is necessary to calculate the general rate of profit (π) as the ratio between the mass of surplus value produced (SV) by the society, and the *total* capital advanced (constant C plus variable V capital):

$$\pi = \frac{SV}{C + V}$$

In his third table (table 3.2) Marx calculates this rate of profit and the prices of production corresponding to each sphere:

	Constant Capital	Constant Capital Used Up	Variable Capital	Cost Price	Surplus Value	Value	Profit	Price of Production	Diverg- ence
#1	80	50	20	70	20	90	22	92	+2
#2	70	51	30	81	30	111	22	103	-8
#3	60	51	40	91	40	131	22	113	-18
#4	85	40	15	55	15	70	22	77	+7
#5	95	10	5	15	5	20	22	37	+17
Σ	390	202	110	312	110	422	22	422	0

Table 3.2

The price of production of each branch is broken down into cost price and average profit which is calculated as the proportion π of the total capital invested (not only the consumed capital or cost price). The migration of capital across the different spheres of the economy in search of a higher profit rate tends to equalise the sectoral rates of profit. As a result, prices on average tend to correspond to production prices, determined by the amount of *capital* necessary to produce the commodities, rather than to their values, determined by the amount of *labour* necessary to produce them.¹⁹

The difference between value and price implies that the surplus value *appropriated* through exchange among the various branches – profit – no longer coincides with the surplus value *produced* by each of them. Those branches that exploit relatively more labour sell their commodities at a price lower than their value and thus pocket a profit lower than the surplus value they have extracted; the reverse occurs in the spheres that mobilize relatively less living labour. However, taking all the spheres together,

the divergences of price from value ... cancel each other out when surplus value is distributed evenly ... To the same extent that one section of commodities is sold above its value, another is sold below it. (Marx 1981:257)

Therefore,

if a commodity is sold above or below its value, there takes place merely a change in the distribution of surplus value between different capitalists. (Marx 1991:75)

If commodities are sold at their prices of production, how does value ‘determine’ these prices?

It is clear that, however much the [price of production] of an individual commodity may diverge from its value, it is determined by the *value* of the total product of the social capital.²⁰

The fact that value constitutes a ‘determinant’ means that it is a quantitative *limit* established by total product; prices of production simply represent a redistribution of this produced quantity of value. Hence, *determination* is not a cause and effect relationship.

These are the main features of Marx’s solution to the apparent contradiction between value and its form which he points out in the *Capital* I passage quoted at the beginning of this section: *value* results from the objectification of socially necessary labour; *price* ensues from the distribution of the surplus value among the various branches of production. As is well known, Marx’s solution implies that the sum of values equals the sum of prices of production and, at the same time, the sum of surplus value equals that of profits.²¹ This conclusion was later to be criticized by Tugan Baranowsky, Bortkiewicz and many others.

Yet, before considering these critiques, it is convenient to discuss the methodological meaning of the transformation and, specifically, the transition accomplished between the second and the third tables of Chapter 9, *Capital* III.

3.3 THE METHODOLOGICAL MEANING OF THE TRANSFORMATION

The dualistic approach to the transformation considers that, before *Capital* III, Marx has exclusively dealt with the 'value calculation' as completely separate from any price expression. This interpretation involves the belief that values are a 'system' separate from prices and even expressed in a different unit of measure (labour time). According to Dobb, the transformation problem

is essentially whether or not the prices of production ... are *deducible* from ... value[s], as determined by quantities of embodied labour. (Dobb 1955:273, emphasis added)

Afterwards, it is commonly asserted that

a set of ... equations can be used to express the value of each output as the amount of labour used directly [and] indirectly ... these values are entirely determined by technological relationships and ... entirely independent of pricing. (Baumol 1974:56)

It has been generally supposed that the relationship between Marx's tables is one of 'causation', where the third (the 'price system', belonging to 'circulation') is 'derived' from the second (the 'value system', 'entirely independent of pricing').

The defenders of this approach attempt to be faithful to Ricardo's and Marx's critiques of Smith's circular adding up concept of value.²² Nevertheless, when Marx says that value 'comes first' or 'is prior to' the price of production, he means that value is the form in which social labour is objectified and price is the form in which it is appropriated; this does not mean, however, that value is a causal factor determined before prices.²³

One complementary version of the dualistic interpretation is based on Rosdolsky (1977). According to this author, in *Capital* I and II, Marx considers 'capital in general' and completely abstracts from the multiplicity of capitals, competition and prices, elements that are allegedly taken into account in *Capital* III. However, neither Rosdolsky nor his followers (Moseley 1993a) have been successful in demonstrating how the operation of the law of value can be accomplished outside of competition, that is, outside the concrete process where the prices are formed. Competition is an inherent element not only of the concept of capital but also of the concept of value itself.²⁴

If competition and prices are regarded, what is Marx's abstraction before setting out *Capital* III? Marx specifically abstracts from the fact that 'the existence [of] a general rate of profit ... prima facie contradicts the determination of value by labour time',²⁵ that is the contradiction between values and prices as presented in the passage of *Capital* I, Chapter 11, cited at the beginning of the first part of this chapter. In this text, Marx summarizes his critique of Ricardo and states that 'many intermediate terms are still needed' to grapple with this opposition between essence and appearance. Only when

the transformation of ... labour-power into wages [and] the transformation of surplus-value into profit ... ha[ve] been explained.²⁶

can this contradiction be properly resolved. Beforehand, it is necessary to abstract from this issue and, correlatively, to assume that ‘prices = values’. Yet, this assumption by no means signifies that value is a substance lacking form; that is, that commodities have no price.

Therefore, from the beginning Marx has taken competition into account, but under conditions that imply that the vector of values coincides with that of prices (‘values = prices’); that is, competition is considered as a *formal* but *existing* process.

Having developed the required categories, Marx works out his second table (Table 3.1) – where surplus value has been transformed into profit²⁷ – maintaining the preceding assumption that ‘prices = values’ and considering the heterogeneity of capital compositions.²⁸ This table, wherein commodities have value and price, does not represent a ‘system of values’, ‘entirely independent of pricing’, as the dualistic approach claims. When the heterogeneity of capital compositions is taken into account, the result is the emergence of different rates of profit, an outcome that contradicts the immanent tendency towards a general rate of profit. These are the terms of the contradiction – abstracted from until *Capital* III – that Marx seeks to resolve; to do this, he accepts that *prices* \neq *values* and correspondingly introduces the category of price of production. Therefore, from now onwards *prices* = *production prices*. As seen, this is how the third table (Table 3.2) is worked out. Marx resolves the contradiction by showing that there is a permanent divergence between values and prices which produces a transfer of surplus value among the spheres. The consideration of competition, previously taken into account *only formally*, becomes a *real* element of the presentation.

Yet this step in the construction of the concrete totality of the capitalist reproduction means that, in contrast to *Capital* I and II, the law of value is *negated* as the norm of exchange between *individual commodities*, and that value and its form no longer coincide directly. In particular, a divergence between the *intrinsic* measure of value (labour time) and its *extrinsic* measure (value in exchange) arises. In his third table Marx shows, however, that this contradiction of the law of value is produced *at the level of individual capitals* but is superseded *at the level of the totality* of capitalist circulation. This is the meaning of the global annulment of the divergences between prices and values: it means that the individual differences between value and price – that is the negation of the law of value as the norm of individual exchange – are the concrete form through which *value* becomes the expression of social labour.²⁹ Therefore, it is clear that ‘production prices [are] mere transformed forms of value’³⁰ and that, considering the totality, they are only fractions of value – specifically, the forms under which value has been appropriated.

There is another sense according to which the principle of construction of the second table is preserved in the third table. In his second table Marx presents commodity *values* as formed by the *price* paid for the elements of cost price and by the surplus value. This calculation principle has been kept in the third table

but here the *prices* of the elements of cost price are equal to their respective *prices of production*, whereas in the second table they are equal to their *values*.

The transformation of values into prices of production is, therefore, a dialectical transition in the presentation of the operation of the law of value and of the relation between value and its form: the simple form of the law of value (values = prices) is negated *at individual level* by the equalisation of the rate of profit (values \neq prices of production) but this is only the manner in which it is imposed on the *totality* (sum of values = sum of prices). In this way, the law of value becomes a complex category and the relation between value and its form *actually* presents the feature of 'quantitative incongruity' which is inherent in its development as price form. Thus, Marx's equalities are *unities of opposites* which express the two contradictory aspects of one process, more specifically, the contradictory unity of production and distribution.³¹ Marx elucidates the rationale of this contradiction in a series of mediations, not completely developed in the first section of *Capital I*.

This transition is expressed in the relation between the two main tables of Chapter 9, *Capital III*: the third table *negates* and simultaneously *preserves* the criterion of construction of the second table; that is, the third table *contradictorily contains* the second. Tugan Baranowsky and Bortkiewicz read this transition erroneously, believing that each table represents a 'world' completely apart from the other.³² In particular, they think the third table is 'derived' mechanically from the second, without perceiving that the latter is integrated in the former.

3.4 TUGAN BARANOWSKY'S AND BORTKIEWICZ'S CRITIQUES OF MARX'S METHOD

During the early twentieth century, the tables drafted by Marx were the object of two reworkings which have framed the 'modern' transformation debate. The first was Tugan Baranowsky's.³³ It constitutes the basis of the second, carried out by Bortkiewicz³⁴ a few years later. This has since been at the heart of the whole debate.

Bortkiewicz criticizes the procedure Marx followed in drafting his solution. He slightly modifies Marx's second table (Table 3.1) to convert it into a simple reproduction schema: constant capital consumed by sphere 2 is 50 in lieu of 51, and in sphere 3, 52 instead of 51. Moreover, he assumes that spheres 3 and 4 produce means of production; 1 and 5 means of subsistence for the workers; and sphere 2 luxury goods. Marx's table, as modified by Bortkiewicz, becomes Table C. On this basis, Bortkiewicz reworks Marx's third table, where production prices are calculated. This is shown in Table 3.4.³⁵ Bortkiewicz's critique of Marx's presentation is clearly shown in this table.³⁶ Here, the general rate of profit is calculated, as in Table 3.3, as the ratio between total surplus value (110) and the total capital invested (500); this rate is then used to determine prices of production.

	Constant Capital	Constant Capital Used Up	Variable Capital	Cost Price	Surplus Value	Value	Rate of Profit (%)
I	145	92	55	147	55	202	
#3	60	52	40	92	40	132	40.0
#4	85	40	15	55	15	70	15.0
II	175	60	25	85	25	110	
#1	80	50	20	70	20	90	20.0
#5	95	10	5	15	5	20	5.0
III	70	50	30	80	30	110	
#2	70	50	30	80	30	110	30.0
Σ	390	202	110	312	110	422	22.0

Table 3.3

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Con- stant Capital	Constant Capital Used Up	Variable Capital	Cost Price	Surplus Value	Value	Profit	Price of Produc- tion	Diverg -ence	Quan -tity	PP/Q
I	145	92	55	147	55	202	44	191	-11		
#3	60	52	40	92	40	132	22	114	-18	33	3.45
#4	85	40	15	55	15	70	22	77	+7	35	2.20
II	175	60	25	85	25	110	44	129	+19		
#1	80	50	20	70	20	90	22	92	+2	30	3.07
#5	95	10	5	15	5	20	22	37	+17	5	7.40
III	70	50	30	80	30	110	22	102	-8		
#2	70	50	30	80	30	110	22	102	-8	55	1.85
Σ	390	202	110	312	110	422	110	422	0		

Table 3.4

Bortkiewicz finds that, in the calculation of these prices, Marx kept the figures corresponding to the *value* of the elements of the cost price unaltered, instead of transforming them into *prices of production*; that is Marx

made the mistake of carrying over certain magnitudes without alteration from the table of values into that of prices. In transforming values into prices, it is inadmissible to exclude from the recalculation the constant and variable capital invested in the various spheres of production. (Bortkiewicz 1952:9)

Actually, this proposition was first advanced by J. V. Komorzynsky. He asserts:

Marx has disregarded the mutual dependence of the prices of the various products and the same omission is found in many passages where he presents the ‘price of production’ as ‘cost-price’ including profit but, at the same time, he defines ‘cost-price’ as the ‘value’ of the consumed constant and variable capital. [For example, Marx asserts that] ‘prices of production ... are equal to their cost elements (the value of the constant and variable capital consumed) plus a profit determined by the general rate of profit’.³⁷

It is clear that, in his reading, Komorzynsky confuses the value of the *constant* and *variable capital* – that is, a sum of money devoted to purchase the inputs, which is generally equal to their prices of production – with the value of the *means of production* and the value of the *wage goods*. Besides this, Komorzynsky asserts that Marx was conscious of his own neglect because he ‘was fully familiar with the mutual interaction of product prices’. To support this

statement, Komorzynsky quotes a passage of *Capital* III, Chapter 9.³⁸ In this form, this author introduced a reading error which has been accepted uncritically in all the subsequent literature. Summing up these propositions, Bortkiewicz asserts that Komorzynsky

shows how Marx has not consequently carried out the conversion of values into prices [and] ... finds that, in *Capital*, the expressions of value and price are confused one with another and, in this point, his critique is an important complement to Böhm-Bawerk's.³⁹

He concludes that Marx's solution

cannot be accepted because it excludes the constant and variable capital from the transformation process, whereas the principle of the equal profit rate, when it takes the place of the law of value in Marx's sense, must involve these elements. (op cit p201)

Tugan Baranowsky also points out a problem he finds in Marx's procedure. The rate of profit in Marx's third table (Table 3.2) is calculated as the ratio between the social surplus value and the *value* of the elements of the invested capital, that is the value of means of production plus the value of wage goods. But Tugan observes that, when capital is invested, the actual rate of profit taken into account by capitalists is not determined by this ratio, but rather by the ratio between the surplus value produced and the *price* of the elements of the invested capital:

We can see, thus, that the general or social rate of profit differ, depending on whether its calculation is carried out with commodities' money prices or labour values. Yet, which of these two rates has relevance? Obviously the rate calculated in accordance with money prices because profit arises actually on the basis of money prices.⁴⁰

A proper calculation would lead Marx into a vicious circle: Marx needs the rate of profit to calculate the correct production prices but he also needs the latter to obtain the former.

These two problems lead Tugan Baranowsky and Bortkiewicz to assert that the transformation procedure devised by Marx was left theoretically unfinished. In order to complete it Bortkiewicz, using Tugan Baranowsky's example, applies a method that – he thinks – rectifies Marx's mistake. As a consequence of this rectification, Bortkiewicz asserts that Marx's double equality is not valid.⁴¹ Although his work is less algebraically elaborated, Tugan Baranowsky reaches a similar conclusion.⁴²

It can be presumed that the transformation is incomplete; that is, that Marx's numerical tables are unfinished. In his draft, he illustrated the general lines of his method of calculation (for example the definition of the rate of profit) but he did not construct a finished numerical example. This is probably why, in his three tables, the figures corresponding to the cost price elements and the rate of profit are the same. To 'complete the transformation' merely means to carry out a numerical calculation which does not affect Marx's theoretical framework.

In his attempt to 'correct' the transformation, Bortkiewicz misinterprets Marx's conception of the relation between value and its form. In particular, he misunderstands the theoretical meaning of the assumption that values = prices

that – it can be assumed – Marx maintains in the first two tables of Chapter 9, *Capital* III. Bortkiewicz thinks that in these two tables Marx only determines the commodity's values, while in the third he only determines prices; the first two tables then represent a world of values without prices, the latter is a world of prices without values. Hence it is not by chance that in reworking Marx's third table Bortkiewicz suppresses the column corresponding to values: according to him values were determined, once and for all, in the previous table.⁴³

Marx, on the contrary, in each of his tables simultaneously determines values and prices. As already stated, the assumption 'values = prices' in the first two tables means that the column of values represents, *at the same time*, the *value* and the *price* of commodities, that is that commodities are exchanged in proportions that allow their producers to appropriate all surplus value extracted from the workers. Therefore, this assumption does not imply a calculation without prices. When Marx passes from the second to the third table, he calculates the prices that allow the capitalists to appropriate a uniform portion of the total surplus value; nevertheless, in the third table, *he calculates values as well as prices*. The fact that the commodities are now exchanged with prices differing from their values

is not a defect, but, on the contrary, it makes this form the adequate one for a mode of production whose laws can only assert themselves as blindly operating averages between constant irregularities. (Marx 1976a:196)

How can it be shown that Marx's calculation in each of his tables is simultaneously a value and price determination, in contrast with Tugan Baranowsky's and Bortkiewicz's? According to these authors, the value of a commodity is formed by the sum of the *value* of means of production, the value of wage goods and the *value* of commodities appropriated by capitalists (luxury goods in simple reproduction). This concept of the magnitude of value coincides with Marx's before *Capital* III. However, when prices no longer correspond to values, Marx states that the *value* of the commodities is broken down into constant capital, variable capital and surplus value. Constant capital is a given amount of money that the capitalist allots to the replacement of means of production and, thus, does not necessarily match their *value* – as Tugan Baranowsky and Bortkiewicz believe – but their *price*. Variable capital is the amount of money allotted to wages, which is used by workers to buy their means of subsistence, and corresponds to the *price* of the wage goods and not to their value. Finally, surplus value is the difference between the new value produced by living labour and the wages. Conceived in this form, value can only be understood as the result of a process where value is determined at the same time as price. Value is not – as Tugan Baranowsky and Bortkiewicz think – a magnitude given separately from prices and the circulation of commodities. Value and price are dialectically linked and form the contradictory unity of value and its form.⁴⁴ The dualistic method used by Bortkiewicz, supposedly to correct the transformation, is based on an understanding of value different from Marx's, leading to incorrect conclusions.

3.5 A MATERIAL REPRODUCTION SCHEMA

An alternative method to complete the transformation procedure will now be presented, which corroborates his conclusions. This method eliminates the dualistic vision of the price-value relation and follows Marx's presentation in the first example of Chapter 9, *Capital* III. Although the simple reproduction schema devised by Bortkiewicz will be used (Table 3.3), the presentation will show that Marx's solution is consistent.

The simple reproduction schema permits use values and values to be distinguished from one another. As Marx stresses in *Capital* II, there are, behind the exchange relations between the different departments, specific proportions in which the different use values must appear in order to allow the material reproduction of society.⁴⁵ The value relations between the various departments can only be established on the basis of the exchange of specific use values. When Marx drafted his *general outline* of the transformation, he did not need to make the material proportions underlying his tables clear; however, the calculation of prices and values here needed to complete his transformation procedure requires making these material relations explicit.

Table 3.3 assumes a given proportionality between the physical supply and demand of the different spheres. The total value of the consumed means of production is 202, 65.3 per cent of which is produced by sphere 3 and 34.7 per cent by sphere 4. This value of 202 is, at the same time, the total constant capital consumed by all spheres. Bortkiewicz is not explicit about how the constant capital of each sphere is proportionally formed by means of production from spheres 3 or 4. In order to simplify these calculations, without affecting his results, it can be assumed that, in all spheres, the different means of production are combined as inputs in the same proportion by which they are produced as outputs; a similar assumption can be made for the means of consumption. For example, sphere 3 consumes £52 of constant capital: 65.3 per cent corresponds to the value of means of production produced by 3 and 34.7 per cent by sphere 4; this implies that sphere 3 consumes $£52 \times 0.653 = £34$ of sphere 3's global production and $£52 \times 0.347 = £18$ of sphere 4's total production.

Nor is Bortkiewicz explicit about the amounts of use values behind the value reproduction schema. However, any physical output whatsoever can be assumed for each sphere. The ratio between the total value of each sphere and the given amount of use values is equal to the unit value of the commodity. For instance, it can be supposed that the five spheres produce 30, 55, 33, 35 and 5 units of their use values, so that the unit values are £3, £2, £4, £2 and £4, respectively. These physical outputs are subsequently allocated to the different spheres in the same proportions by which their values are distributed. For instance, sphere 3's advanced constant capital ($£52 = £34 + £18$) purchases $£34/£4 = 8.5$ units of means of production 3 and $£18/£2 = 9$ units of means of production 4.

	Constant Capital		Constant Capital Used Up		Variable Capital		Supply
	Sphere #3 (1)	Sphere #4 (2)	Sphere #3 (3)	Sphere #4 (4)	Sphere #1 (5)	Sphere #5 (6)	
#3	9.8	10.4	8.5	9.0	10.9	1.8	33
#4	13.9	14.7	6.5	6.9	4.1	0.7	35
#1	13.1	13.9	8.2	8.7	5.5	0.9	30
#5	15.5	16.5	1.6	1.7	1.4	0.2	5
#2	11.4	12.1	8.2	8.7	8.2	1.4	55
Σ	63.7	67.6	33.0	35.0	30.0	5.0	

Table 3.5

Applying this procedure to all the elements of each sphere’s constant and variable capital one can create a table (Table 3.5) which makes the material proportions underlying Bortkiewicz’s reproduction schema explicit.⁴⁶

Columns 1 and 2 represent the amount of means of production used as fixed capital by each sphere, and columns 3 through 6 show the quantities of the different commodities consumed in production. Since a balance between supply and demand has been assumed throughout, the total of the last four columns (the physical demand for each kind of commodity) equals column 7 (the physical supply of each use value). The ratio of the value produced by each sphere (column 6 of Table 3.3) and physical production of each sphere (the last column of Table 3.5) gives the vector of unit values: £3, £2, £4, £2, £4.

3.6 AN ALTERNATIVE PROCEDURE FOR COMPLETING MARX’S TRANSFORMATION

The method used by Marx to illustrate the transformation in the third table of *Capital* III, Chapter 9 (Table 3.2) can be interpreted as the first in a series of approximations of the final calculation of the prices of production and the rate of profit as well as the values themselves.⁴⁷

To complete the procedure, Bortkiewicz’s modified version of Marx’s third table will be used. However, three columns have been added to this table:

- Column 6 corresponds to values and was originally suppressed by Bortkiewicz.
- Column 10 shows the physical production of each sphere and is equal to the last column of Table 3.5.
- Column 11 is the first calculation of the vector of unit prices of production, calculated by dividing the production price of each sphere (column 8) by the physical quantities produced (column 10).

It can be conjectured that in Table 3.3 prices correspond to values and that, in Table 3.4, Marx uses this prevailing price vector to evaluate the inputs. To the resulting cost price, Marx adds the average profit and obtains an initial *provisional* price of production, shown in column 11 of Table 3.4. Obviously, this

is not the final outcome of the calculation since the same use value is being evaluated using two different *prices*, depending on whether it is an input or an output. Hence, it is necessary to complete the procedure through successive iterations. Table 3.6 presents the result of the next iteration.

To perform the second iteration, the amount of physical inputs and outputs, as presented in Table 3.5, remains unchanged and is evaluated using the new vector of production prices, obtained from Table 3.4 (column 11). The difference between Table 3.4's total production price (422) and the new total cost prices of Table 3.6 (320) is the new approximation to the total surplus value (102). The parts of this surplus value produced by the different spheres are determined to be a homogeneous proportion of their variable capital. The value produced by each branch is formed by its produced surplus value and its cost price, constituted by the *price* of the means of production and the *price* of the wage goods (not by their *values*, as imagined by Bortkiewicz).

	(1) Con- stant Capital	(2) Con- stant Capital Used	(3) Var- iable Cap- ital	(4) Cost Price	(5) Sur- plus Value	(6) Value	(7) Profit	(8) Price of Produc- tion	(9) Diver- gence	(10) Quan- tity	(11) PP/Q
I	137.1	87.0	64.5	151.5	51.0	202.5	41.3	192.8	-9.7		
#3	56.7	49.2	46.9	96.1	37.1	133.2	21.2	117.3	-15.9	33	3.56
#4	80.4	37.8	17.6	55.4	13.9	69.3	20.1	75.5	6.2	35	2.16
II	165.5	56.7	29.3	86.1	23.2	109.2	39.9	126.0	16.7		
#1	75.6	47.3	23.5	70.7	18.5	89.3	20.3	91.0	1.8	30	3.03
#5	89.8	9.5	5.9	15.3	4.6	20.0	19.6	34.9	15.0	5	6.99
III	66.2	47.3	35.2	82.5	27.8	110.3	20.8	103.2	-7.0		
#2	66.2	47.3	35.2	82.5	27.8	110.3	20.8	103.2	-7.0	55	1.88
Σ	368.8	191.0	129.0	320.0	102.0	422.0	102.0	422.0	0.0		

Table 3.6

The ratio between the total surplus value and the capital invested by all spheres ($368.8 + 129.0$) gives a new estimation of the general rate of profit which is, in this second iteration, 0.205. With this figure, the average profit of each branch is calculated and then added to the cost price, leading to a new total price of production. These prices do not correspond to those calculated in the previous iteration and used to evaluate the elements of the advanced capital. Therefore, the calculation has still not been completed and it is necessary to repeat the procedure. However, after several iterations, the system converges to a point where the prices of production of the outputs corresponds to the prices of production of the inputs, which completes the example whose first stage Marx drafted in his third table. The final result of the iterations is Table 3.7:

	(1) Con- stant Capital	(2) Con- stant Capital Used Up	(3) Var- iable Capital	(4) Cost Price	(5) Sur- plus Value	(6) Value	(7) Profit	(8) Price of Produc- tion	(9) Diver- gence	(10) Quan- tity	(11) PP/Q
I	138.2	87.7	63.2	150.9	51.5	202.4	41.7	192.6	-9.9		
#3	57.2	49.6	46.0	95.5	37.5	133.0	21.3	116.9	-16.1	33	3.54
#4	81.0	38.1	17.2	55.4	14.1	69.4	20.3	75.7	6.3	35	2.16
II	166.8	57.2	28.7	85.9	23.4	109.3	40.5	126.4	17.0		
#1	76.3	47.7	23.0	70.6	18.7	89.4	20.5	91.2	1.8	30	3.04
#5	90.6	9.5	5.7	15.3	4.7	20.0	19.9	35.2	15.2	5	7.04
III	66.7	47.7	34.5	82.1	28.1	110.2	20.9	103.1	-7.2		
#2	66.7	47.7	34.5	82.1	28.1	110.2	20.9	103.1	-7.2	55	1.87
Σ	371.8	192.6	126.4	318.9	103.1	422.0	103.1	422.0	0.0		

Table 3.7

At this point, the reader might be tempted to compare the results of the last iteration with those of the first, as if the figures represented two historically different moments. That is to say, as if the first iteration corresponded to a situation of disequilibrium and the last to a situation when the price system had converged to equilibrium. The reader might also think – as Bortkiewicz does and Shibata even more clearly – that the *true values* of the commodities are those of the ‘zero’ iteration (Table 3.3) and that their *true prices of production* are those of the last iteration (Table 3.7). Such a reading is incorrect. The interpretation of the relationship between both tables has already been presented in the second section of this chapter. In the present numerical illustration, the magnitudes arising from the ‘zero’ iteration in Table 3.3, or from first iteration, in Table 3.4, are the intermediate results of *calculation process* since – assuming that there is no technical change – it is quite impossible for commodities to have two prices, one as outputs and another as inputs. More generally, it is impossible for the prices of commodities (as inputs or outputs) to correspond to their values. The magnitudes of Table 3.4 are only numerical approximations of the true *value and price* magnitudes (Table 3.7) whose calculation passes through either a series of iterations such as those illustrated or the solution of a system of simultaneous equations.⁴⁸

Additionally, it is important to keep in mind that all the figures in the above tables are measured in money (£). The representation of these magnitudes in labour time requires the determination of the *monetary expression of labour*, a relation between the extrinsic and the intrinsic measures of value which will not be considered here.⁴⁹ Nonetheless, it is important to draw three important conclusions from the final result of the iterative procedure. First, there is a single general rate of profit in the system, defined – as Marx wanted – by the ratio between the mass of surplus value and the sum of the capitals invested in all spheres. In this case, it is

$$\pi = \frac{SV}{C + V} = \frac{103.1}{371.8 + 126.4} = 0.207$$

Given this result, it is clear that Tugan Baranowsky's observation that Marx's system has two alternative rates of profit – 'in value terms and in money terms' – is groundless.⁵⁰ Second, there is a rigorous verification of Marx's result, where the sum of the profits for all the different spheres of production must accordingly be equal to the sum of surplus-values, and the sum of prices of production for the total social product must be equal to the sum of its values.⁵¹

Third, the system represented in Table 3.7 is, *at the same time*, a value system and a price system. The price and value vectors, as well as the rate of profit and the rate of surplus value, are not determined independently of each other; they are, rather, results of the same process of determination, that is the competition through which capitalist reproduction evolves. This is in complete contrast with Bortkiewicz's interpretation of Marx's third table and, in general, with the orthodox reading of the transformation. According to Bortkiewicz, Marx thinks that 'the very existence of the rate of profit suspends the law of value,'⁵² in a such way that the transformation is the passage from a system where there are only values to another where there are only prices.

3.7 A COMMENT ON MARX'S CONTROVERSIAL TEXTS ON THE TRANSFORMATION

Having established how the quantitative divergences between values and prices are formed, and having illustrated them using the numerical example above, Marx then investigates a series of circumstances which may affect the consistency of his drafted solution, in particular the double equality. His concern is expressed in a series of passages following his tables, which have been quoted repeatedly and generally out of context in the transformation debate. In this section three of these passages, probably those most frequently quoted, are examined.⁵³ In each passage, Marx's problem as well as his conclusion will be made explicit. They invariably confirm his solution of the transformation problem. To illustrate Marx's reasoning the economy represented in Table 3.7, where the transformation procedure has been completed, is used as an example.

First problem: is there double counting of profit when all commodities (including the inputs) are exchanged at their production prices?⁵⁴

As already shown, 'the sum of prices of production for the commodities produced in society as a whole ... is equal to the sum of their values.'⁵⁵ Yet, if the sum of prices had a double counting of profits the result would be wrong. Commodity inputs 'are generally bought on the market in capitalist production, so that their prices include an already realized profit ... so that the profit in one branch of industry goes into the cost price of another.' When the sum of prices is considered, is this profit counted twice, once as the profit of the input producer and again as the profit contained in the cost price of the purchasing capitalist?

Let us assume that a linen producer requires only one input, flax. This commodity is purchased at its production price PP_f , which is, as in all production prices, made up by its cost price CP_f plus its profit P_f . The price of production of flax constitutes, therefore, the cost price of the linen. The prices of production of flax and linen can be written in the following form:

$$\begin{aligned} PP_f &= CP_f + P_f \\ PP_l &= CP_l + P_l \\ &= PP_f + P_l \\ &= (CP_f + P_f) + P_l \end{aligned}$$

Since the profit of flax is an element of the cost price of linen, Marx wonders whether the sum of production prices of all branches would not contain the flax profit P_f twice, once in the price of flax (first line) and again in the price of linen (last line).

To answer this question Marx argues that, when considering ‘the total social product’, it is possible to ‘put on one side the sum of the cost prices of all the commodities and the sum of the profits or surplus values on the other’. To do this, he suggests a procedure developed in *Capital I*, called the ‘representation of the value of the product by corresponding proportional parts of the product’.⁵⁶ In this passage, he treats ‘the product of any capital ... as if one part simply replaces *capital*, while the other only represents *surplus value*.’ Analogously, when a commodity is exchanged at its price of production, the latter can be broken down into *cost price* and *profit*. ‘To apply this method of reckoning to the social product’, Marx concludes that, by summing all the prices, the profit embodied in the inputs is added only once, that is that ‘the profit contained in the price of flax, for instance, cannot figure twice, not as both part of the price of the linen and as the profit of the flax producers’. Therefore, for the whole society ‘there is no distinction between profit and surplus value’ and, thus, the equality between global prices and values is not affected.

Table 3.8 is a reworking of Table 3.7 – the final result of the iterative transformation procedure – according to the method suggested by Marx. As already seen, Table 3.7 encompasses all productive spheres; to carry out the exercise only the three global aggregates will be considered: department I is formed by the spheres producing means of production (spheres 3 and 4), department II by those producing wage goods (spheres 1 and 5) and III by the sole luxury goods producer (sphere 2). The construction of Table 3.8 will be illustrated for department I.

The price of production of every department has three components, c , v and p . Each of them can be, at the same time, broken down into ‘one part that represents *cost price* while the other represents *profit*’, as done with the price of production of linen. Considering this, the production price of department I, as all production prices, can be written as:

$$\begin{aligned} PP_I &= CP_I + P_I \\ &= PP_I(CP_I/PP_I + P_I/PP_I) \end{aligned}$$

$$= PP_1(\alpha_1 + \beta_1)$$

Table 3.7 shows that department I's cost price and profit are 150.9 and 41.7 respectively, so $\alpha_1 = 0.783$ and $\beta_1 = 0.217$. Analogously, department II and III prices of production can be broken down into two fractions, one corresponding to cost price and another to profit, which implies the following proportions: $\alpha_2 = 0.680$, $\beta_2 = 0.320$, $\alpha_3 = 0.796$ and $\beta_3 = 0.203$. In this manner, department I's *constant capital* (as well the constant capital of other departments) can be separated into 78.3 per cent, corresponding to cost price, and 21.7 per cent representing profit, whereas its *variable capital* can be separated into 68 per cent for cost price and 32 per cent for profit. This calculation would not be complete unless the part of the production price corresponding to *profit* is similarly broken down. Since profits are used in the purchase of commodities produced by III, then they must be separated by using the proportions in which the price of production of III is divided into cost price and profit, that is 79.6 per cent and 20.3 per cent. Therefore, the three elements of department I's production price can be divided as follows:

$$\begin{aligned} 192.6_1 &= 87.7_1^c + 63.2_1^v + 41.7_1^p \\ 192.6_1 &= 87.7_1^c(\alpha_1 + \beta_1) + 63.2_1^v(\alpha_2 + \beta_2) + 41.7_1^p(\alpha_3 + \beta_3) \\ 192.6_1 &= \{(68.7 + 19.0)_1^c + (43.0 + 20.2)_1^v + (33.2 + 8.5)_1^p\} \end{aligned}$$

(where subscripts indicate department and superscripts show the element of production price). If this calculation is worked out for all departments, table 3.8 is obtained.

In the above formulas, the sum of the first element of each set of parentheses (for department I: $68.7 + 43.0 + 33.2 = 144.9$) represents the *cost price* of the elements which form the production price of each department; the sum of the second element ($19.0 + 20.2 + 8.5 = 47.7$) represents the *profit* of the elements constituting this price of production. These figures, corresponding to each department, appear in the last two columns of Table 3.8. If both magnitudes for all departments are vertically summed, Marx's suggestion is followed: 'if the sum of cost prices of all commodities in a country is put on one side and the sum of the profits or surplus values on the other, we can see that the calculation comes out right.' Indeed, the vertical sum of the last column of Table 3.8 clearly indicates that the sum of the profits embodied in prices of production corresponds to the sum of profits or surplus values in Table 3.7. This shows that, taking the totality of commodities into account, the method for transforming values into prices of production *does not imply* a double counting of profits, which is the problem set forth by Marx in the above mentioned passage.

In most writings on the transformation problem, this passage has been interpreted in two different ways. First, it has been quoted as evidence that Marx was aware of the fact that input values must be transformed although, for some reason, he did not follow his example up to their final outcome. Yet, it can be thought that Marx implicitly assumes the calculation has been completed and that

he contrasts the *conceptually* achieved results – not those *arithmetically* unfinished in his *draft* – with the possibility of a double counting of profits.

	Constant Capital Used Up			Variable Capital			Profit			Production Price		
	S	Cost Price	Profit	S	Cost Price	Profit	S	Cost Price	Profit	S	Cost Price	Profit
I	87.7	68.7	19.0	63.2	43.0	20.2	41.7	33.2	8.5	192.6	144.9	47.7
II	57.2	44.8	12.4	28.7	19.5	9.2	40.5	32.2	8.2	126.4	96.6	29.8
III	47.7	37.3	10.3	34.5	23.4	11.0	20.9	16.7	4.3	103.1	77.5	25.6
Σ	192.6	150.9	41.7	126.4	85.9	40.5	103.1	82.1	20.9	422.0	318.9	103.1

Table 3.8

A second interpretation, as mentioned earlier, has been recently advanced by several authors and has become known as the New Solution to the transformation problem.⁵⁷ These writers recognize the problem presented by Marx in the above passage, although they do not understand the nature of his final answer. Since this interpretation now has significant consensus, it is necessary to consider the conclusions it draws from this passage. In particular, the following has been frequently mentioned:

To apply this method of reckoning to the total social product, we have to make certain rectifications, since, considering the whole society, the profit contained in the price of flax, for instance, cannot figure twice, not as both part of the price of the linen and as the profit of the flax producers. (Marx 1981:260)

What are these *rectifications* that one should make? According to the New Solution authors, Marx suggests that, when all prices are considered, there is a double counting of the *constant capital* consumed; they deduce that ‘the rectifications’ consist of suppressing the elements of the constant capital from the sum of values and prices and only take into account the ‘net product’, that is the value product $v + s$.⁵⁸ As will be immediately seen, this interpretation contradicts the meaning and the conclusions of Marx’s passage quoted above.

A few lines before the sentence just quoted, Marx calls k the cost price of all the inputs of a given commodity, p the profit embodied in them and p_1 the profit on the commodity itself. In department I of Table 3.8, Marx’s calculation would appear as $k = 68.7 + 43.0 = 111.7$, $p = 19.0 + 20.2 = 39.2$ and $p_1 = 41.7$ (Table 3.7). If this department is considered alone ‘the total profit [is] $P = p + p_1$ ’, that is 80.9. However, if such a calculation were to be carried out for all departments, a double counting effect of the profits would indeed occur, since ‘the profit contained in the price of flax, for instance, cannot figure twice, not as both part of the price of the linen and as the profit of the flax producers.’ Thus, the formula $P = p + p_1$ must be *rectified* to calculate the global profit in one of two ways. Either, as already done in Table 3.8, each component of the price of production (c , v and p) can be broken down into cost price and profit; only then it is possible to sum the parts representing the profit of all departments ($47.7 + 29.8 + 25.6 = 103.1$). Alternatively, the profits appropriated by the capitalists of each department must be considered individually ($41.7 + 40.5 + 20.9 = 103.1$). Marx

thus asks if there is a double counting of *profits*, and not of the *consumed constant capital*.⁵⁹

Before concluding, it is interesting to note that, with regard to the procedure illustrated in Table 3.8, Marx mentions explicitly only the elements of the cost price. To divide the elements of the cost price into cost price and profit is an operation with a concrete reference: the cost price is a part of the price of production of the commodity which is the realized form of other commodities – the components of constant capital and wage goods. It is easy, therefore, to represent the commodity's cost price as made up of cost price and profit. Yet, this does not occur with the profit element of the production price: when the commodity is individually considered, this component does not constitute the realized form of any commodity and cannot be *immediately* broken down into cost price and profit. This separation can only be carried out when the whole economy is taken into account; in this case it is clear that the profit must be realized in a series of commodities whose production price can be separated into cost price and profit. For this reason, when Marx deals with an individual commodity, he investigates the elements of cost price but, when he treats production as a whole – for instance, when he discusses the sum of prices and the sum of values – he considers all elements of the price of production, including those that correspond to profit.

Second Problem: when all commodities (including the *inputs*) are exchanged at production prices, is there a global cancellation of the divergences between values and prices of production?⁶⁰

When Marx presents the results of the transformation process, he considers the social capital and shows that the divergences between surplus values and profits are cancelled out. Since the difference between values and prices is only the difference between surplus value and profit, this cancellation implies that the divergences between values and prices are cancelled out for the social capital – as shown in Table 3.7. In the text Marx wonders whether this result is maintained when the elements of cost price are contemplated:

Apart from the fact that the price of the product of capital B, for example, diverges from its value, because the surplus-value realized in B is greater or less than the profit added in the price of the products of B, the same situation also holds for the commodities that form the constant part of capital B, and indirectly, also, its variable capital, as means of subsistence for the workers. (Marx 1981:261)

As in the text commented on above, Marx faces the fact that all commodities, including those consumed as inputs, are exchanged at prices diverging from their values. Accordingly, the value crystallized in the elements of the cost price diverges from the respective price of production. The problem raised by Marx is whether these divergences are cancelled out in the economy as a whole, thus causing the total sum of production prices to be identical to the sum of values. When the linen producers purchase flax in order to consume it in their production

processes, they pay for the flax at its price of production which generally does not coincide with its value. Is this divergence between the price of production of the flax and its value offset by other divergences with the opposite sign or, instead, is it added to other divergences? In other words, if the prices of production of all inputs are put on one side, and the values on the other, are all divergences reciprocally cancelled out?

Marx answers affirmatively: ‘whenever too much surplus value goes into one commodity, too little goes into another’. Citing the example in Table 3.7, Table 3.9 applies this reasoning to all departments in the economy. As in Table 3.8, the components of the production price (c, v and p) of the various spheres of production are broken down into two parts; but, in this case, they are divided into the *value* and the *divergence* between price of production and value. Let us examine an example to see how Table 3.9 is set up.

The price of production of I – or any other department – can be written as:

$$\begin{aligned} PP_I &= VA_I + (PP_I - VA_I) \\ &= PP_I \{VA_I/PP_I + (PP_I - VA_I)/PP_I\} \\ &= PP_I(\delta_I + \gamma_I) \end{aligned}$$

In Table 3.7, I’s price of production is 192.6 and its value is 202.4, so that $\delta_I = 1.051$ and $\gamma_I = -0.051$. With these coefficients, the constant capital consumed by all departments can be broken down into two parts: 105.1 per cent corresponding to the *value* of the means of production used up and –5.1 per cent corresponding to the *divergence* between their price of production and value. The same calculation can be worked out for production prices of the other departments, obtaining $\delta_2 = 0.865$, $\gamma_2 = 0.135$; $\delta_3 = 1.069$ and $\gamma_3 = -0.069$. The division of all the elements of I’s price of production into one part corresponding to their value and the other corresponding to the divergence between value and production price has the following form:

$$\begin{aligned} 192.6_I &= 87.7_I^c + 63.2_I^v + 41.7_I^p \\ 192.6_I &= 87.7_I^c(\delta_I + \gamma_I) + 63.2_I^v(\delta_I + \gamma_I) + 41.7_I^p(\delta_I + \gamma_I) \\ 192.6_I &= \{(92.2 - 4.5)_I^c + (54.7 + 8.5)_I^v + (44.6 - 2.9)_I^p\} \end{aligned}$$

It is obvious that if only one *particular* department or sphere of production is taken into account, the sum of the divergences embodied in the elements of its cost price (–4.5 + 8.5), as well as those contained in the elements of its production price (–4.5 + 8.5 – 2.9) would not be nil.⁶¹ The problem posed by Marx is to consider *all* the departments or spheres of production to find out whether or not the sum of the divergences is nil. Consequently, the calculation only makes sense if all departments or spheres of production are taken into account and, thus, if it is worked out for the *global* sum of divergences. This is the goal of Table 3.9.

It has to be emphasized once again that this procedure must be applied to all the elements of the production price, and not only to elements of the cost price, that is it must be also applied to commodities produced by III, where the capitalists’ profit is realized. In the last two columns of Table 3.9, it can be seen

how the production price of each department is divided into one part which corresponds to the sum of the *values* embodied in its elements and into another corresponding to the sum of the *divergences* between the prices of these elements and their values. If all these accumulated divergences are added vertically, it is clear that 'the divergences from value that [are contained] in the production prices of commodities therefore cancel each other out.'⁶² In this form, the theoretical result that the sum of prices corresponds to the sum of values is maintained.

	Constant Capital Used Up			Variable Capital			Profit			Production Price		
	Σ	Value	Diver- gence	Σ	Value	Diver- gence	Σ	Value	Diver- gence	Σ	Value	Diver- gence
I	87.7	92.2	-4.5	63.2	54.7	8.5	41.7	44.6	-2.9	192.6	191.4	1.1
II	57.2	60.1	-2.9	28.7	24.9	3.9	40.5	43.3	-2.8	126.4	128.2	-1.9
III	47.7	50.1	-2.4	34.5	29.8	4.6	20.9	22.4	-1.5	103.1	102.3	0.7
Σ	192.6	202.4	-9.9	126.4	109.3	17.0	103.1	110.2	-7.2	422.0	422.0	0.0

Table 3.9

Third Problem: what would happen if the cost price of a commodity is equated to the *value* of its material elements?⁶³

In the third passage to be discussed here, Marx once again recalls that the cost price of the commodities coincides with the price of production – but not with the value – of their material elements:

It was originally assumed that the cost price of a commodity equalled the value of the commodities consumed in its production. But for the buyer of a commodity, it is the price of production that constitutes its cost price and can thus enter into forming the price of another commodity. As the price of production of a commodity can diverge from its value, so the cost price of a commodity, in which the price of production of another commodities is involved, can also stand above or below ... the value of the means of production going into it. (Marx 1981:264-265)

It is clear that during a previous analytical phase, when commodities were exchanged at their values, the cost price *was* equal to the *value* of its material elements. Once this assumption is dropped, the cost price must be equated to the price of production of its material components. In the new analytical step, the cost price has, thus, a '*modified significance*' with regard to its *original* situation.

The specific problem posed by Marx in this third passage is the following: what *would happen if*, once the transformation is accomplished, the cost price is equated to the *value* of its material components, that is to the *value* of the means of production and the *value* of the wage goods consumed in its production, rather than with their *price*? Marx's answer to this hypothetical problem is clear: there would be an error ('it is always possible to go wrong') because 'this modified significance of the cost price' would have been disregarded:

It is necessary to bear in mind this modified significance of the cost price, and therefore to bear in mind too that if the cost price of a commodity is equated with the value of the

means of production used up in producing it, it is always possible to go wrong. (Marx 1981:265)

Marx's numerical calculations in his third table have been left unfinished and, since in this table the cost price is equated to the value rather than the price of the means of production, it is possible 'to go wrong'. But, if the cost price is correctly considered, the possibility of such an error disappears.

On the basis of the calculations in Table 3.9, it is possible to see what happens if this 'modified significance of the cost price' is disregarded. Let us suppose that the *value* and not the *price* of the material elements used up is considered in the calculation of the cost prices. In this case, I's cost price would be $92.2 + 54.7 = 146.9$; II's cost price would be $60.1 + 24.9 = 85.0$, and III's would be $50.1 + 29.8 = 79.9$. If the production prices of each branch were not calculated considering the 'modified significance' of their cost prices (150.9, 85.9 and 82.1, as in Table 3.7), but the profits of each department were added to 'cost prices not transformed', a different calculation of production prices would be attained (namely, $146.9 + 41.7 = 188.6$; $85.0 + 40.5 = 125.5$ and $79.9 + 20.9 = 100.8$) whose sum (414.9) would not correspond to that of the values, 422. This leads to a conclusion that the sum of prices is equal to the sum of values only if the 'modified significance' of the cost price is considered and, thus, in the calculation of production prices the inputs 'are transformed'.

3.8 CONCLUSIONS

In the numerical examples which Marx drafted to illustrate the transformation of values into prices of production, the sum of surplus values equals the sum of profits and the sum of values equals the sum of prices. In the wake of Tugan Baranowsky and Bortkiewicz, virtually all other authors writing on the transformation agree that this result only arises in Marx's tables because 'the transformation has not been concluded': the inputs are exchanged at their values and not at their production prices. There have been several dualistic attempts 'to correct the transformation', either through simultaneous equation systems – such as Bortkiewicz's (1984), Winternitz's (1948) and Seton's (1957) – or through iterative approaches – such as Shibata's (1933), Bródy's (1970) and Shaikh's (1977). All these attempts have reached the same conclusion: insofar as Marx 'is corrected', his double equality is invalid.

Since this conclusion has important implications for Marx's entire theoretical framework, the subsequent debate has involved many authors and has been the longest ever in the history of economic thought. However, all these attempts to 'correct' the transformation are grounded on an understanding of value which differs from Marx's. For the usual approach, value is a magnitude determined once and for all in the sphere of production which is related to price in a purely exterior manner. Marx's transformation problem has been reduced into a Ricardian problem: to find a direct relation between labour (or 'the sphere of

value') and prices of production (or 'the sphere of prices'). If, on the contrary, the relation between value and its form is considered in dialectical terms, the value and price of the commodities are determined both qualitatively and quantitatively as the result of the same process, namely capitalist competition. From this point of view, the transformation problem is no longer formulated in Ricardian terms.

The method used in this chapter to rework Marx's numerical example has sought to express the relation between values and prices. Once the solution is reached, all inputs and outputs are exchanged at their prices of production and, at the same time, the double equality enunciated by Marx holds. After Marx conceptually (though not numerically) concluded the transformation, he tested it in a group of passages which have been repeatedly quoted, often out of context. A thorough reading of these texts has shown that Marx proved his methodology to be right. In this chapter, a numerical illustration of Marx's test of his solution has shown the soundness of his theoretical proposal and conclusions.

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NOTES

- ¹ On the previous debate, see Bortkiewicz (1952), Dostaler (1978) and Howard and King (1989). Mühlfort was a predecessor of Bortkiewicz, recently rediscovered by Howard and King (1989).
- ² Bortkiewicz (1952: 8).
- ³ As Kliman and McGlone point out in this volume, 'the non-dialectical understanding perceives each object as isolated, uniquely itself, a whole unto itself.'
- ⁴ Nomenclatures differ. In this chapter the authors refer to the 'New Approach' as the 'New Solution' – editors.
- ⁵ Recent surveys of the literature (Desai 1989 and Bellofiore 1989) do not contain any available contribution from writers of the anti-dualistic vision.
- ⁶ Marx (1976a: 421). Oakley (1976) shows that Marx had already delineated the solution of this contradiction in *Grundrisse* (Marx 1973:435-6).
- ⁷ For example, Hunt and Glick (1987:356): 'the value of a commodity consisted of the labour embodied in the means of production ... (dead labour) and the labour expended in the current production period (living labour).'
- ⁸ 'although exchange value is = to the relative labour time materialized in products, money, for its part is = to the exchange value of commodities, separated from their substance'. (Marx 1973:160)
- ⁹ Marx (1976b:34). This text is from the first German edition of Chapter 1 of Volume I of *Capital*.
- ¹⁰ See notes 6, 11, 18, 26, 29, 53, also Marx to Engels 16 January 1858 and 30 April 1868, Marx to Kugelman 4 July 1868, Marx 1969b:25-30, 173-175, 190-191, 198-199; 1972:81-84, 87-88, 164-165, 167-168, 176-177; 1991:36-7, 75-6, 83-4, 94-101, 232, 1972:330-333, 376-377.
- ¹¹ The first tabular solution (2 tables, 5 spheres) is presented in *Theories of Surplus Value* II (1969b:64-68); the second (1 table, 4 spheres) in a letter to Engels dated 2 August 1862; the third (1 table, 4 spheres) in *Theories of Surplus Value* II (1969b:389); the fourth (3 tables, 5 spheres) in *Capital* III, Chapter 9 (1981:254-9) and the fifth (1 table, 3 spheres) in the same chapter (p. 263-4). If literature

- were concerned with this last solution, the creation of a 'system of values' entirely separated from prices would be more difficult.
- ¹² Because we do not consider the matter without fixed capital, Marx's first table is not commented on.
- ¹³ Marx (1981:256). The only changes introduced in the table are the order of the columns and the suppression of the column corresponding to the rate of surplus-value.
- ¹⁴ Tugan Baranowsky with his 'labour-value' schema (1905:170-174) is the practically unknown founder of this approach.
- ¹⁵ Marx (1976a:188). In his critique of labour-money Marx asks: 'Since labour-time is the intrinsic measure of value, why use another extraneous standard as well? Why is the value ... computed in terms of an exclusive commodity, which thus becomes the adequate expression of exchange value, i.e. money?' (Marx 1970:84). See Saad-Filho (1993) for a discussion of Marx's critique of labour-money. Rubin (1973:111-113) warned against the usual practice of measuring value in labour-time instead of measuring it, as Marx does, in money. Elson (1979b:135-139) provides a lucid discussion about this common error.
- ¹⁶ See notes 6 and 11.
- ¹⁷ Marx (1969b:67); first emphasis added. Also: 'Let us assume ... that all commodities ... were sold at their actual values ... i.e. [that] they are exchanged with one another in proportion to the value contained in them, at their *value prices*' Marx (1981:275, emphasis added).
- ¹⁸ Marx says that throughout *Capital* I and II he has 'in fact assumed that prices = values. We shall, however, see in Volume III that even in the case of average prices, the assumption cannot be made in this simple manner'. (Marx 1976a:329n). This assumption, explicitly made in *Capital* I, Chapter 5 (1976a:268-9) and maintained in the first two tables of *Capital* III, Chapter 9, does not imply that the figures of these tables are magnitudes of labour. Rather, it means that the exchange relations between commodities (their prices) are directly proportional to the amounts of labour congealed in them.
- ¹⁹ 'The rates of profit prevailing in the different branches of production are accordingly originally very different. These different rates of profit are balanced out by competition to give a general rate of profit which is the average of all these different rates. The profit that falls to a capital of given size according to this general rate of profit, whatever its organic composition might be, we call the average profit. That price of a commodity which is equal to its cost price, plus the part of the annual average profit on the capital applied in its production ... is its price of production.' (Marx 1981:257-8).
- ²⁰ Marx (1972:82). In this passage, Marx still uses 'cost price' instead of 'price of production'
- ²¹ Marx (1981:259, 273).
- ²² For instance, Bortkiewicz (1952:16); Garegnani (1959:24, 211). Bortkiewicz quotes Marx's following passages: Marx (1978: 460, 464-5, 466, 478; 1981:985). See also Marx (1978:459; 1981:277).
- ²³ In general, the relation between price and value has to be interpreted in a Hegelian way: 'the essence is being that is past, but timelessly past' (quoted by Inwood 1992:90). In particular, when Marx criticizes Smith's conception, he refers to value as 'coming first' with respect to the components of individual commodities. Value is understood as the social regulating magnitude which has asserted itself upon individual capital as 'the law of gravity asserts itself when a person's house collapses on top of him.' Marx (1976a:168). It is on the basis of this social determination (that is, value) that – directly, in *Capital* I and II, or indirectly, in *Capital* III – the components of individual commodities are determined.
- ²⁴ Criticizing Rosdolsky's approach, Elson (1979b:168) says: 'The trouble with this explanation is that it often leads to confusion about competition: to the view, for instance, that *Capital* I, abstracts from competition. This is clearly not the case: competition is an essential feature of capitalism; capital can only exist in the form of many capitals.'
- ²⁵ Marx (1969b:174); emphasis omitted.
- ²⁶ Letter to Engels, 27 June 1867, emphasis omitted.
- ²⁷ In the *Manuscript 1861-63*, Marx considers this to be a 'first transformation' that – it can be interpreted – is represented in the first/second table. See Marx (1991: 96-101).
- ²⁸ 'At a given rate of surplus-value it is only for capitals of the same organic composition – assuming equal turnover times – that the law holds ... that profits stand in direct proportion to the amount of capital ... [a result that] is true on the same basis as our whole investigation so far: that commodities are sold at their values' (Marx 1981: 252). See also Marx (1991:299-300).

- ²⁹ 'This ... conclusion only raises the question how on the basis of exchange-value a market-price differing from this exchange-value comes into being, or rather, how the law of exchange-value asserts itself only in its antithesis. This problem is solved in the theory of competition'. (Marx 1970:62).
- ³⁰ Marx (1981:274).
- ³¹ Marx's equalities are not external postulates as generally and erroneously interpreted. Nor can a unity of opposites be reduced to a tautology as Böhm-Bawerk (1984:36) and Duménil do (1983:446) because it does not consist in defining a concept in terms of itself ($A \equiv A$). See Marx (1972:87-88).
- ³² Using Platonic terminology, Desai has called these 'two worlds' 'the invisible value domain' and 'the visible price or exchange domain' (1979:143).
- ³³ Tugan Baranowsky (1905:174-175). See comments by Samuelson (1971) and Dostaler (1978) on Tugan's formulation.
- ³⁴ Bortkiewicz (1952) and, particularly, Bortkiewicz (1984).
- ³⁵ Bortkiewicz (1952:8).
- ³⁶ The last two columns and column 6, originally suppressed by Bortkiewicz, have been added to the table. The method used to calculate them and their function will be explained in the following section.
- ³⁷ Komorzynsky (1897:294, 289); our translation. The cited passage from Marx is 1981:779. Komorzynsky was Professor in the University of Vienna; Böhm-Bawerk edited the journal which published his article.
- ³⁸ Marx (1981:264-265). This passage is commented on in the present article (see the last section: 'Third problem').
- ³⁹ Bortkiewicz (1906:15 (German edition)); our translation.
- ⁴⁰ Tugan Baranowsky (1905:174); our translation. This argument will be noisily repeated by Steedman (1977) though inspired by Garegnani (1959).
- ⁴¹ Bortkiewicz (1984:12) and Bortkiewicz (1984:205).
- ⁴² Tugan Baranowsky (1905:174); our translation.
- ⁴³ Actually, Bortkiewicz's *dualistic* conception comes from Tugan Baranowsky's book where he tries to solve what was later called 'the inverse transformation problem' that is, how 'to transform prices of production into labour-values'. Here, Tugan Baranowsky shows an understanding of the relationship between value and price as a completely outward link: for instance, he thinks that the 'value schema' is expressed in 'labour-units', while the 'price-schema' is calculated in 'money-units'.
- ⁴⁴ For a justification of this approach – in particular for the thesis according to which the *value* transferred by the means of production to the final commodity does not correspond to their value but to their price – see Wolff, Roberts and Callari (1982, 1984a), Carchedi (1984), Roberts (1987), Kliman and McGlone (1988), Ramos (1991), Moseley (1993a) and Rodríguez (1994). Moseley (p. 171) mentions Mage (1963, Appendix A) and Mattick Jr. (1981) as supporters of this conception.
- ⁴⁵ Marx (1978:470-471).
- ⁴⁶ We have rounded off the errors in all the following tables.
- ⁴⁷ The iterative method has been used by Shibata (1933), Bródy (1970), Morishima (1973), Okishio (1974) and Shaikh (1977). Using the categories of individual and social value, Carchedi (1984) develops a temporal determination of values and prices that goes beyond the mere calculation process.
- ⁴⁸ One example of a simultaneous equation system was presented in Rodríguez (1994). The conditions of equivalence between the iterative and the simultaneous equations solutions were presented in Laise, Pala and Valentino (1977) and Panizza (1981). See also Giussani (1991), Freeman (1993a), Kliman (1993) and Naples (1993). The use of 'postulates of invariance' is only possible (and necessary) in the context of the dualistic approach. These 'postulates' are the conjunction of two conditions of normalization, one in the 'system of values' and another in the 'system of prices'. The relationship between both normalization conditions makes it possible to define a different unit of measure in each 'system' in such a way that one aggregate equals any figure in the other. The above-presented iterative sequence does not consist of two different 'systems' but, rather, of a single system. Its solution gives both the vector of values and the vector of prices and needs only one condition of normalization. It is clear that Marx's equalities are verified for every iteration, independently of the selected normalization. Moreover, if in Table 3.7 use-value #1 is chosen as money-commodity, all the data have to be divided by 3.04 in order to make its 'price' equal to 1. This procedure changes the original normalization and,

therefore, the corresponding total value and total price become 138.9, different from the initial total of 422.0 (See Rodríguez's contribution in this volume).

⁴⁹ See Rodríguez's contribution in this volume, Ramos (1994) and Rodríguez (1994) for a discussion about this ratio. See also Aglietta (1979), De Vroey (1981) and Foley (1982).

⁵⁰ As his predecessor did 70 years earlier, Steedman (1977:29-31) imagines that there are two different rates of profit. From his misunderstanding he deduces his 'criticism is sound and cannot be answered.'

⁵¹ Marx (1981:273).

⁵² Bortkiewicz (1952:28).

⁵³ The reference for each text is presented after each question where the problem is summarized. These passages deal with the generically-named 'transformation of inputs problem'. Marx first considers this in two passages of the *Manuscript 1861-63* (see Marx 1972:166-168 and 1991:36-7); in *Capital* III he studies this generic problem in four diverse aspects, three of which are commented on here. The remaining aspect regards the average composition commodity and is less controversial (see Marx 1981:309). The first passage quoted (Marx 1972) plays an important role in the non-dualistic interpretation of Wolff, Roberts and Callari (1982:575).

⁵⁴ Marx (1981:259-261); from 'This seems contradicted ...' to '... cannot figure twice'.

⁵⁵ Marx (1981:259).

⁵⁶ The method is presented in *Capital* I, Chapter 9 Part 2, (1976a:329-332), where Marx says that it will be applied later 'to complex and hitherto unsolved problems' (p. 331); the reader can also refer to a similar procedure developed in *Theories of Surplus Value* I, Chapter 3, Section 10 (1969a, pp. 107-151) and in *Capital* II, Chapter 3 (1978:169-171). As far as we know, this observation, included in one of the key texts of the transformation problem, has been neglected by the literature. It is worthwhile to note, however, that Schmidt (1971) uses the method suggested by Marx.

⁵⁷ Duménil (1980, 1983), Foley (1982), Lipietz (1982).

⁵⁸ Duménil (1980:37-39, 62-65); Glick and Ehrbar (1987:297-299). Marx calls $V + S$ *Wertprodukt* (value-product). See Marx (1976a:669).

⁵⁹ According to Duménil, who quotes only two small parts of the above-mentioned text: 'As it is presented in *Capital* III this calculation [the rectifications] is quite incomprehensible' (1980:63); our translation. Yet, a *complete* and *careful* reading of the text reveals that this calculation is quite comprehensible. In particular, tracing Marx's suggestion regarding the possibility of dividing the elements of production prices into their component parts gives the text a clear meaning. However, the ensuing conclusion does not show that it is necessary to consider only the 'net product' to transform values into production prices, as maintained by Duménil, Lipietz and Foley. Glick and Ehrbar (1987:299) likewise slash up the text arbitrarily because Marx does not speak of a double counting 'in the reduction of profits' – as they call the difference between price and value in the flax industry – in relation to a hypothetical 'system of values'.

⁶⁰ Marx (1981:261); from 'The distinction is ...' to '... the dominant tendency'.

⁶¹ These divergences are nil only in the production price of an average-composition commodity.

⁶² Marx (1981:261). (In the Penguin translation, 'obtain' replaces the words between brackets; the German original says 'stecken'.)

⁶³ Marx (1981:264-265); from 'The development given ...' to '... on this point'.

4 Money, the postulates of invariance and the transformation of Marx into Ricardo

Adolfo Rodríguez-Herrera

4.1 INTRODUCTION

Ricardo's attempt to demonstrate that labour constitutes „the foundation of exchangeable value of all things“¹ has a series of deficiencies which he recognizes. Marx resolved these in a dialectical conceptualisation of the relationship between labour and price in which the commodity – and capitalist reproduction – is understood as a unity of opposites. To this end he had to make a theoretical break with Ricardo, particularly as regards the concept of the magnitude of value.

Participants in the controversy on the transformation of values into prices have not perceived the nature of this break. Thanks to a Ricardian concept of the magnitude of value they can separate the capitalist economy into two different spheres – price and value – a procedure completely foreign to Marx. The main consequence of this separation is the misunderstanding of the money form of value, a problem that arises in two ways. Firstly, money is a commodity like all others and there is thus an essentially contradictory relationship between its value and its exchange value, that is between its value and the expression of this value in the use value of another commodity. This contradiction is neglected in the controversy, and therefore money becomes a simple numéraire, exactly as in the Ricardian and Walrasian traditions. Second, two juxtaposed standards of price are allowed to coexist – one in the sphere of values and the other in the sphere of prices – whose relationship constitutes the only external link between the two realms. The transformation of values into prices becomes an external problem of reconciling two systems of accounting.

The abolition of the difference between the value and the exchange value of money as well as the duplication of the standard of price are presented as naïve mathematical tools needed to solve two systems of simultaneous equations (Bortkiewicz 1952, Winternitz 1948, Seton 1957) or a system of iterative equations (Shibata 1933, Bródy 1970, Morishima and Catephores 1978a, Shaikh 1984). The main goal of this chapter is to identify the conceptual mistakes

concealed behind these „mathematical tools“ and show that these „procedures“ have placed the transformation controversy outside Marx’s own theoretical framework.

The first section of this chapter discusses the differences between Ricardo and Marx regarding the concept of the magnitude of value and shows that the participants in the debate separate value from price by means of a conception of value closer to Ricardo’s than Marx’s. The second section shows that this separation entails abolishing the contradictory nature of the money form of value and discusses what this contradictory nature is for Marx. Finally, the third section analyses the concept of „postulate of invariance“, showing that this „postulate“ conceals a spurious method of juxtaposing two standards of price.

4.2 THE SEPARATION OF PRICES FROM VALUES

The concept of value developed in the course of the transformation debate is closer to Ricardo’s than Marx’s. For Ricardo, the commodity’s absolute value is determined by the quantity of living labour directly or indirectly required to produce it. It is an amount of labour accumulated during various production periods. For him, living labour required to produce the means of production (and the means of production involved in their production) plays the same role in determining absolute value as the living labour directly consumed in producing it. This implies that the commodity’s value can be broken down into the sum of the absolute value of the used up means of production (which in turn contains the absolute value of their means of production) plus the absolute value created by fresh labour.

This is not Marx’s concept of value. The difference between the authors is not that which is usually maintained. For Ricardo, as well as Marx, value is not determined by the individual value consumed in producing a particular commodity but by the *social average* labour needed to produce it.² Moreover for Ricardo as for Marx, value is not determined once and for all but changes with the conditions of production. Thus for both authors, value is the average labour required to *reproduce* the commodity.³ The difference between Marx’s and Ricardo’s concept of value is not grounded – as is often maintained – on these two aspects of the definition of the labour needed to produce the commodity. The difference arises, rather, from the fact that, for Ricardo, the value is determined by the labour necessary to produce a commodity *as use value* while for Marx value is determined by the labour necessary to produce the commodity *as capital*. This implies that for Marx value, which is the monetary form of social labour, is determined in the process of production and circulation considered as a whole and thus not exclusively determined in the process of production.

The commodity’s value, whose extrinsic measure is money,⁴ has two components: the constant capital C produced during previous production periods, and the value product V+S resulting from the objectification of living labour. On

the one hand, constant capital constitutes the sum of value that the capitalist has to advance in order to replace his or her means of production. This means that it is not given by the value of these means but by their price and, specifically, by their replacement price rather than purchase price.⁵ The amount of social labour transferred by the means of production is equal to that represented by their price and does not correspond to the social labour necessary to produce them as use values, unless their capital has average composition. Any variation in the price of the means of production modifies the value of constant capital C and hence the commodity's value $C+V+S$.

On the other hand the second component of the commodity's value, the value product, constitutes an aliquot part of the value produced by social living labour, that is, the total value product. The proportion of total value product represented by the value product contained in the commodity is given by the proportion of total social living labour represented by the living labour required to produce the commodity. This total value product is distributed between the three main classes in the form of wage, profit and rent. Its measure, like that of any value, is money. Although the amount of living labour that is objectified in the value product is given, the magnitude of the value product can change due to the contradictory character of its expression, money. This implies that the amount of money in which one hour of socially necessary labour is represented, that is the ratio between the total value product and total living labour, is not determined once for all in the sphere of production but in production and circulation as a whole. Given the total living labour, any variation in the total price of the material components of the value product (that is, in the total price of the net product) modifies the total value product and therefore the amount of money in which one hour of socially necessary labour is represented. Consequently, any variation in the price of the net product modifies the value product contained in the commodity, $V+S$, and hence the commodity's value $C+V+S$.

In this form, the two components of the commodity's value, constant capital and value product, can be modified by changes in prices, although the amounts of necessary labour needed to produce the means of production and the commodity itself remain unchanged. This is the precise meaning of the statement that the commodity's value is determined through the unity of production and circulation and that there exists an internal link between value and price.⁶

Marx's interpreters prefer to think that value is determined once for all in the sphere of production. To this end they introduce two essential modifications of Marx's concept of value. Firstly, they determine value product exclusively in the sphere of production. Bortkiewicz, who measures value in money, asserts that the amount of money in which one hour of socially necessary labour is objectified is determined as a function of the amount of money commodity produced in one labour hour.⁷ This implies that the expression of social labour in the value product exclusively depends on the production conditions of the money commodity. The other contenders in the debate (except Shibata 1933) directly measure value in

labour hours. Therefore, the value product is no longer an amount of money – which may change although the living labour it expresses remains constant – but becomes the given amount of living labour consumed in producing the commodity. The second modification introduced into Marx's concept of value is to define the value transferred to the commodity from the means of production to be equal to the value, instead of the price, of these means of production. In this way both constant capital and value product are exclusively determined in production and the commodity's value is unaltered by price formation.

This different conception of the magnitude of value leads to a discrepancy between Marx and his interpreters regarding the conception of the relationship between value and price. The fact that value is unaffected by price variations allows them to conceive of values and prices as completely separated sets of exchange values. The commodity's value, says Bortkiewicz, is the amount of money received in exchange for the commodity when all commodities, money included, are exchanged according to the amounts of the labour socially necessary to produce them. The commodity's price is the amount of money received in exchange for the commodity when all commodities, money included, are exchanged at their prices of production. In this form, rather than „conceiving of price as a form of value, value becomes another form of price“.⁸ In *Capital* I and II, Marx assumes that commodities are exchanged according to their amounts of labour and calls „value“ the prevailing price vector. In *Capital* III, commodities are exchanged according to the amounts of capital advanced for their production and what Marx calls „price of production“ gives the resulting price vector. For Bortkiewicz „value“, in *Capital* III as well as in *Capital* I and II, is the price vector prevailing in *Capital* I and II:

In what follows, *value* will always be taken to mean the index of an exchange-relationship [my emphasis – AR] ... it is of the essence of that concept of value that its magnitude be determined according to the (Marxian) law of value. This in fact constitutes the difference between value and price of production ... since the latter is formed not according to the Law of Value but according to the Law of the Equal Rate of Profit. (Bortkiewicz 1952:6)

Therefore the strict separation between prices and values allows them to be conceived as two juxtaposed exchange systems. This result has two important implications which will be discussed in the next section. First, it is possible to define a different standard of prices in each system in such a way that their relationship is defined as an external link between the system of values and the system of prices. The arbitrary definition of one of these standards, given the other, is known as the „postulate of invariance“. Second, it permits an understanding of both the exchange value (or „price“) and the value of the money commodity as a relationship of exchange of money against itself which makes it impossible to perceive the contradiction between the value and the exchange value of the money commodity and, thus, the particularity of the money form of value.

Before concluding this section, it is necessary to stress that, arguing against Smith, Marx affirms that values are not modified by changes in wages.⁹ In this statement he attempts to underline the fact that, if the proportion of social labour appropriated by workers as wages increases, then those appropriated by the capitalist class as profit must necessarily diminish. However, insofar as the rise of wages provokes a relative change in prices – either of the means of production or the use values in which the value product is realized – there may be a modification in the money expression of this social labour, that is, in the value of the social product. In effect, a modification of wages has a different effect on the cost price of gold and the cost price of any commodity produced by a capital whose organic composition differs from that of the capital producing gold. Given the equalisation of the profit rate, this different effect on cost prices provokes a variation in the exchange rate between gold and these commodities (that is a variation in the prices of the commodities, or, which is the same, in the exchange value of the gold). If these commodities are either the means of production or the net product, a change in wages thus implies a corresponding modification of constant capital or the value product respectively, and consequently a modification of the commodities' value, although the amount of labour socially necessary to produce the means of production, the net product and the gold remains constant.

This fact does not invalidate Marx's argument against Smith, since Marx does not require that value and value product be invariable magnitudes. The validity of the argument – and hence of the Marxist theory of value and surplus value – only requires a demonstration that prices, as aliquot parts of social value, are the objectified form of social labour. To do this, the internal relationship between labour and price has to be apprehended, which calls for an understanding of the dialectical relationship between the intrinsic measure of value – labour – and the extrinsic measure of value – money. The basis of this dialectical relationship is the contradictory nature of the money form of value; a proper understanding of this nature implies an acceptance that value (the monetary form of labour) is not given once and for all in the sphere of production but, rather, that it is quantitatively and qualitatively determined in the unity of production and circulation. Marx's theoretical results, according to which total value = total price and total surplus value = total profit can only be understood and demonstrated on the basis of this dialectical conception of the „inner, necessary connection between value-form, value-substance and value-magnitude“.¹⁰

4.3 VALUE AND THE EXCHANGE VALUE OF MONEY

Rejecting the equality between total value and total price Bortkiewicz, in his second and best known article (1952, originally 1907), develops an argument which has been neglected in the literature on transformation. This reasoning is

nevertheless crucial because it helps disclose the essential differences between Marx and the other contenders in the debate regarding the concept of money. In this commentary Bortkiewicz suggests that two different standards of price coexist, one in the „sphere of values“ and another in the „sphere of prices“.

The sum of prices is the exchange relationship between the total bulk of commodities and the money commodity. A total sum of prices of 422 *ounces of gold* means that this amount of money commodity has to be exchanged for the total output. According to Bortkiewicz's conception of value, every commodity has two exchange relationships with the gold: one corresponding with the amount of labour (called „value“ by Bortkiewicz) and other corresponding to the amount of capital, that is the „price of production“. This implies two different exchange relationships between total output and gold, the first given by the total sum of values and the second given by the sum of prices. Only when the capital producing gold has the same organic composition as social capital would these two exchange relationships be equal. Otherwise, the exchange relationship between the gold and total output would be quantitatively different, depending on whether it is established according to the amounts of labour or to the amounts of capital, and thus, the sum of values would diverge from the sum of prices. Bortkiewicz's argumentation is developed in the following passage, where he comments Marx's first illustration in *Capital* III, Chapter 9.

Let G be the good which serves as measure of value and price. The figures 90 and 92, which indicate the value and the price of the total output of sphere 1, would accordingly signify that this total output *is exchanged* for 90 units of G *according to the principles of the value-calculations*, and for 92 units of G *according to the principles of the price-calculation*. Such differences between price and value are due to differences in the organic composition of capital invested in the various spheres of production. These differences obviously also depend, with respect to their signs and their magnitude, on the organic composition of the capital invested in the production of G. (my emphasis – AR)

Let us now assume that this capital has the lowest organic composition of all, i.e. that in this capital, constant capital constitutes relatively a smaller part than it does elsewhere. On this assumption, *the transition from value-calculation to price-calculation* [my emphasis – AR] should result in all goods being exchanged for more units of G than formerly, in other words, all prices should be higher than their corresponding values. The total price would consequently be greater than the total value. In the opposite case, where the capital employed to produce G has the highest organic composition, the total price would prove to be a lower figure than the expressing total value. (Bortkiewicz 1952:11, my emphasis)

Since for Bortkiewicz (1952:6) value is always „the index of an exchange-relationship“ whose magnitude is „determined according to the (Marxist) Law of Value“, he naturally assumes that the exchange relationship between gold and gold is 1 to 1 and, hence, that the value of gold is 1. He analogously reasons that the price of production of gold is equal to 1. However, these two expressions are, in themselves, wholly meaningless: What does an exchange relationship between gold and gold, or between any use value and other use value of the same kind, mean? To define the value or price of *1 ounce of gold* as *1 ounce of gold* is as

irrational as asserting that the exchange value of *20 yards of linen* is *20 yards of linen*. The reason – as Marx repeatedly says – is that the value of linen requires a different commodity to be expressed in. For instance,

It cannot, for example express the value of linen in linen ... 20 yards of linen are nothing but 20 yards of linen, a definite quantity of linen considered as an object of utility. The value of the linen can therefore only be expressed relatively, i.e. in another commodity. The relative form of the value of the linen therefore presupposes that some other commodity confronts it in the equivalent form. (Marx 1976a:140)

On exactly the same basis, it is meaningless to say that the price of *1 ounce of gold* is *1 ounce of gold*. In the words following the above passage, Marx explicitly says:

On the other hand, this other commodity, which figures as the equivalent, cannot simultaneously be in the relative form of value. It is not the latter commodity whose value is being expressed. It only provides the material in which the value of the first commodity is expressed. (Marx 1976a:140)

Therefore, gold needs the other commodities to express its own values:

The relative value of money is expressed in the innumerable prices of all commodities; for in each of those prices in which the exchange value of the commodity is expressed in money, the exchange value of money is expressed in the use value of the commodity.¹¹

When the organic composition of a given commodity does not correspond to the average, its price diverges from its value and the profit appropriated by the producer through exchange diverges from the surplus value contained in it. Every commodity has only one exchange value, which is its price: the price vector constitutes the structure of exchange value, the only effective basis on which to calculate the cost price of commodities and hence their respective prices as well as their values. The value of a commodity is not, as Bortkiewicz thinks, an exchange relationship juxtaposed with price, a supposedly second exchange value defined according to another principle of equivalence.

The commodity's value is the *ideal* exchange relationship between the commodity and that gold which, given the structure of prices, would allow its producer to appropriate the whole surplus value produced by her or his workers. Its calculation is grounded on a certain structure of prices given for the whole commodity world, for example on a series of exchange relationships between the gold and the other commodities such that, in the case that a general rate of profit exists, all producers – including the gold producer – realize the average profit. This means that commodity values are calculated assuming that gold (as well as other commodities) is exchanged in proportions which permit its producer to pocket the average profit, and that these proportions are the unique effective exchange value between gold and commodities. This is a difficult matter due to the contradictory nature of the money form of value. An example can facilitate its understanding.

Firstly, let us assume that capital producing linen has the average composition and that the production of *20 yards of linen* requires *1.25 ounces of gold* as

constant capital and living labour which is objectified in 1.25 ounces of gold, half being appropriated as wages and half as surplus value. Linen's value can be broken down in the following form:

$$\begin{aligned} v_L &= 1.25_C + 0.625_V(1 + s) \\ &= 1.25_C + 0.625_V + 0.625_S \\ &= 2.5 \text{ ounces of gold} \end{aligned}$$

Let us suppose that, in the production of linen, the whole advanced capital is consumed and that its price is set at a level such that its producer appropriates as profit one third of its cost price, that is, the rate of profit is equal to $\rho = \frac{1}{3}$. In this case the price of the linen can be broken down as follows:

$$\begin{aligned} p_L &= (1.25_C + 0.625_V)(1 + \rho) \\ &= 1.25_C + 0.625_V + 0.625_P \\ &= 2.5 \text{ ounces of gold} \end{aligned}$$

The value and price of linen correspond: its producer objectified value expressed in 2.5 ounces of gold and his commodity's price is 2.5 ounces of gold. However, the fact that the value and the price of the commodity coincide does not mean that the value contained in linen is the equivalent of the value contained in 2.5 ounces of gold. The fact that linen's value is 2.5 ounces of gold is completely independent of the value of these 2.5 ounces of gold which can be produced by a different amount of labour from that required to produce 20 yards of linen. The value of linen and gold coincides only under an additional condition: that gold is produced by an average composition capital. Yet, this is an additional condition that depends on the conditions of production and circulation of the use value gold, for which the expression of the linen's value is completely indifferent.

Thirdly, let us suppose an equal rate of surplus value in all branches and that the organic composition of the capital producing gold is different from that producing linen. What would be the expressions of value and exchange value of gold parallel to those of linen? Let us suppose that the production of one ounce of gold requires 0.25 ounces of gold as constant capital and eighty per cent of the living labour needed to produce twenty yards of linen, that is 0.5 ounces of gold, corresponding to variable capital. This allows us to calculate the value contained in the gold as well as the value appropriated by its producer in the circulation. On the one hand, assuming an equal rate of profit in all branches, the profit appropriated by the producer of gold would be 0.25 ounces of gold. If value produced and value appropriated in the production of one ounce of gold are expressed in gold, the following result is obtained:

$$\begin{aligned} v_G &= 0.25_C + 0.5_V(1 + s) \\ &= 0.25_C + 0.5_V + 0.5_S \\ &= 1.25 \text{ ounces of gold} \\ p_G &= (0.25_C + 0.5_V)(1 + \rho) \\ &= 0.25_C + 0.5_V + 0.25_P \end{aligned}$$

= 1 ounce of gold

As stated, these expressions are in themselves meaningless because the value of gold cannot be expressed in gold: the money commodity is the only one that has neither price nor a general expression of value.¹² Money needs the use value of other commodities to express its value. So what is the correct reading of these expressions? On the one hand gold's „price“ ($p_G = 1$) is the exchange relationship that lets the gold producer appropriate the average profit.¹³ It is the relationship between one ounce of gold and any other commodity whose price is one ounce of gold. Since the price of twenty yards of linen is 2.5 ounces of gold, then one ounce of gold purchases $20/2.5 =$ eight yards of linen. Therefore, buying linen at its price, the gold producer would appropriate the average profit, that is if she or he exchanges one ounce of gold for eight yards of linen.

On the other hand, the value of gold is the exchange relationship that, *given prices for all commodities*, permits the gold producer to appropriate the totality of surplus value produced by his or her workers. It is the relationship between one ounce of gold and any other commodity whose price is equal to 1.25 ounces of gold. Since the price of twenty yards of linen is 2.5 ounces of gold, then 1.25 ounces of gold allows the gold producer to purchase $(20/2.5) \times 1.25 =$ ten yards of linen. Therefore, if the gold producer exchanges one ounce of gold for ten yards of linen, then she or he would appropriate the whole surplus value.

It is, however, necessary to stress that this exchange relationship, ten yards of linen for one ounce of gold, is purely *ideal* and its calculation supposes that the actual exchange relationship between linen and gold is eight yards of linen for one ounce of gold (= the exchange value of gold) or 2.5 ounces of gold for twenty yards of linen (= the price of linen).

This is the fundamental contradiction of the money form of value. Money is not only the *universal form* of value but it is also a *particular commodity* and thus the relationship between its value and its exchange value is as contradictory as that of any other commodity. In a passage that, out of this context seems incomprehensible, Marx (1973:150) stresses precisely this fact in the *Grundrisse*:

An incongruity arises not only because money, which exists only in exchange, confronts the particular exchangeability of commodities as their general exchangeability, and directly extinguishes it, while, nevertheless, the two are supposed to be always convertible into one another; but also because money comes into contradiction with itself and with its characteristic by virtue of being itself a *particular* commodity (even if only a symbol) and of being subject, therefore, to particular conditions of exchange in its exchange with other commodities, conditions which contradict its general unconditional exchangeability.

As a result of this contradiction between the value and the exchange value of gold, as far as it is the money commodity, the value contained in gold *as a specific use value* differs from the value that it represents as *universal form of value*. This contradiction is not present in the simple form of value: when the producer exchanges directly twenty yards of linen for one coat, she or he does not appropriate a *symbolic value* but rather the very *actual value* contained in the coat. But when he or she exchanges twenty yards of linen for 2.5 ounces of gold,

she or he appropriates the value contained in this gold *and* the value that this gold represents as universal form of value, that is the fraction of the total value this gold can be exchanged for. The value represented by money as the universal form of value (its symbolic value) arises from its social specific function and, therefore, it does not depend on the particular conditions of its production. These conditions determine the value contained in money as a specific use value. Conversely, the value represented by money is determined in the context of the social reproduction as a whole: If the total value product is Y thousand ounces of gold, one ounce represents $1/Y$ thousandths of the value produced by social living labour and, consequently, in this ounce is expressed $1/Y$ thousandths of the social labour objectified through this production period.

The ratio between the total value product and the total living labour gives a coefficient meaning the amount of gold in which one hour of social labour is represented, and so it constitutes the quantitatively determined relationship between the intrinsic and extrinsic measure of value. This coefficient, discussed by Foley (1982) and – I believe wrongly – termed by him the „value of money“, is not given once for all but its magnitude is determined in the process of price formation, where the value product is determined as a specific amount of money: any change in the price of the totality of commodities (and hence in the exchange value of money) is at the same time a change in the exchange relationship between money and the net product, and hence in the magnitude of the value product. Given the amount of living labour, this implies a modification of the ratio between the total value product and the total living labour, and consequently a variation in the amount of money in which one hour of social labour is represented. The basis of this fact is that labour is expressed in money, and money is not a simple unit of account but a contradictory unity of value and exchange value. To apprehend the internal and contradictory relationship between the intrinsic and extrinsic measure of value it is thus necessary to understand the contradiction between the value and the exchange value of money – in turn the basis of the money form of value – and not to treat money as a simple unit of account.

It is not guaranteed that the value *represented* by money coincides with the value *contained* in it. The possibility of this divergence, which constitutes the specificity of the money form of value, is the basis for the development of the symbol of money: long before gold is replaced by currency, gold (as money) is already a symbol whose symbolic value is divorced from its actual value. Both symbolic and actual value coincide in the specific case where the capital producing the money commodity is of average organic composition; this implies that its producer appropriates the whole surplus value created by his or her workers.

The apprehension of this specific contradiction of the money form of value constitutes the essential difference in the conception of money separating Marx from the other economists, classical as well as neoclassical. Ricardo is looking,

as measure of value, for a commodity produced by an average capital, in such a way that the value and the exchange value of this commodity coincides and their contradiction has no consequences for the value expression of the other commodities. Money would hence be „neutral“ and could be considered as a unit of account or numéraire. That is exactly what is done by the participants in the debate on the transformation problem and for the neoclassical tradition founded by Say and Walras: money is taken as a unit of account by collapsing its exchange value into its value and by considering that the „money commodity is the one commodity which enters the circulation process with its value“. In so doing, the money form of labour becomes determined exclusively in the sphere of production (of commodities as well as the money commodity).¹⁴ It lets values be separated from prices and opens the way for the suppression of the concept of value.

The main originality of Marx's conception of money is that money is not a simple unit of accounting but the contradictory expression of a class relationship:¹⁵ firstly money is a commodity, and so the *possibility* exists of a contradiction between its value and its exchange value; secondly, money is a commodity which is capital, hence the contradiction between its value and its exchange value becomes a *necessity* for the reproduction of capital.¹⁶

By imposing the condition that the value and the exchange value of gold are equal, almost all solutions to the transformation problem leave out this specific contradiction of the money form of value. The first author to do this was Bortkiewicz, who equates the „price“ and the value of gold to 1, a method later generally followed. The next step in the dissolution of Marx's framework is to measure the value of gold (and all values) in a different unit from that which is used to measure its price (and all prices); this is supposed to make it possible to derive one of Marx's equalities. The following section is devoted to the discussion of this procedure.

4.4 THE POSTULATES OF INVARIANCE

The determination of the value of gold, as of any commodity, arises from the reproduction process as a whole and requires a definite structure of prices. To assert arbitrarily that the price and value of gold are equal to 1 – independent of the organic composition and turnover time of the capital which produces it – is only possible if values and prices are conceived as two separated and juxtaposed systems of exchange. Only if value and price are independent can the unit of measure in the sphere of prices be chosen separately from the unit of measure in the sphere of values. If we require that in the passage from one sphere to the other a certain magnitude remain „invariant“ it is enough to define two appropriate different units of measure (or „standards of price“). As Bortkiewicz says:

One is not at all tied to the condition that the unit of price should be the same as the unit of value. If the latter is represented by 1 ounce of gold, the former may be represented by $\frac{3}{4}$ or $1\frac{1}{2}$ ounces of gold. In these circumstances, one can always, with any given model of values ... select such a unit of price as will make one particular element of the price-model (e.g. the price of the total output of 1 or the variable capital invested in 3, etc.) equal to the corresponding element in the table of values. Similarly, there is nothing to prevent one making a sum of certain elements in the table of prices coincide with the sum of the analogous elements of the table of values, and thus, for instance, equating total price with total value. Such method of determination can, however, obviously be applied only to one single function of these magnitudes. It would thus not be permissible to equate total price with total value whilst simultaneously equating total profit with total surplus value. (Bortkiewicz 1952:12)

For Bortkiewicz it makes sense to express values in a different unit of measure from those used to express prices, since he thinks that both spheres are completely independent and define two alternative exchange systems. For Tugan Baranowsky the unit of measure in one sphere is thousands of man years and in the other millions of marks; for Bortkiewicz likewise, in one sphere the unit of measure could be ounces and in the other thirds of an ounce or hectograms. The relationship between the two standards of price is defined through the relationship between the value and the price of the money commodity. Since for Bortkiewicz value is an exchange relationship, the value of the money commodity (for him the exchange relationship of gold against gold) must be 1. In his equation (10)¹⁷ he asserts that the value of one ounce of gold is one ounce of gold. When Bortkiewicz defines the standard of price in the sphere of prices, he has to ask: what is the price of one ounce of gold? If the same standard of price is defined (ounces of gold), the price of one ounce of gold is equally defined as 1. Notwithstanding this, a unit with different weight could be defined like, for example, those proposed by Bortkiewicz in the passage quoted above. If the standard of prices in the system of prices is defined as $\frac{3}{4}$ ounces of gold, the price of one ounce of gold would be $1\frac{1}{3}$ units of such standard; if it is defined as $1\frac{1}{2}$ ounces, the price of one ounce of gold would be $\frac{2}{3}$ units.

The selection of two different standards is what permits at least one of the aggregates in both systems to coincide and so to define a „linkage“ between the sphere of prices and the sphere of values. Since a uniform rate of profit is compatible with any linear combination of the vector of prices of production, a level of absolute prices can be chosen imposing the equality of one aggregate in both systems; for instance the sum of values and the sum of prices. If the sum of values is 875 ounces of gold and the sum of prices is 1000 ounces of gold, then it suffices to define a unit of measure for prices equal to $\frac{8}{7}$ ounces of gold. Thanks to the selection of this standard of price, the sum of values „coincides“ with the sum of prices, that is their magnitudes are equal to 875 money units in both systems: 875 ounces in one case and 875 units of $\frac{8}{7}$ ounce in the other. Since the matter is, as Seton says, „the selection of a definite aggregate (or other characteristic) of the value system which is to remain invariant to the

transformation into prices"¹⁸ these different alternatives have been called „postulates of invariance“.

The selection of two juxtaposed standards of price is carried out in the form of two different normalizations, one in the system of values and the other in the system of prices. The method of carrying out such normalizations varies according to the type of systems used, namely simultaneous or iterative.

In the case of „corrections“ in simultaneous equations, the procedure sets out two different systems of equations, each of one formed from n equations and $n + 1$ unknowns. In the system of values, the unknowns are the values of the n commodities and the rate of surplus value; in the system of prices, the unknowns are the prices and the rate of profit. In contemporary notation, Bortkiewicz's system can be written

$$\begin{aligned} v &= va + vl(1 + s) \\ &= v[a + wl(1 + s)] \\ p &= p[a + wl](1 + r) \end{aligned}$$

where v and p are row vectors of unit values of prices, a is a square matrix of input-output coefficients (excluding labour), w is a column vector of wage goods, l is a row vector with the amounts of living labour required to produce a unit of each use value and s is the rate of surplus value. Both systems have n equations and $n+1$ unknowns: in the first case the n values and the rate of surplus value, in the second the n prices and the rate of profit. All linear combinations of vector p corresponding to the largest characteristic root of a are compatible with the rate of profit and all linear combinations of v are compatible with the rate of surplus value that corresponds to w . So, the solution to the first system gives a vectorial hyperplane corresponding to all the linear combinations which represent the same structure of the relative values of the commodities. The selection of one single vector is carried out by posing the value of the money commodity to be 1: this constitutes one normalization of the system. In the case of Bortkiewicz, who measures value in money, this means that the value of one ounce of gold is one ounce of gold. In the case of the other solutions of simultaneous systems, which measure value in labour, this means that the value of one ounce of gold is one unit of labour.¹⁹ On the other hand, the solution of the system of prices equally gives an vectorial hyperplane which represents relative prices; the choice of a particular vector – that is the level of absolute prices – is achieved through one particular normalization of the system. In Bortkiewicz this normalization is carried out posing the price of the money commodity as equal to 1; this implies that the standard of prices in both systems is the same: the value as well as the price of one ounce of gold (and all the other commodities) are measured in ounces of gold.²⁰ In the case of the other participants in the debate, the normalization is carried out by selecting a second standard of prices, which ensures the equality between some aggregate of the system of values (expressed in corresponding units of measure) and the same aggregate of the system of prices (expressed in the other unit of measure). For instance, Winternitz selects a

standard which equates total price to total value, Seton selects another which equates the price of wage goods to their value, while Duménil selects a standard of price which equates the price of „net product“ to its value.

In the case of „corrections“ in iterative systems, these usually begin from a vector corresponding to the solution of the system of values, which consequently entail a certain normalization. This normalization is generally carried out by setting the value of the money commodity equal to 1. Then an iterative sequence is defined which gives the vector of absolute prices. The normalization condition in the system of prices – that is the selection of the standard of prices corresponding to this system – is carried out implicitly through the choice of formula used to define the sequence of the rates of profit. In effect, the profit rate defines a normalization condition for the price system in such a way that, given the implicit normalization in the initial vector of values, some magnitude remains constant along the iterations. The formula of the rate of profit ensures, thus, that any modification in the normalization of values consequently implies a change in the normalization of prices and, therefore, defines a certain relationship between both standards of price. In Shibata's, Bródy's and Shaikh's iterative process the rate of profit is defined in such a way that the total price equals total value, and in Morishima and Catephores's iterative sequence the total profit equals the total surplus value.

In both traditions (simultaneous and iterative equations) values and prices are two separate systems, each of which can be solved only by adding another equation. This supplementary equation, which implies choosing one of the linear combinations belonging to the vectorial plane which constitutes the solution of the system, is their specific condition of normalization. The different „solutions“ advanced by both traditions are simple definitions of a specific relationship between the two conditions of normalization in such a way that some magnitude in one system is „equated“ to those corresponding in the other. The postulate of invariance is the selection of the normalization condition in one system which, given the normalization applied in the other, implies that some magnitude remains „invariant“ and so it implies the juxtaposition of two different standards of prices.

In *Capital* Marx mentions a series of relationships directly derived from his concepts of value and price such as, for instance, the equality between total surplus value and total profit, the equality between total value and total price, the equality between price and value in spheres of average composition, and so on. Once Bortkiewicz's concept of value replaces Marx's, all these relationships become „mutually incompatible“. According to Bortkiewicz (1952:12), Marx neglects this incompatibility since he erroneously conceives these relationships as logical consequences of his theory, instead of correctly considering them as „permissible, though arbitrary assumption(s)“. Many „solutions to the transformation problem“ are possible, in accordance with the selection of some „postulate of invariance“ and, therefore, they reduce the transformation to the

merely external relation between units of account. Marx's interpreters are not aware that by doing this, they have „solved“ the transformation problem by setting Marx on his head. For them, „gold is the measure of value because its value has been established as an invariable quantity of value; it is the standard of price because it is used as variable unit of weight“.²¹

Before concluding it is necessary to ask: why do the contenders in the debate not perceive the nonsense of this procedure consisting of „linking prices with labour values“ through the arbitrary and false definition of two standards of price? They appear to think that this is a legitimate method because, according to their interpretation, Marx deploys an analogous procedure. In effect, all the contenders – excepting Bortkiewicz and Shibata²² – argue that while Marx's values are reckoned in labour time, prices are expressed in money units: „value is labour, its measure is labour time“.²³ According to them, when Marx „postulates“ the equality between total value and total price, he supposedly maintains that a certain number of hours or working days is equal to a certain number of pounds sterling or ounces of gold and, thus, in their systems of equations, they do exactly this. In this form, measuring value in time instead of money cancels the fact that when a „postulate of invariance“ different from Bortkiewicz's is chosen, the analysis imposes two different standards of price (for example, ounces and $\frac{8}{7}$ of an ounce). As Sweezy and Dobb²⁴ say, selecting the „postulate of invariance“ seems like a naïve accounting procedure. To get the equality, it suffices to choose money units in such a way that figures corresponding to the total value and price are equal. If, on the one side, there are 1000 barrels and, on the other, 2471 acres, it is enough to measure the latter quantity in hectares²⁵ to obtain the „link“ between the sphere of „contents“ and the sphere of „surfaces“: we can thus write 1000 barrels = 1000 hectares. Selecting the „postulate of invariance“ is deciding which figure in each sphere (in labour hours and money units) has to be equalled and „naïvely“ choosing proper units of measure.

Assuming that quantities in the schema of values are expressed in labour hours (or days) and the figures in the schema of prices in ounces of gold (or pounds sterling), how can we interpret Bortkiewicz's equation that allows him to impose the existence of one standard of price? The question is important because if the schema of values is expressed in labour hours, it is impossible to call the unit of account the „standard of price“. Sweezy (1970:117) has the answer. Defining value and „price“ of money commodity to be equal, „the number of units of labour necessary to produce one unit of the money commodity would provide a direct link between the two systems of accounting“. In effect, since the „price“ of one unit of the money commodity is 1,²⁶ the equality „value of money = “price” of money“ implies that the value of one unit of money measured in labour time is 1, and so the unit of accounting in the schema of value is defined as the amount of labour necessary to produce one unit of money. In this form, the unit of account of the scheme of values is defined as the amount of labour necessary to produce one unit of money. Thanks to this, commodity values can be expressed

directly in money units or, conversely, prices in labour hours. With this, the relationship between values and prices achieves the form of the banal functional relationship that is commonly accepted: „the “transformation problem” in the formal sense of linking value and price of production is seen to be practically trivial mathematically“.²⁷

4.5 CONCLUSIONS

The critiques advanced throughout the transformation debate are based on a conception of value different from Marx's. Thanks to this conception, values and prices are considered as two independent systems whose unique relationship consists of „a direct link between the two systems of accounting“²⁸ called the „postulate of invariance“. In this form, the relationship between value and price is presented as an external link – the arbitrary choice of two different conditions of normalization – which does not arise from the concept of value. Both systems could be determined without imposing any relation between the two conditions of normalization and so there would be no „link“ at all between the „sphere of values“ and the „sphere of prices“. In this manner, the transformation has been reduced to the substitution of one vector of relative prices for another, as depicted by Samuelson in his famous „theorem of rubber“,²⁹ and the road is clear for the Sraffians to speak of the „redundancy of value“.³⁰

This conception of the relationship between value and prices has blocked any perception of the contradiction between the value and the exchange value of money. Consequently, the contradictory form in which labour is expressed by money appears incomprehensible. This implies that the transformation debate has only reproduced exactly the same deficiencies that provoked the dissolution of the Ricardian School. This chapter has attempted to clarify at least two pillars where these deficiencies are grounded, which, as the last decade testifies, have contributed to the dissolution of the new version of the Ricardian School.

NOTES

¹ Ricardo (1990:13)

² „[T]he general prices of the commodities, which are the produce of such work, will not be governed by the peculiar facilities afforded to these workmen, but by the common, usual and natural difficulties which every other manufacturer will have to encounter“ (Ricardo 1990:73).

³ In the final example of his first chapter, Ricardo assumes that, given the amount of labour, the production of all commodities is doubled. His commentary clearly infers that this situation implies a 50 per cent reduction in the absolute value of each commodity including those produced under the new conditions, and those already produced.

⁴ See for example, the *Grundrisse* (Marx 1973:141) „As value, [the commodity] is *money*“. Or *Capital I* (Marx 1976a:142) „human labour creates value but is not itself value“.

⁵ Thus see *Capital III* (Marx 1981:238): „the value of any commodity – and thus also of the commodities which capital consists of – is not determined by the necessary labour-time that it itself contains, but by the socially necessary labour-time required for its reproduction“. In chapter 6 of this

volume, where he discusses the effect of price changes, Marx is clear enough that the commodity's cost-price is determined by the replacement price of the material elements involved in its production.

⁶ To Wolff, Roberts and Callari (1982,1984a) belongs the great merit of stressing, for the first time, that the commodity's constant capital component is determined through the process where prices are formed and, thus, that value is not a pre-determined variable. However, for these authors the measure of value is not money but time; this prevents them perceiving that the second commodity's component, value-product, is also determined through price formation. For a discussion on this issue see Rodríguez (1994).

⁷ This idea has recently been expounded again by Moseley (1993a:170): „The quantity of money that represents one hour of abstract labour is equal to the inverse of the labour value of a unit of money.“

⁸ Kliman and McGlone (1988:65).

⁹ See, for example, *Capital* II (Marx 1978:462).

¹⁰ Marx (1976b:34). This quotation is from chapter I of *Capital* I in the first German edition but was revised by Marx for the fourth German edition which is the basis of the standard English translation of *Capital*.

¹¹ See *Theories of Surplus Value* II (Marx 1969b:201). See also the *Grundrisse* (1973:207) „In order to express the price of money, the whole sphere of commodities would have to be listed, each in the quantity which equals 1 ounce of gold.“ Ricardo (1817:105) presents this idea: „To say that commodities are raised in price, is the same thing as to say that money is lowered in relative value; for it is by commodities that the relative value of gold is estimated“.

¹² *Theories of Surplus Value* II (Marx 1969b:201): „The price of the commodity which serves as the measure of value, and hence as money, does not exist at all, because otherwise, apart from the commodity which serves as money I would need a second commodity to serve as money – a double measure of values“.

¹³ Rigorously, the amount of any commodity given in exchange for gold is not the gold's price, but one of the many exchange values of gold. The price is the general exchange value of the commodities, the expression of their value in the use value of the commodity functioning as money. Money does not have price because no commodity can express its value in its own use value; but money has as many exchange values as there are commodities expressing their value in money.

¹⁴ de Brunhoff (1976:70).

¹⁵ See the *Grundrisse* (Marx 1973:218): „The money relation is itself a relation of production if production is looked at in its totality“.

¹⁶ To Suzanne de Brunhoff (1976:70-71) belongs the great merit of stressing, for the first time since Marx, this contradictory character of the money-form of value: „If money is treated as a unit of account possessing a price, it loses its specificity, and if its price is equal to its labour value, it can be considered as neutral. The confusion of the problem of prices and that of the conditions of reproduction, and the introduction of a money-commodity unit of account, wreck the bases of Marx's theory of money.“

¹⁷ Bortkiewicz (1952:14).

¹⁸ Seton (1957:152).

¹⁹ This is the case, for example, with Morishima and Catephores (1978a:158) who define the value system as $v = va + L$. As the „distribution variables“ (the vector of wage-goods and the rate of surplus value) are not specified, this system has n equations and n unknowns. Its unit of measure is not defined through a normalization (as in the above system) but it is directly given by the unit of measure of labour (hours, days, years...).

²⁰ Bortkiewicz's system presents three productive spheres where only the third produces luxury commodities. According to his conception of value, surplus-value is given by the value of these articles and profit by their price. When he defines that this sphere produces the money-commodity and that its price equals its value, Bortkiewicz obtains the additional result according to which total surplus-value and total profit are equal. If, in Bortkiewicz's system, there were various branches producing luxury commodities, his normalization would not imply that total surplus-value equals total profit.

²¹ Marx (1970:71): „Gold is the measure of value because its value is variable; it is the standard of price because it has been established as an invariable unit of weight“.

²² These exceptions are frequently neglected and, in many presentations of Bortkiewicz's system, values are measured in labour time and prices in money units. Sweezy (1970:117) who translated

Bortkiewicz's pieces into English, does not notice this either: „in our value schemes ... one hour of labour has been the unit of account“. See also Morishima and Catephores (1978a:157).

²³ Duménil (1983:441). See, for example, Tugan Baranowsky (1905:174), Moszkowska (1979:11), Sweezy (1970:117), Medio (1972:321), Shaikh (1981:128) and (1984:59), Morishima and Catephores (1978a:157), Lipietz (1982:61, note 6) and Mandel (1984).

²⁴ Sweezy (1970:117). „It is important to realize that no significant theoretical issues are involved in this divergence of total value from total price. It is simply a question of the unit of accounts.“Dobb (1955: 279) fully supports this interpretation of the so-called „postulate of invariance“: „So far as the transformation problem is concerned, the difference of assumption is purely formal: as Sweezy says, any such assumption is significant only as a way of establishing a link between Prices of Production and Labour-Values“.

²⁵ 1 acre = 0.4047 hectares.

²⁶ See equation (27) in Bortkiewicz (1952:21).

²⁷ May (1948:596).

²⁸ Sweezy (1970:117).

²⁹ Samuelson (1971:400): „For when you cut through the maze of algebra and come to understand what is going on, you discover that the “transformation algorithm” is precisely of the following form: “Contemplate two alternative and discordant systems. Write down one. Now transform by taking an eraser and rubbing it out. Then fill in the other one. You would have completed your transformation algorithm”.“

³⁰ Steedman (1977).

5 Time, money, equilibrium: methodology and the labour theory of the profit rate

Michele I. Naples

5.1 INTRODUCTION

Marx identified the profit rate as the driving force in capitalism. The search by capitalists for an adequate return on their capital, he argued, gives capitalism its dynamic and unstable character. The profit rate is both the measure of successful accumulation and the motive for greater accumulation.

Marx insisted that the source of the profit rate was labour, labour as a process, and labour productivity as the result of that process. He (1969b:432) criticized Ricardo for limiting the determining role of labour productivity to capital and wage goods industries (that is, basics), and treating the luxury sector profit rate as passively mirroring the basics rate (see also Marx 1981:177). Yet all solutions to the transformation problem since Marx have accepted Bortkiewicz's (1984) (and Sraffa's 1960) equilibrium Ricardian model whose profit rate is the value rate of profit in basics.¹

This chapter criticizes the methodology of neo-Ricardian models of price and profit rate determination as neoclassical² on three counts:

- ☐ its approach to time, and to how to incorporate reproduction over time;
- ☐ its treatment of the money-of-account;³ and
- ☐ its presumption that equilibrium, and in particular a uniform profit rate, are possible in capitalism, and moreover determine the profit rate.

It emphasizes that the implicit *theory* is Ricardian rather than Marxian:

- ☐ production conditions in basic industries alone affect the profit rate,
- ☐ all technical change will lead to a higher profit rate (Marx had argued that increased capital intensity may reduce the profit rate), and
- ☐ money is a veil thrown over real relations.

This chapter contrasts the neo-Ricardian methodology with that of Marx and the classicals. It challenges equilibrium in terms of its method of abstraction, imposition of simultaneous time, and assertion that capitalism is rational. The causal model implicit in Marx's transformation algorithm and modern solutions

is arguably essentialist; a structuralist approach more akin to Marx's historical method and to non-equilibrium is explored. In the structural approach to reproduction, capitalist pricing causes nominal price changes as it redistributes real (surplus) value among firms. Such non-equilibrium price instability calls into question gold as the money-of-account.

The chapter then focuses on the issues of nominal price, inflation, and the money-of-account. It shows how the equilibrium assumption segregates inflation and the price level from the determination of relative price and the income distribution, a Ricardian and pre-Keynesian habit. It critically evaluates the meaning and implications of a gold money-of-account. It shows that Marx recognized that historically, the price unit changes from gold into a conventional accounting unit *before* capitalist exchange. Consequently, Marx's monetary theory is fully consistent with the qualitative differences between nominal price and real value implied by non-equilibrium.

The chapter then incorporates reproduction over time into the transformation from values to prices via a structural non-equilibrium methodology. It employs a conventional money-of-account, permits nominal price to deviate from real value, and recognizes that the profit rate *cannot* be uniform. The model determines the real rate of profit, aggregate value and surplus value. It shows that $n - 1$ prices and aggregate price (in)stability are indeterminate without analysis at a lower level of abstraction – the level of the historically contingent structure of capitalist competition (see also Naples 1989).

5.2 MARX'S METHOD OF ABSTRACTION

In Volume I of *Capital*, Marx demonstrated that when goods are produced for exchange, prices are regulated by labour productivity. Moreover, workers' productivity over and above their equivalent hourly wage creates surplus value.

In Volume III of *Capital*, Marx applied these core concepts to the case of capitalist production. He examined how surplus value is converted to a general rate of profit on capital, transforming values to prices of production. He abstracted from the actual absence of a uniform profit rate, and capitalists' need to reproduce themselves over time. Because Marx was not concerned with reproduction, he treated the following subsidiary issues as inessential:

- 1) the transformation of input costs from values to prices of production;
- 2) productivity change; and
- 3) the introduction of new goods tomorrow.

Marx abstracted from those real conditions he considered inessential in order to throw into relief the underlying structure of capitalism. The „principle of appropriate abstraction“ (Sweezy 1970:20) was to identify and distinguish the core elements of the problem from the inessential (see also Meek 1967:94). Marx was able to show that under capitalist pricing behaviour, goods would no longer

exchange at values, yet labour productivity would still determine price and profit. The prices of production charged would redistribute surplus value to industries with higher organic compositions of capital.

The theoretical project since Bortkiewicz has been to incorporate one aspect of reproduction, the *feedback* of today's pricing behaviour on tomorrow's costs (item 1 above). Bortkiewicz did so through a specific set of assumptions:

- ☐ input costs would be evaluated in prices of production;
- ☐ prices would be stationary, (he set input prices charged yesterday equal to output prices charged today);
- ☐ goods markets would clear (otherwise the markup on unit costs will not equal the profit rate, see Naples 1994).

Combined, these form an *equilibrium* specification. But equilibrium is only one way to incorporate reproduction into Marx's model; a competing formulation has been advanced (for example Naples 1989).

Bortkiewicz interpreted his equilibrium model as implying that it was not possible for both of Marx's invariance postulates to hold. His discovery of a contradiction between Marx and equilibrium is itself a major contribution. Unfortunately, the postwar generation schooled in neoclassical theory found equilibrium a more obvious point of departure than Marx's exploitation theory of the profit rate. Too few have recognized the different epistemological statuses of Marx's labour theory of value and Bortkiewicz's equilibrium assumption. Bortkiewicz allowed his simplifying equilibrium assumptions to vitiate Marx's most crucial concept: that the capitalists' ownership of the means of production permits them to extract both necessary and surplus labour from workers, and that their labour productivity explains both price and the profit rate.

But Marx would never have adopted simplifying assumptions which were inconsistent with his central theoretical discovery. The irony is, neither would any other theorist. As T. Kuhn and I. Lakatos have both argued, any scientific practice rests on an overarching „paradigm“ or „research program“. Moreover, as Blaug quotes Lakatos,

„all scientific research programmes may be characterized by their “hard core”, surrounded by a protective belt of auxiliary hypotheses which has to bear the brunt of tests“. The „hard core“ is irrefutable by „the methodological decision of its protagonists“ – shades of Kuhn's paradigm! (Blaug 1988:367)

The labour theory of value was Marx's „hard core“, and therefore incapable of refutation from within his own paradigm or research program (see also Dobb 1989:3-7 on vision). He would have rejected equilibrium as an „inappropriate abstraction“ inconsistent with his core principles.

Those who follow Bortkiewicz have replaced the labour theory of value with equilibrium assumptions. But they have also replaced Marx with Ricardo, where Ricardo's conception of capitalism was *not* inconsistent with Bortkiewicz's equilibrium⁴ assumptions. The neo-Ricardian model treats profits as the surplus left over from nature's and technology's bounty once other class incomes are paid

(see Marx 1976a:650-651,1994:18,32 on nature). And the model treats labour and labour power as identical.

Yet Marx saw his labour/labour power distinction as his critical advance over Ricardo. The question was not only how class incomes are distributed, but the source of capitalists' income in their successful extraction of labour (more hours of work, more intensive labour, better quality performance) from employees. It is probably more than coincidence that the two theories which are consistent with an equilibrium methodology, neoclassical and Ricardian theory, treat the production process as a black box labelled „technology“, not as the conflict-ridden power struggle Marx perceived (for more on social theories of productivity, see Naples 1987).

5.3 EQUILIBRIUM AND TIME

Equilibrium in the classical tradition meant a central tendency – towards a uniform profit rate, and the exchange of goods at their natural prices or prices of production – not the achievement of a state of tranquillity (Robinson's language 1969). Since the marginalist revolution, equilibrium has been understood as a point from which there is no tendency to move. In the Marshallian (1982) long-period equilibrium, prices, wages and the rate of profit are constant over time (subject to given endowments and technology), and all markets clear.

Bortkiewicz's equilibrium methodology followed neoclassical General Equilibrium theory by employing the logical construct of simultaneous time – a moment in which all economic behaviour transpires at once. He was conscious that this formalistic approach to time and causation differed from the classical:

Alfred Marshall said once of Ricardo: „He does not state clearly, and in some cases he perhaps did not fully and clearly perceive how, in the problem of normal value, the various elements govern one another *mutually*, and not *successively* in a long chain of causation“. This description applies even more to Marx ... [Marx] held firmly to the view that the elements concerned must be regarded as a kind of causal chain, in which each link is determined, in its composition and its magnitude, only by the preceding links ... Modern economics is beginning to free itself gradually from the successivist prejudice, the chief merit being due to the mathematical school led by Léon Walras (Bortkiewicz 1952:23-24) ⁵

His explicit attention to this issue highlights the incongruity between the Walrasian equilibrium *Weltanschauung* and classical thinking. His last sentence indicates how unusual simultaneous time still was even twenty-five years after the marginalist revolution.

The Surplus School, which encompasses neo-Ricardians and Post-Keynesians, eschews neoclassical equilibrium and its associated equilibration of supply and demand. They counterpose an economy in a state of tranquillity, which

develops in a smooth regular manner without internal contradictions or external shocks, so that expectations based upon past experience are ... constantly fulfilled. (Robinson 1969:59)

While this is not identical to the statics of neoclassical economics, the economy is stationary in the sense of the natural sciences: despite ongoing motion, there is no substantial or structural change.

While the neoclassical and Surplus School notions of equilibria differ, they share a common equilibrium methodology. Analysts search for determinant outcomes from a set of equations representing tranquillity or equilibrium. This does *not* mean that economists from the Surplus School adopt a neoclassical *theory* of the determinants of an equilibrium position. Methods are distinct from theories, and economists of varying persuasions often employ methodologies from different traditions. For instance, some Marxian analyses of the extraction of labour from labour power have utilised an equilibrium methodology (for example Bowles 1985). The theory of profits and productivity has nothing to do with neoclassical theory, but the method is wholly an equilibrium one.

However, methods are not in themselves neutral. Thus American Keynesianism, based on an equilibrium methodology, leads to different policy prescriptions from those implicit in the Post-Keynesian representation of Keynes.

Keynes saw the decentralized nature of capitalist investment decisions in an uncertain world as a chronic source of instability and underemployment which only the socialization of investment, that is, planning, could rectify (see Keynes 1964 Chapter 24). The neoclassical interpretations of Keynes do not advocate different theories of effective demand from his. But their comparative static equilibrium models define away any determining role for uncertainty and a crisis of confidence as unfolding processes through chronological time.

Similarly, despite his classical *insight* that prices depend on production conditions, Sraffa employs an equilibrium and therefore non-classical *methodology*. This has theoretical consequences. For instance, his model has been shown to imply that every profitable change in technique will lead to a higher rate of profit or more net income to be distributed between capitalists and workers (Bortkiewicz 1952; Okishio 1961).⁶ While Sraffa's model accepts the classical view of a conflict between capitalists and workers over the distribution of a given income, it implies a harmony of interest in promoting technological change. Moreover, capitalists uniformly benefit from productivity growth.

Yet Marx had insisted that labour saving technical change would hurt capitalists as a class by tending to reduce the rate of profit, which is more likely to force some firms out of business. Margaret Andrews (1981) has developed a fixed wage model where capitalists choose techniques at non-equilibrium prices. She showed how without the equilibrium assumption, labour saving technical change may reduce the average (non-uniform) profit rate.

The equilibrium methodology does not provide a neutral analytical tool, but directs economic investigations towards neoclassical results. As Bortkiewicz (1952:54) asserted:

The mathematical method ... achieves still more: by its means, the cost of production theory can, without any difficulty, be brought into harmony with the law of supply and demand ... [f]ollowing the example of Walras ... It is in this connection that the superiority of the mathematical method over the Marxian method appears particularly clearly.

Methodological innovations which imitate neoclassical techniques should be suspect a priori: techniques are most probably laden with theoretical priorities and perspectives, they are not paradigm-neutral.

5.4 EQUILIBRIUM AND RATIONALITY

The neo-Ricardian method posits an economy in equilibrium with an income distribution consistent with stable relative prices. This takes for granted that capitalism can be characterized in this way, as a rational, internally coherent system.⁷ Interestingly the father of simultaneous equation economic models, Léon Walras, saw the demonstration of that rationality as the central goal of economic science; this would help provide the basis for rejecting a socialist alternative.

Man [sic] is a creature endowed with reason and freedom, and possessed of a capacity for initiative and progress. In the production and distribution of wealth, and generally in all matters pertaining to social organization, man has the choice between better and worse and tends more and more to choose the better part. Thus man has progressed from a system of guilds, trade regulations and price fixing to a system of freedom of industry and trade, i.e. to a system of *laisser-faire, laisser-passer*; he has progressed from slavery to serfdom and from serfdom to the wage system. The superiority of the later forms of organization over the earlier forms lies not in their greater naturalness (both old and new are artificial, the newer forms more so than the old since they came into existence only by supplanting the old); but rather in their closer conformity with material well-being and justice. The proof of such conformity is the only justification for adhering to a policy of *laisser-faire, laisser-passer*. Moreover, *socialistic forms of organization should be rejected* if it can indeed be shown that they are inconsistent with material well-being and justice. (Walras 1984:55, emphasis added)

While Smith and Ricardo might not have balked at the neo-Ricardian effort to demonstrate the rationality of capitalism (Godelier 1972), it was Marx's enterprise to identify capitalism's contradictions, its inconsistent tendencies and counteracting tendencies. Marx sought the endogenous sources of capitalism's recurring crises. He saw capitalism as irrational, a system which a rational, self-interested working class would replace with socialism.

Bortkiewicz reframed the transformation problem in terms of a Walrasian vision of economic science.⁸ He *assumed* that the outcomes of competitive individual behaviours were consistent with each other, and sought to show they

were inconsistent with Marx's theory of the profit rate. Bortkiewicz claimed that the equilibrium condition that the profit rate be uniform determines its magnitude. However, „a static equilibrium system only expresses the *conditions* for an unspecified dynamic system to be in equilibrium” (Dobb 1989:9, quoting R. Bentzel and B. Hansen). Bortkiewicz's model did not prove that the profit rate in capitalism must equal the Ricardian rate, but rather that a capitalist economy will only settle down into equilibrium if its rate of profit equals the Ricardian rate.

Thus Bortkiewicz and other neo-Ricardians have not demonstrated that Marx's own presentation was internally inconsistent. Rather, *they have shown that an internally consistent capitalism is irreconcilable with the exploitation theory of the profit rate*. For Marx capitalism is riddled by contradictions which render impossible the stationarity and rationality implicit in the neo-Ricardian equilibrium method.

5.5 ESSENTIALISM VERSUS STRUCTURAL CAUSATION

The neo-Ricardian equilibrium assumption is arguably not Marxian. But the model's essentialist view of causation is. In Marx's original transformation, prices were transformed quantities of labour values, but their units were not qualitatively different from values. Exchange value was reducible to its value-essence in a straightforward unmediated manner. Marx's critics, in „correcting” his transformation, have also assumed that the price realm had to be shown to be a direct reflection of the essential underlying value realm if the labour theory of value was to be substantiated. Capitalist pricing implied that the quantity of socially necessary abstract labour time earned by a capitalist would change, but not the mechanism which allocated real income.

Yet in the field of history Marx's own analysis was much more complex, and Marxists have recognized the pitfalls of essentialist theories of causation. For instance, Louis Althusser (1970) argued that revolutionary events are never simply „determined” by an essential cause like the contradiction between labour and capital. Rather, they are *overdetermined* by an accumulation of contradictions deriving from the structure of capitalism. This does not negate the view that that structure emerges from the fundamental conflict between labour and capital, but rather enriches it: such secondary conflicts as competition within the capitalist or working class also shape that structure and its corresponding „laws of motion”.

Althusser cited Frederick Engels's⁹ reading of the sources of social transformation as an example of essentialist thinking. He contended that Engels's attribution of a determinant role of the economy „in the last instance” was economistic and wrong, since „the lonely hour of the “last instance” never comes” (Althusser 1970:113). Some have interpreted this as saying that the evolution of

social formations is not determined by economic factors at all. By extension, the effort to reduce categories like „price“ to an underlying „value“, or of exchange value to production relations, is misplaced. Values and prices are mutually and reciprocally determining and determined (Kliman and McGlone 1988; Wolff, Roberts and Callari 1982), there is no *ex ante* cause after the onset of capitalist pricing.

Ironically, this echoes Bortkiewicz's view of simultaneous causation rather than the classical view. Many if not most of the authors in this collection take a similar stance, because they are critical of the dualism of the neo-Ricardian model. In the neo-Ricardian specification, values play no determining role. The value realm is orthogonal to the price realm, and the two only connect through a single invariance postulate.¹⁰

I too am critical of this dualism. But I believe Bortkiewicz was correct in treating Marx's sequential causation as fundamentally different from simultaneous causation. For Marx production logically preceded exchange, and value preceded price. Rather than counterposing mutual causation to no causation, (simultaneous determination to neo-Ricardian dualism), I argue that we must retain the prime causal role of values by changing our model of causation from essentialist to structuralist.

In history we are not limited to two choices: reducing everything to economics, or foregoing economic determinism altogether. Similarly, Althusser's critique of essentialism implies that instead of linear determinations, models of the transformation problem should embody a structuralist, more nuanced vision of causation. Equilibrium economic models have been likened by others to the method of Newtonian mechanics (see Bharadwaj 1978:43). A non-equilibrium model with nonessentialist causation can be exemplified by Einstein's modification of Newton's laws.

In Newtonian theory, a force applied to an object of a given mass for a period of time produces a change in speed.¹¹ The essential cause behind the acceleration is the force applied. Einstein recognized the contradiction between this theory and the apparent constancy of the velocity of light. He suggested that simplifying assumptions, like the constancy of an object's mass or the constancy of time's duration, should now be re-examined. The contradiction was resolved through a structural causal model.

Einstein argued that as an object approaches the speed of light, the constancy of light's velocity implies that added force may cause mass and/or time to adjust as well as speed. Because of the discovery of the constancy of light's speed, Einstein argued, other „parameters“ of the natural system had to be reconceptualized as variables. Thus changing velocity can no longer be reduced in a linear fashion to an immediate, essential cause (except for low velocities, below ninety percent of the speed of light). Nevertheless the application of force is the fundamental underlying cause of acceleration, as well as of the other resultants (changes in mass and/or time).

Bortkiewicz's discovery that equilibrium contradicts the conservation of value (socially necessary labour time) suggests that the structure of capitalism prohibits the essentialist determination of prices by values implied by an equilibrium model. A nonessentialist approach to a non-equilibrium transformation reconceptualizes a „parameter“, the price level, as a variable. Thus, a change in price can no longer be reduced in a linear fashion to an immediate essence (an equivalent change in value or surplus value realized); it could also reflect an additional purely nominal change produced by the *process* of redistributing surplus value. The relationship between values and prices of production is mediated by the phenomenon of nominal price, just as the relationship between force and velocity is mediated by such other factors as time and mass.

5.6 EQUILIBRIUM, THE MONEY-OF-ACCOUNT, AND INFLATION

In neo-Ricardian tranquillity, there can be neither changes in relative prices nor endogenous inflation. The equilibrium approach accepts a schism between the determination of relative prices and of the price level, despite the fact that the price level is only a weighted average of individual prices. The failure to allow for linkages between nominal price changes and changes in relative prices permits a Walrasian-style separation of price theory from the theory of money.

This aspect of the neo-Ricardian model follows Ricardo, but deviates from Marx's views. Ricardo is the father of the idea that changes in money will affect the price level without affecting relative price determination (see Rist 1966:160: „I assume as a fact which is incontrovertible,” says Ricardo, “that commodities would rise or fall in price, in proportion to the increase or diminution of money”). In the equation of exchange,

$$Mv = PX \quad (1)$$

for a stock of paper money M , velocity of money v , row vector of nominal prices P , and column vector of goods X , Ricardo argued causation only ran from the left to the right. Changes in the stock of money, given the characteristic velocity, would change only the level of nominal prices because the output level and relative prices were given by the goods sector.

Yet Marx continually insisted (see for instance Marx 1970:193-95; 1976a:212-213; 1973:789-90, 810, 813-814, 878)¹² that causation in equation (1) ran from right to left, implying an endogenous velocity of money proper (see also Thomas Tooke's 1844 criticisms of Ricardo, and Rist 1966). For Marx inflation was not initially a monetary phenomenon, but derived from real forces.

The Marxian and Post-Keynesian macroeconomic traditions reject both an equilibrium methodology and the notion that inflation is independent of relative prices and the income distribution. A prime cause of inflation is struggles to change the distribution of income (Rowthorn 1977; Rosenberg and Weisskopf 1981). Inflation results from inconsistent nominal claims by workers and

capitalists. No excess demand or exogenous change in the money supply is required, only nominal income claims which in the aggregate exceed the value of output at historic prices. Relative price changes contribute to cyclical inflation as well: in the early expansion, prices for raw materials rise, in the late expansion, relative prices for capital goods and nominal and real wages rise, and both relative price changes cause the price level to advance (Boddy and Crotty 1975; Kalecki 1936; 1966). Inflation is inherently uneven, not „pure“, and is linked to the distribution of income and relative prices.

Nevertheless, scholars who work in the Marx-Keynes macroeconomic tradition have accepted the neo-Ricardian long period abstraction from changes in the price level. This is the more remarkable since Marx argued that prices of production involved a *redistribution* of surplus value from industries with low organic compositions of capital to those with high compositions. There is no a priori reason to assume that the redistribution mechanism which changes individual absolute prices does not generate price level changes; rather, price stability is imposed by the equilibrium methodology.

5.7 GOLD AS THE MONEY-OF-ACCOUNT

Since Marx insisted that gold was the standard of price, it is often taken for granted that his unit of account was always gold (see for instance Steedman 1981:47; critics of this view include de Brunhoff 1976:71 and Foley 1983). From this perspective it seems impossible to reconcile endogenous uneven inflation with Marx's labour theory of value. Price would always be in terms of gold, and would express real value.

This section argues that treating gold as a commodity money does not protect models against the economic forces which generate inflation. It shows that Marx's interpretation of gold as a measure of value was different from the neo-Ricardians'. Furthermore, it is not clear that Marx's unit of account in Volume III of *Capital* was gold. Marx's references to gold as measure of value do not necessarily mandate gold as the unit of account in which prices were measured. I conclude that there is nothing in Marx which either forces the accounting unit to be a commodity money, or precludes endogenous nominal inflation.

First, a commodity money accounting unit can mask inflationary forces in formal models. In 1985 I showed that there can be chronic, pure inflation in a Sraffian model despite a gold numéraire commodity if the (uniform) nominal profit rate exceeds the equilibrium rate. Since relative prices do not change, gold prices can be constant, although prices expressed in a conventional accounting-money will change over time. In 1993 I demonstrated that both Shaikh's (1977) and Kliman and McGlone's (1988) sequential models of the transformation problem masked inflation, despite their claims of a commodity money money-of-account.¹³ This inflation dampens out over time, as the models tend toward

equilibrium. A commodity money accounting unit is only logical for an economy in long run equilibrium without endogenous inflation, but it does not prevent such inflation.

Equilibrium models often adopt a gold accounting unit, but treat the gold money commodity like any other commodity whose exchange value depends on the equilibrium solution. Gold has a value and a cost of production, and is produced in firms that earn the average rate of profit. Marx explicitly criticized Ricardo's similar treatment of the gold commodity money¹⁴ as „falsely assuming“ that the „medium of circulation, exchanges as a commodity for commodities“ (Marx 1969b:200). Ricardo had suggested that a fall in wages would only reduce the prices of goods which employed a lower proportion of fixed capital than

„the medium in which price was estimated; all those which had more, would positively rise in price“. With regard to *money* prices this seems *wrong*. When gold rises or falls in value, from whatever causes, then it does so to the same extent for all commodities which are reckoned in gold. (Marx 1969b:200)

Is Ricardo discussing the exchange value or „natural price“ of money, while Marx discusses its value? No, rather Marx used „value of money“ and „exchange-value of money“ interchangeably because to him, gold was a non-transformed value. Alan Freeman has pointed out that in Volume III Marx (1981:50) takes the „value of money“ as „constant throughout“ despite the general transformation of values to prices.¹⁵

As I have suggested elsewhere (1993), Marx's language is consistent because gold is produced in mines. Thus *gold exchanges at its value* rather than price of production, since mineowners collect absolute ground rent.¹⁶ The neo-Ricardian solution is wrong on gold because it abstracts from land, a crucial means of production in mining, and from landowners' rent. It treats gold as infinitely reproducible, like other commodities. But Marx made clear that the good which serves as commodity money must be scarce to serve as money. Just as Marx rejected Ricardo, he would reject the neo-Ricardian model where the exchange value of money is determined in the same way as other commodities' prices of production.

It is not true that Marx's unit of account was always gold. In Volume I, Marx assumed „gold is the money commodity, for the sake of simplicity“ (1976a:188). But in Volume III, where he analysed the general profit rate and prices of production, Marx abstracted from changes in „the value of money“ (1981:142) or in the „money-expression“ of given values (1981:238, 259, 266). The money form he had in mind is ambiguous. If money has value, it must be a commodity money. But at only one point did Marx explicitly refer to a commodity money. And there he made clear that

This is so even with a purely nominal change in value, the rise or fall of mere tokens of money, as long as other factors remain the same. (Marx 1981:236)

Otherwise he spoke of „the money-value (pp238, 280)“ of capital or profits, value in „the money form (p295)“ or „assessment of commodity values ... in

money (p275)“, or the „money-expression“ of value. His choice of words sets money apart from values, as if the money expression itself had no value, as would be true of a token money and a conventional money-of-account.

Moreover, in discussing „the money-value“ of capital, Marx uses gold as a measure of real value without necessarily assuming gold as the unit of account. Since he was not concerned with reproduction in Volume III, there was no need to compare yesterday’s prices with today’s, nor then to refer to the actual unit of account which measured prices from one period to the next.

Marx clearly did have a conventional money-of-account in mind in one section of Volume III. There Marx argued that pricing behaviour itself could cause nominal profit rates to exceed the real rate, and that this would generate endogenous inflation:

Suppose that the general rate of profit, and hence the average profit itself is expressed in a money value that is higher than that of the actual average surplus-value. As far as the capitalists are concerned, it is all the same whether they charge one another 10 per cent profit or 15 per cent. The one percentage covers no more actual commodity value than the other does, since the inflation of the monetary expression is mutual. For the workers, however (we assume that they receive their normal wages, so that the rise in the average profit is not an actual deduction from the wage ...), the increase in commodity prices resulting from this rise in the average profit must correspond to an increase in the monetary expression of the variable capital. In actual fact, a general nominal increase of this kind in the profit rate ... is not possible unless it brings with it an increase in wages and similarly an increase in the price of those commodities which form the constant capital. (Marx 1981:281)

By implication the value equivalent of the money-of-account will have changed because of capitalist pricing behaviour. Gold cannot be Marx’s unit of account.

5.8 THE HISTORICAL DEVELOPMENT OF A CONVENTIONAL MONEY-OF-ACCOUNT

In fact Marx showed that before capitalism, the development of exchange transformed the unit of account from gold to a conventional accounting unit whose value equivalent was affected by many factors besides the value of gold. That is, precapitalist development produced a money-of-account consistent with ongoing non-equilibrium and aggregate price instability.

Marx (1973:142, 166-67, 173, 192) saw a money-of-account as the first historical form of money (see also Keynes 1930:3). It was born of the need for a common denominator to compare qualitatively different goods or gifts in a tribal society, and came into being before a universal medium of exchange. This early money-of-account could be „purely imaginary“ (1973:167) and had no necessary relation to gold or any other real price standard.

The development of exchange led to the isolation of a general equivalent (gold) which was both the measure of value and the medium of exchange. The quantitative standard of price began as a unit of gold's weight. Then

A general rise in the prices of commodities can result either from a rise in their values, which happens when the value of money remains constant, or from a fall in the value of money, which happens when the values of commodities remain constant. (Marx 1976a:193)

But the implicit fixed gold standard only held as long as the money-of-account and money proper remained undifferentiated.

The further development of exchange induced changes in the quantitative standard of price and therefore in nominal prices, even if there was no change in the value of goods or of gold. Circulation debased the gold money, which therefore was replaced by stamped coins. The money-of-account (£ – „the pound“ currency unit), itself the name of a coin, was thus distinguished from a unit weight of gold (lb. or pound):

In the course of circulation, coins wear down, some to a greater extent, some to a lesser. The denomination of the gold and its substance, the nominal content and the real content, begin to move apart ... The weight of gold fixed upon as the standard of prices diverges from the weight which serves as the circulating medium, and the latter thereby ceases to be a real equivalent of the commodities whose prices it realizes. (Marx 1976a:222)

These historical causes convert the separation of the money-name from the weight-name into an established habit with the community. Since the standard of money is on the one hand conventional, and must on the other hand find general acceptance, it is in the end regulated by law:

The prices, or quantities of gold, into which the values of commodities are ideally changed are therefore now expressed in the money-names, or the legally valid names of the subdivisions of the gold standard. (Marx 1976a:194-195; see also Marx 1970:72, 107-114)

This *de facto* separation of the money-of-account from gold meant that prices were no longer denominated directly in gold. When prices are assessed in the money-of-account, the standard of price is not of necessity fixed as £1 = 1lb. of gold. What then determines the exact relationship between the money-of-account and gold, or put in a manner which Marx would abhor, the price of gold? (Marx (1970:75) argued that the „price“ of gold money is a misnomer: since gold is the standard for all other prices it cannot itself have a price.)

Marx suggested that both material factors and historical conventions determine the quantitative standard of price. He argued against the Nominalists“ (Sir James Steuart, Bishop Berkeley, M. Proudhon) claim that the price standard is only in our heads and represents nothing but a subjective convention. Rather, gold is the universal equivalent because of a real historical process (Marx 1976a:197). Economic forces will determine how much gold a currency unit represents, whether the state officially honours convertibility to that standard or not (see Marx 1970:82-83).

The historical break between the money-of-account and gold means that prices are denominated in pounds (£'s), while gold remains the measure of value for both goods and the pound (£). Moreover,

If we compare prices in England in e.g. the fifteenth century with those of the eighteenth, then we may find that two commodities had e.g. entirely the same nominal money value, e.g. 1 pound sterling. In this case the pound sterling is the standard, but expresses four or five times as much value in the first case as in the second, and we could say that, if the value of this commodity is = 1 ounce in the fifteenth century, then it was = $\frac{1}{4}$ ounce of gold in the eighteenth; because in the eighteenth, 1 ounce of gold expresses the same labour time as $\frac{1}{4}$ ounce in the fifteenth. It could be said, therefore, that the measure, the pound, had remained the same, but in one case = four times as much gold as in the other. This is the *ideal standard*. (Marx 1973:796-7)

Here the nominal prices of goods are no longer determined by the value of gold. Rather, a change in the value of gold changes the equivalence between the pound (£) and gold, instead of changing all £-prices, as a gold commodity money accounting unit would warrant.

This entire discussion refers to Marx's analysis of precapitalist exchange, abstracting from credit money as well as an equalised profit rate (see Marx 1970:116, 143, 169). Marx also identified the endogenous tendency towards replacing gold as money proper with alternative moneys that were cheaper to produce – metal tokens and paper money. He observed that the costs of circulation are paid out of surplus value (Marx 1973:548, 625), which provides a material basis for efforts to find a money proper which is less costly to produce, such as paper money.

With the emergence of paper fiat money, Marx recognized that new forces would affect the value represented by the currency unit: the quantity of paper,¹⁷ and confidence in the monetary authority. Marx argued that a change in the quantitative standard of price, that is, gold equivalent of the £, will result from the injection of more paper tokens. A currency depreciation would change

nothing but the nomenclature of the standard of prices, which is of course purely conventional, quite irrespective of whether it was brought about directly by a change in the monetary standard or indirectly by an increase in the number of paper notes issued in accordance with a new lower standard.¹⁸ As the name pound sterling would now indicate one-fifteenth of the previous quantity of gold, all commodity-prices would be fifteen times higher. (Marx 1970:120)

Here the quantitative standard of price is endogenously determined by the quantity of paper money relative to the value of all goods.

Marx also recognized the role of uncertainty and expectations:

If confidence in the government were to be thoroughly shaken ... the paper thaler would in practice cease to be equal to the silver thaler and would be depreciated because it had fallen beneath the value proclaimed on its face. (Marx 1973:132)

Where Ricardo argued that trade, and therefore purchasing power parity, was the only factor determining exchange rates, Marx joined Tooke (and anticipated Keynes) by incorporating the confidence of international financial investors.

Thus the history of the money-of-account allowed for 1) a change in the standard of price for metal money despite no change in the value of gold, due to a debased coinage; and for forced paper money, a change in the standard of price resulting from 2) an undue change in the quantity of money or 3) a crisis of confidence.

Marx saw that even before capitalism, the money-of-account was converted from a money commodity to a social convention. The quantitative price standard became relatively autonomous from the value of gold, while gold remained the measure of real value as distinct from nominal price. A new category of exchange value – nominal price movements – came into being historically, and was analysed by Marx. With this background, it is clearly consistent with Marx's monetary theory for the amount of real value expressed by the currency unit (or equivalently, the price level) to be affected by capitalist pricing behaviour.

1.9 A NON-EQUILIBRIUM MODEL

The neo-Marxian model combines a non-equilibrium snapshot of the economy with Marx's labour-productivity theory of price and the profit rate. Following Bortkiewicz, assume circulating capital, constant labour productivity, no product innovation, and simple reproduction (hence goods markets clear). Because this is a non-equilibrium model, a uniform profit rate is not imposed. Hence all price variables are expressed in a money-of-account, to register nominal price as distinct from real value.¹⁹ Industry prices are then

$$P^t = P^{t-1} + Q^t = P^{t-1} A(1 + \alpha) \quad (1)$$

where

- P^t = row vector of nominal unit prices at the end of the production period;
- P^{t-1} = row vector of nominal prices at beginning of the production period, that is, input prices;²⁰
- A = the matrix of unit input requirements, including labour-power and productivity implicitly through unit labour costs;
- Q^t = nominal unit profits;
- I = identity matrix;
- α = diagonal matrix of nominal profit rates.
- r = diagonal matrix of real profit rates.

Time is measured in production periods, where the end of one production period is the beginning of the next.

Because we now examine reproduction over time, it is necessary to consider explicitly whether capitalists set aside sufficient money capital *at current prices* to buy sufficient outputs to reproduce themselves tomorrow. Consequently, real

or constant dollar profits (Q^{tc}) differ from nominal profits (Q^t) since they must be adjusted for nominal changes in input cost:²¹

$$Q^{tc} = (P^{t-1}A)\alpha - (P^t - P^{t-1})A \quad (2)$$

where Q^{tc} = nominal unit profits at time t corrected for inflated or deflated input costs.

Also, an industry's real profit rate, r_i , as distinct from its nominal rate, α_i , must evaluate all price terms consistently. (The profit rate is calculated per production period.) Therefore costs in both the numerator and denominator are in current price:

$$r_i = \frac{\alpha_i \left[\sum_j P_j^{t-1} A_{ji} \right] X_i - \left[\sum_j (P_j^t - P_j^{t-1}) A_{ji} \right] X_i}{\sum_j P_j^t A_{ji} X_i} = \frac{Q_i^{tc} X_i}{\sum_j P_j^t A_{ji} X_i}, \quad i = 1, n. \quad (3)$$

Finally, given simple reproduction, real profits are spent on luxuries, so for the vector of real profit rates r ,

$$rP'AX = Q^{tc}X = P_{III}^t X_{III} \quad (4)$$

where subscript III means only luxury goods, those produced in Marx's department III, have nonzero elements. Simple reproduction in basics is classically independent of prices:

$$AX = X_b \quad (5)$$

where subscript b means only basic goods have nonzero elements.

This way of modelling price determination transforms the structure given by the equilibrium model, even without Marx's value theory. The input prices (on the right hand side of equations (1)) are historically given parameters, rather than endogenous variables equal to output prices. Because additionally the profit rate is not assumed to be uniform, the system is not recursive to the equations for basic industries, nor does it tend towards the neo-Ricardian rate of profit as the sequential models do. Up to this point, this model is general enough to be consistent with any theory of value. Put differently, the system of equations for prices, the profit rate, and simple reproduction (1-5) could not be solved without a theory of the profit rate and of the source and magnitude of *real* value, that is, a theory which can distinguish nominal from real.

The two invariance postulates which summarize Marx's labour-productivity theory translate prices or profits in the currency unit to values or surplus value:

$$P^t X = d^t Z X \quad (6)$$

$$Q^{tc} X = P_{III}^t X_{III} = d^t s L X \quad (7)$$

where

d^t = the scalar dollar expression of one unit of socially necessary labour time at time t ,

Z = row vector of unit labour values,

s = the scalar share of one hour's labour going to surplus value (where $v = 1 - s$ is value of labour power), assumed uniform across the economy,
 L = row vector of unit labour requirements.²²

Taking prices minus profits gives capital advanced, in price and value terms:

$$P^t X - Q^{tc} X = d^t (ZX - sLX) = d^t (C + V + S - S) \quad (8)$$

or

$$P^t A X = P^t (X_I + X_{II}) = d^t (C + V) \quad (8')$$

where

C = scalar, total constant capital advanced,
 V = scalar, total variable capital advanced,
 S = scalar, aggregate surplus value.

But these two versions of Marx's invariance postulates 7 and 8', divided by each other, imply that the real average profit rate in price terms will equal the value profit rate Π :

$$\bar{r} = \frac{Q^{tc}}{P^t A X} = \frac{S}{C+V} = \Pi \quad (9)$$

where \bar{r} = the real rate of profit. Note that d^t cancels out.

Setting the level of effective demand (that is, an output level), $n - 1$ degrees of freedom can be shown to remain.²³

This model allows prices and the price level to vary over time by adding one endogenous variable (d^t). Whether there is inflation or deflation depends on whether basics (and luxury) prices rise or fall on average. Note that the model implies that the rate of inflation in basics will be identical to that in luxuries. This is only because simple reproduction means that all of surplus value is spent on luxuries, and the money expression of surplus value must equal that for basics (and for total value).

The model's structure mandates a unique real average rate of profit, determined by the surplus value produced by labour relative to the value embodied in capital advanced. The model remains underdetermined or open ended with respect to prices, since no one unique set of relative prices is implicit. (Similarly see Alan Freeman's final chapter, which makes the same discovery on the basis of a non-uniform profit rate alone; he does not investigate the possibility of endogenous inflation.) We must be given $n - 1$ markups or nominal profit rates to find absolute and relative prices, and the rate of inflation or deflation implied by d^t/d^{t-1} .

In other words, more information on the historical structure of capitalist competition is necessary before relative prices can be known (for example the degree of monopoly, extent of new industries, the structure of state regulation, and so on). In the absence of these markups, only the real value rate of profit and other real value aggregates are determinant.

As Bortkiewicz showed for a simultaneous-time model, if a uniform profit rate is superimposed on this model, the system of equations becomes

overdetermined.²⁴ But Marx would argue that it is not he but capitalism which is internally inconsistent. Its tendency towards a uniform profit rate cannot be realized. He would agree with Walras that the promise of socialism hinges on demonstrating the irrationality of capitalism. And Marx would applaud the success of his labour theory of value in demonstrating precisely that.

5.10 CONCLUSION

The equilibrium method of neo-Ricardian models is neither Marxian nor neutral, since it frames the Marxian transformation problem in a format which prevents its solution. The neo-Ricardian method has been shown to involve simultaneous time, mutual causation, an arbitrary commodity money-of-account, a uniform profit rate and aggregate price stability. Marx's own methodology has been counterposed as embodying historical time, sequential causation, tendential equalisation of the profit rate, and a conventional money-of-account. When this non-equilibrium method is combined with reproduction over time, the result revises Marx's view of how values cause price from an essentialist to a structural causal framework. It distinguishes nominal price from real value, and allows for endogenous aggregate price instability.

The non-equilibrium method implies that the tendency to equalise the profit rate may generate endogenous changes in the value represented by the money-of-account. In physical mechanics, the constancy of the speed of light causes time and mass to adjust when a force is applied to an object approaching that speed. In non-equilibrium Marxian price theory, the conservation of value *and* surplus value causes the currency expression of value to adjust when surplus labour extracted is allocated in proportion to capital advanced. Nominal price is determined by value, without *being* value, just as velocity is determined by force, without being reducible to force alone. Equilibrium and nominal price stability are only possible when the organic composition of capital in luxuries equals that in basics (for example a Standard Economy).

This result means that even abstracting from productivity change and from crisis tendencies, capitalism most likely exhibits chronic price instability. This implies that a stable price level would require conscious intervention on the part of the state's monetary authorities. The formation of central banks and development of monetary and regulatory policies are in part directed to such price level stabilization.

By incorporating simple reproduction into the transformation problem, this model exposes capitalism's *non-equilibrium*, internally contradictory structure. To consider how a firm is reproduced we have to distinguish nominal from real, and trace the implications of today's pricing behaviour *by other capitalists* for tomorrow's costs. This illustrates how each firm's reproduction is contingent on what every other firm is doing, which the individual capitalist cannot know in an

unplanned economy. As Marx argued, the reproduction of capitalism is always contingent, not effortless as implied by the equilibrium model.

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NOTES

- ¹ This includes the New Solution. Such sequential solutions as Kliman and McGlone (1988, and McGlone and Kliman's chapter in this volume) and Shaikh (1977) follow Bortkiewicz in combining simple reproduction with a uniform profit rate, although they start with non-equilibrium prices. Their models too stabilize at Ricardo's profit rate. In this paper, equilibrium as an *outcome* refers to Robinsonian tranquillity, not Walrasian equilibrium (Robinson 1969; see note 4 below).
- ² It will be argued that equilibrium as a *methodology* is the same in either Robinson's tranquillity or Walras's equilibrium formulations.
- ³ In neo-Ricardian models, gold commodity money typically serves as numéraire money-of-account. But like Keynes, Marx distinguished accounting money (in terms of which prices are expressed) from real money (gold, like Keynes's money proper) (Keynes 1930; Marx 1973:190). Most economists have been taught that „money“ serves several different functions. In fact, money-of-account serves some functions (unit of account for current transactions, unit of account for deferred payment or debts), and money proper serves others (medium of exchange, store of value, means of payment). Under the forced paper monetary system we have today, gold may be the *price standard*, and gold may *measure* real value. Yet the *money-of-account* is a conventional currency unit, paper money circulates as *medium of exchange*, bank reserves are the *means of payment*, and in an inflationary crisis, a different international currency or basket of currencies may *denominate long term debts*.
- ⁴ This is not neoclassical equilibrium: (1) there is no labour market, but a given subsistence wage, following Ricardo; (2) nor is there a capital market, but simply an assumed uniform profit rate, reflecting profits as a residual; (3) consequently price is not the sum of imputed factor incomes, as neoclassicals contend, but prices derive from production conditions, and profits are prices minus materials costs and other classes' incomes.
- ⁵ In William Jaffé's edition of Walras (1984), he refers to frequent correspondence between Bortkiewicz and Walras regarding the *Elements*: November 1887 (p567), May 1888 (p571), February 1889 (pp588, 596), and a „series of unpublished letters which Walras exchanged with Bortkiewicz and Edgeworth between the dates January 9 and September 14 1889“ (p539); at the time, Bortkiewicz was 19-21 years old.
- ⁶ It is not widely known that Bortkiewicz (1952) actually proved the Okishio theorem in 1906-7! He observed that for Marx, an increase in labour productivity implied an increase in the organic composition of capital (p38), and therefore a fall in the profit rate. Using his neo-Ricardian model of price and profit rate, Bortkiewicz showed that „What is in fact true is thus the exact contrary of Marx's theory. An increase in the productivity of labour ... leads to an increase in the rate of profit, with the sole provision that this increase in productivity should take place in those lines of production which are directly or indirectly relevant for the production of real wages“ (pp47-8). Bortkiewicz limits productivity change to basics because a change in luxuries would have no effect on the profit rate.
- ⁷ „The adoption of the metaphor of equilibrium from physics onto the problem of price determination ... conjur[es] up images of natural laws bringing about a natural order“ (Clark 1992b:12).
- ⁸ Schumpeter argued that an economist's underlying vision is inevitably ideological, since „it embodies the picture of things as we see them“ (Schumpeter quoted in Dobb 1989:3).
- ⁹ Engels to Bloch 21 September 1890.

- ¹⁰ Section IX shows that Marx's two invariance postulates combined imply that the real rate of profit will equal the value rate, not the Ricardian rate. Thus neo-Ricardian models which claim to include two invariance postulates (examples cited in Alfredo Saad Filho's chapter) exclude some element of Marx's two invariances.
- ¹¹ That is, for $F = \text{force}$, $t = \text{time}$, $m = \text{mass}$, $v = \text{velocity}$, $a = \text{rate of acceleration}$,

$$F\delta t = \delta(mv)$$
or, for a constant mass,

$$F = \delta(mv)/\delta t = m\delta v/\delta t = ma.$$
- ¹² „This much is clear, that prices are not high or low because much or little money circulates, but that much or little money circulates because prices are high or low“, (Marx 1973:195). „[T]he money not thrown into circulation does not exist for the commodities. Thereby there exists no fixed relation between the value of money generally and the mass of it which enters into circulation. That the mass actually in circulation, divided by the number of its turnovers, is equal to the value of money is merely a tautological circumlocution for saying that the value of the commodity expressed in money is its price (1973:869-70). Marx acknowledged that excessive state issue of forced paper money could affect the value expressed by the money-of-account, see Section VII.
- ¹³ In his response, Kliman (1993) distanced himself from this view. „Naples is correct to criticize K&M's imprecise discussion of money. Despite our mention of the "value of ... money", we intended to posit the existence only of a money of account, not commodity money“(p149).
- ¹⁴ Ricardo was earlier quoted as claiming that a change in the quantity of money would change all prices proportionately. His two theories of the exchange ratio between gold and commodities reflect different, and inconsistent, perspectives.
- ¹⁵ Bortkiewicz (1952:11) interpreted Marx as claiming here only that „the same amount of labour is always required to produce a given quantity of gold“, since Marx „always regarded the proportion in which gold ... was exchanged against goods, or *rather against other goods*, as being subject to the general laws of value and of price“(emphasis added).
- ¹⁶ In his chapter, Adolfo Rodríguez poses a contradiction between the value and exchange value of a gold commodity money because he believes that gold's „price“ is the Ricardian exchange rate, while its value is socially necessary abstract labour time. But there is no contradiction once we recognize that Marx meant that gold's exchange value equals its value.
- ¹⁷ Here I differ from Suzanne de Brunhoff, who claimed that „[i]nstead of tending towards a quantity theory of paper money, [Marx] seeks to get rid of quantity theory for all kinds of money“(1976:35). But Marx argued that „a person who restricts his studies of monetary circulation to an analysis of the circulation of paper money *with a legal rate of exchange* must misunderstand the inherent laws of monetary circulation“(1970:122) because „in the circulation of tokens of value all the laws governing the circulation of real money [i.e. gold] seem to be reversed and turned upside down ... the value of paper tokens depends on the number of tokens in circulation“(1970:121). In fact, he gave the example of a fictional „forced gold money“ system, and argued that in this case even gold becomes a token, and would not exchange in proportion to its value. If „Gold as a token of value ... fall[s] below its real value ... [t]he effect would be the same as if...all commodities were evaluated in metal of lower value than gold ... Commodity-prices would therefore rise ...“(Marx 1973:172, emphasis added; I am indebted to Alan Freeman for this quote).
- ¹⁸ Modern Keynesians would disagree. If notes are issued and inflation ensues, it is the governmental issuer of notes who has redistributed real income from others in the economy who pay higher prices, to itself as borrower.
- ¹⁹ For Marx, real value is socially necessary abstract labour time. Nominal changes in prices are not associated with a change in socially necessary abstract labour time produced or realized. Neoclassicals convert nominal variables to real by deflating by a price index. The GDP price index is constructed by designating a representative bundle of commodities and services which serves to assess base-year prices, and asking how much that bundle costs in the present year. All price changes are interpreted as purely nominal, despite such obvious discrepancies as price declines caused by productivity advances. Moreover, the output mix also changes from year to year, but to calculate changes in the price level the commodity basket is treated as fixed over several years. Thus neoclassicals treat „real values“ as quantities of things, of the base-year commodity basket.

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- ²⁰ Input prices are historical givens. They could in principle be any magnitude given from the past: values, prices of production, neo-Ricardian prices, random prices – whatever prices were consistent with the labour theory of value in the previous period.
- ²¹ The inflation I discerned (1993) in Kliman and McGlone (1988) becomes perceptible via this technical correction of gross profits, from nominal profits (Q^l) to real profits (Q^{lc}). Without this correction, capitalists as a class may reproduce themselves over time, but individual capitalists will not. Because relative prices change over time, there is uneven inflation in Kliman and McGlone's model. For example, if capitalists in department I, whose relative output price has dropped, should continue to buy the same amount of luxuries out of gross profits, they will not set aside enough money capital to buy the inputs Kliman and McGlone assume that they do continue to buy. Because Kliman and McGlone do assume simple reproduction of capitalists in each department, they have to trace the implications of this assumption for the distribution of surplus value among departments. Once department I capitalists set aside sufficient money capital, they are forced to buy fewer luxuries as a result of department I's lower real profits realized (while department II's capitalists will have higher relative prices, higher real profits, and be buying more luxuries).
- ²² I am assuming for convenience that each labourer performs only simple labour at a uniform intensity. Thus one hour's labour maps one-for-one to one hour's use of labour power. L , which is technically one unit of socially necessary abstract labour time, is also interpreted as one hour of labour power.
- ²³ The variables include: n elements of P_i^l , (or $n - 1$ relative prices, 1 price level), n elements each of α_i , Q_i^{lc} and r_i respectively, $m - 1$ relative X_i 's in basics (m is the number of basic goods), one luxury X_i relative to basic outputs, one output level, and d^l . There are $4n + m + 2$ variables. The independent equations include: n equations for P_i^l in terms of α_i (1), n equations for Q_i^{lc} (2), n equations for r_i in terms of α_i (3), $m - 1$ independent X_i equations in basics (5), one luxury X_i equation (4), two invariance postulates (6 and 7; equation 9 for determining the real profit rate is implicit in these). There are $3n + m + 2$ independent equations. Consequently there are n degrees of freedom. Using one to set the output level leaves $n - 1$.
- ²⁴ To impose a uniform profit rate means setting $n - 1$ real industry rates equal to the average rate, where calculating the average rate itself takes up one degree of freedom, so in all n degrees of freedom are used. But only $n - 1$ degrees of freedom are available, hence the overdetermination.

6 The value of money, the value of labour power and the net product: an appraisal of the ‘New Approach’ to the transformation problem

Alfredo Saad-Filho

The transformation of values into prices of production has been the subject of discussion for over one hundred years. The first shots of this debate were fired even before the publication of Marx’s own treatment of this issue, in the third Volume of *Capital* (see Engels 1981 and Howard and King 1987). A continuous flow of literature has followed, which analyses the relationship between values and prices from virtually every conceivable angle. Today, the polemic is still very much alive, although the matters at stake have changed with the concerns of the writers involved.

Until the mid 1970s, the most important issue in the discussion was the circumstances in which the equalities between total value and total price, and total surplus value and total profit, hold. Marx attributed great importance to them, and they quickly became the conditions which any credible solution to the transformation problem must satisfy – or at least convincingly explain away.

The prominence of these equalities is closely related to the predominance which general equilibrium approaches to the transformation problem have achieved. These approaches follow the tradition of Tugan Baranowsky (1905) and Bortkiewicz (1952, 1984). They became, quite early, the standard way to frame the relations between values and prices (the most typical example is Steedman 1977). Even though many disagreed with them, general equilibrium solutions remained for decades the centre of attention. This has now changed. In the late 1970s and early 1980s Gérard Duménil and Duncan Foley independently proposed the ‘New Approach’ to the transformation problem; one of the most important characteristics of their solution is that it addresses the transformation problem (and Marx’s two aggregate equalities) irrespective of equilibrium.

The increasing popularity of the New Approach has helped shift the terms of the transformation debate into more substantive issues, as far as Marx’s value theory is concerned, such as the nature of value and price, the value of labour power and the value of money. In this chapter, I am concerned with the evaluation of the New Approach from the point of view of its potential

contribution for a non-equilibrium interpretation of Marx's theory of value. Therefore, I do not examine the New Approach as a pretext for proposing another solution to the transformation problem, nor do I engage in eulogy or hairsplitting controversies. On the contrary, my objective is to scrutinize the New Approach searching for its positive contribution, and the means to develop it further.

With this objective in mind, I make a systematic presentation of the context and content of the New Approach in the first two sections of this chapter. This presentation establishes a general framework for the analysis of the New Approach, which is until now absent from the literature. The third critically analyses general equilibrium solutions to the transformation problem (especially the neo-Ricardian), argues for their rejection, and emphasizes the positive contribution of the New Approach in this respect. The fourth, fifth and sixth examine three of the most important contributions of the New Approach for value theory – the operation on the net product and the definitions of value of money and value of labour power. The seventh summarizes the discussion.

6.1 THE CONTEXT OF THE NEW APPROACH

The New Approach to the transformation problem was developed as part of the reaction against the neo-Ricardian critique of Marx. The neo-Ricardian view of the transformation is well known, and does not need to be summarized here (see Desai 1989, 1992, and Steedman 1977; for a critical survey, see Fine and Harris 1979). It suffices to say that, in their approach to the transformation, the neo-Ricardians begin from two systems of equations in equilibrium, one purporting to represent commodity values and the other prices of production. Given these systems, a little algebraic manipulation shows that it is generally impossible to obtain both Marx's equalities between total value and total price, and total surplus value and total profit. This is important, because it follows that either it cannot be shown that unpaid labour is the source of profit, or that prices are forms of value. Either of these results seriously challenges the cogency of Marx's theory of value, and a large part of the transformation debate revolves around claims and counter claims with regard to definitions and the conditions in which these equalities hold.

Therefore, even when challenging the neo-Ricardian results the literature on the transformation problem has often accepted the framework in which the critics of Marx posited the transformation. In particular, it was accepted (if only implicitly) that the validity of Marx's value theory hinges upon the possibility of obtaining the two aggregate equalities, and of connecting the systems of equations representing values and prices in a logically meaningful way. As mentioned above, it was not difficult for the neo-Ricardian writers to show that this is generally impossible. Those who attempted to salvage Marx's theory of value from within this model could at most provide some (generally unconvincing) explanation for the failure of the two equalities to hold

simultaneously (see, for example, Gerstein 1976; his analysis is criticized in Fine 1986b).

By the mid 1970s it was already clear to many that the neo-Ricardian attack was based on a serious misrepresentation of the concepts and the method appropriate to Marx's theory of value (see, for example, Mandel and Freeman 1984, and Yaffé 1974). Awareness of this fact eventually led to the impossibility of meaningful dialogue across the theoretical divide and, subsequently, to the bitter collapse of the discussion. In the following years increasingly sophisticated studies were made, which gave generality and more consistency to Marx's theory of value (see, for example, Elson 1979a, and Hunt and Schwartz 1972). The development of one of these research programmes led, in the late 1970s, to the elaboration of the New Approach to the transformation problem. This innovative approach not only to the transformation but to value theory as a whole was proposed by Gérard Duménil (1980, 1983, 1984), Duncan Foley (1982, 1983, 1986) and Alain Lipietz (1982, 1983, 1984). Their interpretation of value theory owes much to Rubin (1973), and subsequent work draws heavily upon Aglietta (1979).

The distinctive conception of value theory in the New Approach surfaces most clearly through three differences between this and previous solutions to the transformation problem; first, the emphasis on the net, not the gross product; second, the distinctive conception of the value of money and, third, the changed definition of the value of labour power. When looked at under the light of these innovations, the transformation problem becomes trivial and, in effect, vanishes. Let us see why.¹

6.2 THE NEW APPROACH: AN INTRODUCTION

In order to follow the 'New Solution' to the transformation problem, we presume that the economy's wage rate is known.² In addition, the inputs and labour time socially necessary to produce each commodity, and the prices of all commodities, are also presumed known. In other words, we have the hourly wage rate w , the $1 \times n$ price vector p , the $n \times 1$ gross output vector X , the $1 \times n$ labour inputs vector l and the $n \times n$ technical matrix a of the economy.³ These variables may not be for equilibrium, and may not reflect the prevalence of a uniform rate of profit across all sectors.

The value of money (measured in hours of labour per pound sterling) can now be defined. For the New Approach, the value of money is the ratio between the labour performed in the economy and the price of the net product, which is the $n \times 1$ vector Y ; it is identical to $(I - a)X$. Therefore, the price of the net product is

$$pY = p(I - a)X$$

The value of money indicates the quantity of labour represented by the unit of money, or the labour time necessary to add one pound sterling to the value of the final product (see Aglietta 1979:41-44, and Foley 1982).

For example, suppose that we have a very simple economy, where the gross product is one unit of flax (F) and one unit of linen (L) per year. Flax is produced by four hours of labour (l), and linen by two hours of labour and one unit of flax; therefore, all flax is consumed as an input in the production of linen, and the unit of linen is the net product of the economy.⁴ This can be represented as:

$$\begin{aligned} 4l &\rightarrow 1F \\ 2l + 1F &\rightarrow 1L \end{aligned}$$

It must be stressed that the flax produced in the *current* year will be used as an input to the production of linen in the *next* year; in other words, the flax is *not* consumed in the same period when it is produced. It is immediately evident that the total labour performed in this economy is $6l$, the total gross product is one unit of flax and one unit of linen and, as mentioned above, the net product is one unit of linen. If the linen is sold at £6, it follows that the value of money is:

$$\lambda^m = 6l/\text{£}6 = 1/\text{£}$$

In more general terms, the value of money is:

$$\lambda^m = \frac{IX}{p(I-a)X}$$

The reader should beware of the fact that the value of money is conceptually distinct from the value of the money commodity. In particular, it does not follow from the definition of value of money that commodity prices are necessarily proportional to the labour time socially necessary to produce them (see below and section 5).

The conception of value in the New Approach begins from the fact that the total labour performed in the period (IX) is equal to the newly created value λY , where λ is the $1 \times n$ vector of commodity values, given by

$$\lambda = l(I-a)^{-1}$$

From this⁵ and the definition of the value of money a highly important conclusion follows: the price of the net product is identical to the total value produced divided by the value of money (if k is the inverse of the value of money, or the money value added to commodities in one hour of labour, then $pY = k\lambda Y$).⁶

According to the New Approach, this is the content of Marx's equality between total value and total price.⁷ The underlying conception is that the labour performed in the period creates the gross product of the economy, but only the value of the net product. The newly produced money value is allocated to the commodities in the net product as their price. Hence, whatever the rules of price formation, Marx's first equality must always hold (the rationale for the emphasis on the net, and not gross product is discussed in section 4).

Let us now proceed to the second equality, between total surplus value and total profit. Define W to be the quantity

$$W = wIX$$

or the total wages of all workers.

The value of labour power, V , is defined as the share of the net product that is appropriated by the workers, and the surplus value is the share of the capitalists (thus, $S = 1 - V$).⁸ The value of labour power is the product of the value of money by the wage rate:

$$w = \frac{wIX}{IX} = \frac{W}{\lambda Y} = \frac{W}{\lambda^m pY} \Rightarrow$$

$$w\lambda^m = \frac{W}{pY} \equiv V$$

In the example above, $IX = \lambda y = 6l$, $pY = £6$ and $\lambda^m = 1l/£$. If we suppose that $w = £0.5/l$, then $V = 0.5$ and $S = 0.5$.

The newly created value is distributed to capitalists and workers as wages and profits. Hence, whatever the rules of distribution and price formation the social revenue is equal to the money value (and price) of the net product:

$$W + \Pi = pY$$

$$\frac{W}{pY} + \frac{\Pi}{pY} = 1$$

It follows that:

$$\frac{W}{pY} + \frac{\Pi}{pY} = V + S$$

as $W/pY = V$,

$$\frac{\Pi}{pY} = S \Rightarrow \Pi = kS\lambda Y$$

In the example, we know that $W = 6 \times £0.5 = £3$ and $pY = £6$; thus $\Pi = £3$. This is equal to the share of the money value created per hour of labour seized by the capitalists, times the mass of new value produced. It immediately follows that the shares of workers and capitalists in the net product are identical, whether they are measured in labour hours or money (see Aglietta 1979:48-49 and Duménil 1980:76, 124). Thus,

$$e = \frac{S}{V} = \frac{\Pi}{W}$$

This ratio is the rate of surplus value, or of exploitation. It is determined when commodities are priced and wages are paid. The ratio is unaffected by the use of wage revenues, which may include the consumption of necessities or luxuries, saving or hoarding (in our case, $e = S/V = 0.5/0.5 = \Pi/W = 3/3 = 100$ per cent).

The New Approach sees this as a proof that profit is merely redistributed surplus value. The (trivial) manner in which Marx's two aggregate equalities are obtained has led Duménil and Lévy (1991:362) to claim that

[r]ather than a 'solution' [to the transformation problem], it is more adequate to refer here to an *interpretation*, since there is basically nothing to prove from the formal point of view.

Some writers have objected that the simplicity and generality of this solution is the result of the changed definition of some key variables. Because of this, they argue that the New Approach fails to produce any new insights and reduces the real problems in the transformation into a tautology (see, for example, Bellofiore 1989). However, this is not the whole story. As will be seen in sections 4 to 6 below, this critique of the New Approach is based on a partial reading of Duménil and Foley's work, which ignores the important contribution that their approach can offer to a non-equilibrium interpretation of Marx's theory of value.

In my view, the most important issue at stake is that the New Approach obtains the two equalities without presuming general equilibrium or simple reproduction. This is an important step forward, for it shifts the transformation debate away from the (inadequate) terms imposed by the neo-Ricardian approach. Before we evaluate the contribution of the New Approach in more detail, we need to investigate the problems with the equilibrium analysis that it has displaced.

6.3 GENERAL EQUILIBRIUM AND THE DERIVATION OF PRICES OF PRODUCTION

The assumption of either general equilibrium or simple reproduction is an important feature of most solutions to the transformation problem, especially the neo-Ricardian. If general equilibrium is presumed, it follows that the economy can be represented by a price equation such as

$$p = (pa + wl)(1 + r)$$

In other words, the price of each commodity is the sum of the price of the material inputs with the wage cost, marked up by one plus the rate of profit. This equation has been considered a useful depiction of the concept of price of production because of the uniform rate of profit r , which allegedly expresses the results of competition. In addition, it ensures that input prices are identical to output prices, in which case Marx's alleged error of not having transformed input values is avoided. Let us see how legitimate are these arguments, starting with the uniform rate of profit.

Everyone knows that profit rates are not identical across the economy. The issue is whether, given our interest in the transformation of values into prices of production, the presumption that they are helps us understand some essential features of capitalism, or whether it makes it harder to grasp them. Marx, for example, identifies two qualitatively distinct kinds of competition in his work, between capitals of the same branch and between capitals of different branches.⁹ Competition between capitals of the same branch is analysed in detail in *Capital* I, where it is shown that this is a powerful force behind the overexploitation of the workers and the introduction of technical innovations in production.¹⁰ Faster and more demanding production lines, new methods of production and more

advanced machines reduce the individual value of a commodity relative to its social value and, thereby, grant exceptionally high profits to some producers. These profits are skimmed from their relatively backward competitors, whose unit costs are higher. Therefore, competition between capitals in the same branch leads to the *divergence* of individual profit rates.

In the first two parts of *Capital* III Marx shifts his attention to competition between capitals in different branches. This kind of competition operates through the (threat of) migration of individual capitals towards sectors in which the profit rates are higher. Because of this, commodities are not sold at prices proportional to their labour value (otherwise sectors with a lower than average organic composition of capital would have exceptionally high profit rates). On the contrary, commodities are sold at prices of production formed on the basis of an equal profit rate across all sectors of the economy. Therefore, competition between capitals of different branches leads to the *equalisation* of profit rates across the economy.

Marx's theory of value is a dialectical theory, that recognizes that the contradictory forces put in motion by these two kinds of competition have distinct levels of complexity. Therefore, they cannot be added to give either a uniform rate of profit across the economy (in which case competition within sectors is obliterated) or an ever growing disparity of profit rates (which would lead to the unrelenting monopolization of all sectors of the economy). The most important aspect of this analysis is that it captures the complex, conflicting and dynamic tendencies beneath capitalist competition.

In contrast, the assumption that prices are formed on the basis of the uniform rate of profit eliminates technical progress at its source and, with it, the possibility of conceptualizing these real contradictions. In exchange for the ability to understand the complex processes behind competition (which is one of the most important advantages of Marx's approach over mainstream economic theory), general equilibrium analysis offers a price system that can, in certain (restrictive) circumstances, deliver a determinate price vector; because it is for equilibrium, this vector brings with it the sought-for identity between output and input prices. This bargain has been considered acceptable by many, who felt that an adequate solution to the transformation had to be probed against the (external) criterion of the two aggregate equalities. As this involved the need to determine the sum of prices and the sum of profits, a price equation such as

$$p = (pa + wl)(1 + r)$$

was considered a necessity.

This equation was introduced into the analysis of the transformation by writers who conflated the issues that concerned Marx with those that interested Sraffa (1960): the investigation of the effects of changes in distribution on prices. Because of the nature of Sraffa's concerns, he uses a price equation tailored to impose equilibrium and preclude technical change.¹¹ Moreover, he feels no need to consider how technologies are determined and why they change, to peer into

the origin of the surplus, or to analyse the inner nature of class conflicts in capitalist society. However, these limitations make production in Sraffa's system resemble a purely technical process, while capital can hardly be defined except as a collection of use values. As a result, the social aspect of production is either assumed away or projected upon the sphere of immediate interest, distribution (this argument is developed in some of the best known Marxian critiques of neo-Ricardianism; see, for example, Rowthorn 1974a, and Shaikh 1982, 1984).

This analytical context is clearly distinct from Marx's, where the social and historical aspects of capitalist production are heavily emphasized. For example, in *Capital I* he shows that, despite the fact that technologies are conditions for value creation, they are themselves determined through the law of value (see Carchedi 1991). This conclusion cannot be justified on the basis of general equilibrium models and, particularly, of Sraffa-based ones. Marx also discusses class struggle in production extensively, but his analysis of distributional struggle is much less developed, as opposed to Sraffa's. This is not because Marx considered it unimportant, but because it is more complex and concrete; it would have been considered later, had he been able to fulfil his plans (this issue is discussed extensively in Lebowitz 1992; see also Naples 1989).

Therefore, the use of a price equation derived from Sraffa in the analysis of the transformation is misleading for several reasons (of course, this does not mean that this equation should be rejected in general). First, Marx does not discuss the transformation in the context of equilibrium or simple reproduction, and his own problem does not depend upon the equality between input and output prices. The imposed identity between them is therefore unnecessary and unwarranted, for it eliminates one of the main sources of dynamics in capitalism, competition inside branches. Second, the technical conditions of production are irrelevant to Marx's analysis of the transformation, other than the distinct organic compositions of the capitals involved. In contrast, the use of Sraffa's price equation requires knowledge of the technologies of production. Third, the main subject of Marx's transformation is not the calculation of values or prices, as is the case in equilibrium approaches; on the contrary, Marx's intention is to show that profit is merely a form of surplus value, and that price is a form of value.

In addition, the equilibrium assumption has implications of another order: in equilibrium, the qualitative relations of determination between the variables are lost. Systems of equations such as the neo-Ricardian do not have a clear internal structure, and cannot reflect the distinct levels of abstraction which Marx's theory of value uses to reconstruct the relationship between essence and appearance. Hence, general equilibrium approaches can hardly conceive the transformation except as the attempted construction of a mathematical correlation between otherwise autonomous price and value systems. As a result, the connection (transformation) between them is bound to be arbitrary.

This is a result of the misleading opposition between the value system and the price system in which it is transformed (see Kliman and McGlone 1988). The

price system has two degrees of freedom (because it has n equations, one for each commodity, but $n + 2$ unknowns, the n prices and the wage and profit rates). Therefore, while the value system can usually be solved (provided that the matrix A is well behaved), the price equations can only be solved if other assumptions are introduced, such as the identity of the value of labour power with the value of a fixed bundle of goods (while the wage is the price of this bundle), plus some normalization condition such as one of Marx's aggregate equalities. However, the solution of this system generally shows that the other aggregate equality is not also possible.

There is surely one major difficulty with this result, and it lies in the model and not Marx's theory of value. For Marx was adamant that these equalities are not independent conditions, but one and the same; the reason why total prices equal total values is that total profit equals total surplus value. Unfortunately, most analysts disregarded the built-in inability of general equilibrium models to represent adequately the concepts which are being investigated, and ignored the problems of trying to represent the complex internal structure of Marx's theory of value in this context. Because of this Marx's theory, and not the equilibrium models which improperly represented it, was blamed for the inconsistent results obtained.

The anomalous results reached by equilibrium analyses are discussed in a vast literature. Because of their misleading representation of Marx's theory of value and, particularly, the conflation of Marx's transformation problem with Sraffa's, several elements of Marx's method and some of his most important conclusions have been deemed to be wrong. This is the case with his 'error' of not having transformed input values, the attribution of 'undue importance' to the value rate of profit as opposed to the price rate, the 'unwarranted' stature of values in the analysis of capitalism, and so on (see Steedman 1977). The New Approach rightly sets these difficulties aside, and obtains the two 'identities' with no need to presume general equilibrium (the formulations in Lipietz 1982, 1983 are more limited). This is one of its greatest merits, and it is against this background that the alternative perspective of the New Approach should be evaluated. In the next three sections the peculiarities of this solution are considered in detail.

6.4 THE OPERATION ON THE NET PRODUCT

Duménil (1980) and Foley (1982) pointed out that the traditional view, in which the aggregate equalities between value and price and surplus value and profit refer to the money value and price of the gross product, is inconsistent with the definition of value adopted in the New Approach because of double counting. They argue that the profit on the production of means of production, say, counts first as part of the social profit, and again as part of the cost of the means of consumption. The same holds with respect to the other components of the money

value of the means of production. Therefore, they must be subtracted, and only the net product and its value can be the subject of the transformation.¹²

This is one of the most important innovations of the New Approach. The rationale for the operation on the net product is not straightforward. Let us start from the circuit of capital:

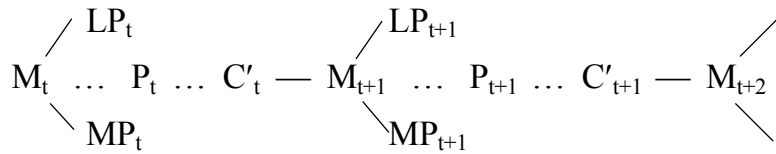


Figure 6.1 The Circuit of Capital

In each period (t , $t + 1$, and so on). the capitalists buy labour power LP and means of production MP. During production ($\dots P \dots$) the workers transform the means of production into new commodities C' . The newly produced commodities have greater value than the capital originally advanced ($M_{t+2} > M_{t+1} > M_t$).

The gross output of each period C' is composed of means of production and means of consumption. The form in which they circulate establishes links between the successive circuits of capital (the proceeds of sales are obviously used as new capital, but the circulation of commodities as use values is also relevant). Different interpretations of this process are partly to blame for divergent views of the transformation. This section discusses the production of means of production and the circulation of constant capital; the value of labour power and variable capital are considered below.

There are two distinct ways to conceptualize the net product. In terms of use value, it is that part of the gross output over and above that necessary to maintain the productive system, or to repeat the same pattern and level of production. Therefore, it comprises the means of consumption and net investment. In terms of value, as was shown above, the value of the net product is identical to the newly applied labour. This raises the issue of what determines the value of the gross product, since the labour applied in a period creates all the gross product but only part of its value.

The part of the value of the gross output that is not produced in the period corresponds to the value of the means of production used up (which Marx calls C). There are different ways to conceptualize this value but, for the New Approach, it is determined by the labour time socially necessary to reproduce the means of production, or to produce them with the present level of technology. In this case, the (possibly distinct) level of social technology when these commodities were originally produced is irrelevant. If this definition is accepted, it follows that the value of the gross output is the sum of the abstract labour newly performed in the economy and the present value of the means of production necessary to reproduce the commodities in the net product. As the performance of labour upon previously produced means of production not only

creates the gross output and produces new value, but also determines the new value of the means of production used up, it is indeed true that the value of the means of production is counted twice in the value of the gross product. It counts first as the value of the newly produced means of production, and again as the new value of the means of production used up. This point will become clearer if we return to the flax and linen example above. We have presumed that the technologies of production are:

$$\begin{aligned} 4l &\rightarrow 1F \\ 2l + 1F &\rightarrow 1L \end{aligned}$$

Given these technologies, the labour time socially necessary to produce a unit of flax (its labour value) is $\lambda_F = 4l$, and the labour value of linen is $\lambda_L = 2l + [4l] = 6l$, where $[4l]$ is the labour time necessary to produce a unit of flax. Therefore, in general we have:

$$\begin{aligned} \lambda_F &= l_F \\ \lambda_L &= [\lambda_F] + l_L \end{aligned}$$

where $[\lambda_F]$ is the present labour value of flax and l_F and l_L represent the labour time necessary to produce a unit of flax or linen. The labour value of the gross product, λX , is the sum of the labour values of the flax and the linen produced in the period, λ_F and λ_L :

$$\lambda X = 4 + 6 = 4 + [4] + 2 = 10l$$

In other words,

$$\lambda X = \lambda_F + \lambda_L = \lambda_F + [\lambda_F] + l_L$$

This example shows that, given the definition of value adopted by the New Approach, the labour expended in the production of the means of production is counted twice in the value of the gross output; first in the value of the means of production used up and, second, in the value of the final commodities produced with those means of production.¹³ For this reason, the New Approach argues that only the value of the net product should be the subject of the transformation, otherwise (given the definition of value of the means of production) double counting naturally follows. This is because the value of the means of production used up does not correspond to labour actually performed either in the period or ever; on the contrary, it is merely a reflection of labour carried out and value created elsewhere.

The emphasis on the net product is relevant because it allows the New Approach to focus on the relationship between the performance of labour and the creation of value, in isolation from the transmission of value through the productive consumption of the elements of constant capital. The fact that labour alone creates value is of course central in Marx's theory of value, but this is not at the forefront of conventional approaches to the transformation. Therefore, even though the emphasis on the net product has been criticized because it eliminates the industries producing the consumed means of production from the analysis, it

allows the New Approach to point out that, for Marx's theory of value, price is nothing but a form taken by social labour in circulation.

6.5 THE VALUE OF MONEY AND COMMODITY PRICES

If the value of the inputs is counted twice in the value of the gross output, it follows that the value of money should be defined on the basis of the net, and not gross product. However, the concept of value of money is problematic and should be used with care (see Ramos and Rodríguez's contribution in this volume). It tells us how many hours of abstract labour are necessary to add £1 to the money value of the output, but only at the aggregate level; the same number of hours of labour may add a different quantity of money value in any individual sector (this may happen not only because of the distinct skills of the workers but, more generally, because of the different organic compositions of the advanced capitals).

Another limitation of this concept is that the value of money is merely an *ex post* reflex of the relation between labour performed and money value added in the period. Therefore, it becomes known only *after* commodities are produced and priced and the socially average level of technology is determined. In this respect, it has a different scope than the Marxian concept of value of the money commodity, which is determined prior to circulation and the sale of the commodities produced (see Arnon 1984, and de Brunhoff 1976). However, the notion of the value of money is legitimate regardless of equilibrium or the existence of a money commodity, which makes it useful for the analysis of contemporary capitalism. In this respect, it favourably contrasts with the concept of money used in equilibrium analyses such as the neo-Ricardian.

In equilibrium systems monetary analysis is generally fruitless because all commodities are, by definition, sold. Consequently all labours, and not only those producing the money commodity, are immediately social (in other words, labour directly produces money and not only commodities). Because of this, the choice of which commodity fulfils the role of numéraire is a matter of fancy, which surely cannot be the case with money.¹⁴ In analyses where equilibrium is the organizing principle the study of non-equilibrium situations, uneven accumulation, crises and inflation is impossible unless arbitrary assumptions are introduced, because the circuit of capital is collapsed into unity and there is no instance in which money can play an autonomous role. The real-monetary dichotomy premised in these analyses is in sharp contrast with Marx's painstaking effort to derive money from commodities and commodity exchange in *Capital I*, which he considered one of the most important achievements of the book. In sum, money, as it exists in general equilibrium approaches, is a *non-money* in Marx's sense, because it is unable to account for the socialization of commodity-producing labours and to express values in circulation as prices.

These tasks, which in reality are carried out by money, are fulfilled in these models by the assumption of simple reproduction. Therefore, this assumption occupies in these schemes the role of money in Marx's.

The concept of value of money to which the New Approach adheres implies that money is essentially command over the newly performed abstract labour. This notion is generalised for prices, which are conceived as commodity owners' claims over the abstract labour performed by society. In other words, prices are money values concretely reallocated between commodities, in accordance with rules determined by capitalist behaviour. There is no reason why prices should be identical to money values, and the former are determined irrespective of the ratio between the labour value of commodities and the labour value of the money commodity. The absence of explicit reference to the money commodity in the analysis allows for unequal exchanges (between commodities produced by distinct quantities of abstract labour) from the start. This is, once again, in contrast with Marx, for whom such exchanges become systematic only after the transformation.¹⁵

This conception of price is methodologically questionable. Its main drawback is that this is simply a circulation-based view of price. It is correct as far as it goes, but it fails to give analytical priority to conceptually more fundamental processes such as the performance of labour in production, *vis-à-vis* more superficial phenomena such as the relations between supply and demand for each commodity or monopoly power. The internal structure of the New Approach leads it to address the appearances from the start (in the analysis of unequal exchanges or the systematic disproportion between labour value and price, the absence of the money commodity, and so on), but this apparent advantage exacts a heavy toll: it becomes very difficult to develop the theory further without making use of arbitrariness in the choice of phenomena to be explained, the judgement of their importance and their relation with other features of reality.

This difficulty is ultimately caused by the manifold (but not haphazard) connections between the various features of reality. Because of this, the recognition that Marx's two equalities hold is, not surprisingly, in itself insufficient to grant validity to the New Approach. The diverse solutions to the transformation problem in which these equalities hold show that the way it is obtained is at least as important as reaching the right result. Unless a sound methodological procedure is followed from the start, the equalities may become an object in their own right with no further analytical significance; as a result, the analysis as a whole becomes prone to faults or unable to explain important aspects of reality, and there is increasing risk that it will be led astray.

6.6 THE VALUE OF LABOUR POWER

Whilst the neo-Ricardians define the value of labour power as the value of an $n \times 1$ vector b of commodities whose consumption is necessary to reproduce a

unit of labour power, the New Approach defines it as the share of the net product which the workers can claim with their wages, or the wage rate times the value of money (see section 2; Glick and Ehrbar 1987, argue differently). Labour power is considered a distinct commodity because, in contrast to others, it is not created by a capitalist production process subject to the equalisation of profit rates. On the contrary, the reproduction of labour power depends on the physical and social existence of the working class. Its value is determined by class struggle (see Foley 1986:41; Lipietz 1982:75).

The new definition of the value of labour power successfully avoids the difficulty, inherent in the neo-Ricardian approach, that once a fixed consumption bundle b is defined it follows that the general rate of profit depends only on the industries which (directly or indirectly) produce the goods in b . Much has been made of this result, which contradicts Marx's conclusion that the production of all commodities affects the general rate of profit.

In more general terms, the difference between the neo-Ricardian and the new definition of the value of labour power owes much to the distinct methodological perspective of these approaches. The neo-Ricardian conception reflects a very abstract understanding of the value of labour power. It derives from Marx's definition in *Capital* I, which he finds useful to demonstrate how exploitation is compatible with equal exchange under capitalism. In this context, it is legitimate to represent the value of labour power by the value of a bundle of goods, however it may be determined. Nevertheless, this image has very strict limits. Two of these limits are particularly relevant here; first, the use of this conception of value of labour power and the wage in the transformation problem implies that labour power is the only commodity to be purchased at its value *after* the transformation, which is unjustifiable.

Second, this conception ultimately denies the monetary character of the wage. The adherence to a conception of value of labour power which denies the workers the power to spend their wage with some (albeit restricted) freedom is costly, because the neo-Ricardians become unable to distinguish the workers from the goods they consume. This is a serious analytical error, which has led some to the conclusion that it is arbitrary to suppose that workers are exploited, because this model leads to identical results if corn, iron or energy are exploited. Marx may or may not have been aware of this difficulty, but he went to great lengths to emphasize that it is simply wrong to presume that in capitalism the wage could, in general, be paid in kind. See, for example, *Capital* Volume II (Marx 1978) pp197, 245, 285 and 290-97.

Although the wage is a sum of money, the workers' possession of a given amount of the general equivalent is insufficient to grant them the right to purchase, as a class, any commodity that they might want. It would be naive to imagine otherwise, because this would ignore the social role of the wage as the sum of money with which the working class reproduces itself. This implies that the wages cannot be so low that workers would starve to death, nor so high that

they could buy means of production or avoid work over long periods. Whilst not incompatible with these limits, the new definition of value of labour power is unable to highlight them. This is due to the fact that this is a circulation-based conception of the wage, that captures its (quantitative) limits, but cannot reflect its (qualitative) determinants. They may be incorporated into the analysis at another stage, but cannot be derived from the conception of the value of labour power which gives rise to this view of the wage.¹⁶

The (relatively more abstract) relation between the value of labour power and the value of a bundle of goods, and the (relatively more concrete) existence of the wage as a sum of money which may be spent with some freedom set limits to the conceptualization of value of labour power and the wage. These limits are (as was the case with competition, discussed in section 3) influential at distinct analytical levels, which makes a direct confrontation between the neo-Ricardian and the new conceptions of value of labour power logically inadequate. The issue is not which of them is right and which is wrong in the abstract, but what contribution can each of them make to value analysis, at which level of analysis they play a meaningful role, and how they should be connected to each other. This is what Marx seems to be looking for in *Capital*, even though his analysis of wage labour was left incomplete (see Lebowitz 1992).

The new definition of the value of labour power is, therefore, incomplete at best. But it can be criticized from another angle as well. Because of its focus upon circulation and the purchasing power of the wages, this definition of value of labour power is hardly connected with the process of creation of surplus value, the value produced in excess of that necessary to reproduce labour power. In other words, it cannot grasp the distinction between necessary and surplus labour within production or go beyond one of the effects of exploitation, namely the inability of the workers to purchase all the net product.¹⁷ This was the same aspect of exploitation which the Ricardian socialist economists emphasized in the early nineteenth century (see Saad-Filho 1993), and this is also the only one which neo-Ricardian analysts discuss.

This is not wrong but it is trivial, because it does not emphasize the difference between exploitation in general and the specifically capitalist form of exploitation. In addition, the new notion of value of labour power can be misleading, if it dilutes the ability of theory to conceptualize the primary form of class conflict in capitalism (which takes place in production) and, instead, induces the conclusion that exploitation is due to the unfair distribution of income.¹⁸ There may also be difficulty with the concept of relative surplus value, which tends to be blurred because the notion of workers' consumption goods is not clearly defined. This notion of value of labour power may also lead to error if it directs the analyst towards some version of the well known classical dichotomy between ordinary commodity values, determined by labour embodied, and value of labour power, given by supply and demand. Moreover, it may also reinforce the belief that the net product is somehow shared between workers and

capitalists at the end of each period of production. The nature of most of these difficulties is clear enough, but the same is not true of the last of them. Let us see why it is wrong and what the implications are.

If all capitals have a uniform turnover period, at the beginning of period t , say, capitalists purchase MP produced in period $t - 1$ and hire workers to transform the former into new output. These workers may spend their wages on commodities produced in $t - 1$ as well as t , depending on when they are paid and how their expenditures are distributed.¹⁹ There is no analytical justification for imposing restrictions upon the timing of payment or expenditure of the wage, but it is different with surplus value.

The surplus value produced in period t is only realized at the end of t , when the output of the period is sold. Hence, capitalists use their income of a period to purchase means of consumption produced in this period, while the workers may buy commodities produced in this as well in as a previous period. Therefore, it is incorrect to argue that, at the end of period t , there is a mass of products to be shared between capitalists and their employees. More generally, it is not true that part of the value added in each period is given to the workers as wage, because they are paid, and the wages may be spent, prior to the sale of the output. This analysis shows that aggregate profits and wages are not simultaneously determined as the result of a struggle for shares over the net product, however important distributional conflict in capitalism may be. The relation between profits and wages is, therefore, fundamentally distinct from that between industrial profit, interest and rent, which are conflicting claims over the (previously given) mass of surplus value extracted from the workers. This shows that the 'new' notion of the value of labour power cannot be the sole basis for the development of a theory of class conflict around income distribution, although it may seem to be sufficient at first sight (see Gleicher 1989).

6.7 CONCLUDING REMARKS

The contribution of the proponents of the New Approach to the long lasting polemic which surrounds the transformation problem can be seen from two distinct angles; first, they argue that the net product is the appropriate context for the transformation, dispose of arbitrary normalization conditions through the conceptualization of the value of money, and adopt a more complex and concrete concept of the value of labour power. In doing this, they reject the equilibrium framework in which the transformation was generally discussed in the past, and raise several other important issues for value analysis. These innovations are part of a wider reconsideration of Marx's theory of value, and should be considered in their own right. In sections 4 to 6 of this chapter, we have seen that they have a lot to offer to a non-equilibrium reconstruction of value analysis. In spite of this, their present form is open to criticism on several grounds.

In general terms, I have shown that the claim that the New Approach is a development of Marx's own concepts and method is fragile at best. This approach emphasizes the sphere of circulation, and neglects the sphere of production, which Marx himself considers the determinant in capitalism. The building of the links between the innovations introduced by the New Approach and Marx's own effort to reconstruct the main categories of the capitalist economy is an extremely difficult task. Its complexity cannot be minimised, and the possibility of success cannot be taken for granted.

The second angle from which the New Solution can be evaluated has to do with the reduction of the transformation problem into triviality. This is a consequence of the changed definition of the variables (and, ultimately, the redefinition of the problem as a whole) that follows from the view of Marx's theory of value from which the New Approach springs. The transformation becomes trivial because, in this context, Marx's two aggregate equalities become identities. This innovative result is very important, because it has shifted the grounds of the transformation debate. As a result, the validation of the aggregate equalities is no longer an issue, because they always hold.

The simultaneous verification of the two equalities in the New Approach is not simply the result of a play with definitions. On the contrary, it is the outcome of a careful development of that view of Marx's theory of value which derives from Rubin and Aglietta. This view surely represents the concepts and method of Marx's theory of value more faithfully than the neo-Ricardian (or equilibrium approaches in general), and it has shown its power by displacing some of the trivialities which have long bogged down theoretical advance. Unfortunately, however, the New Approach cannot account for the complexity of the relationship between values and prices. This is because it lacks an internal structure grounded upon Marx's method. The absence of this structure is the reason why the proponents of the New Approach fail to recognize the conceptual importance of the transformation of values into prices of production, and agree with the Sraffians that the fundamental error in Marx's procedure is the non-transformation of input values (see, for example, Duménil 1980:8, and Lipietz 1982:64-65; this claim is refuted elsewhere in this book).

The peculiarities of its internal structure create severe problems for the further development of the New Approach. The most important is that, because the New Approach posits an identity between content (for example value) and form of expression (price), the content itself may lose its own distinctive stature and become redundant with the further development of the inquiry (see, for example, the analysis in de Vroey 1985, especially p47). This would be a sad outcome. In addition, the structure of the New Approach makes it vulnerable to the charges of tautology (because of the way in which it validates Marx's equalities) and empiricism (because it does not highlight the structures whose development underlies value analysis).

The best way to avoid these problems is to recognize the logical context in which Marx develops his theory of value and put to the forefront the logical issues involved in the transformation. If this is done, the aggregate relations between value and price, and surplus value and profit, which the New Approach obtains, could no longer be attributed to the redefinition of the variables. They would, instead, hold because they are a reflex of the transformation of the variables themselves, whose meaning should shift according to the level of abstraction of the analysis. In accordance with this, their forms of appearance should become increasingly complex as the reconstruction in thought of the main categories of the capitalist mode of production progresses.

For this reason, it is not strictly correct to say that total profit is equal to total surplus value, that total value is equal to total price, or even that the labour value of the net product divided by the value of money is identical to the price of the net product. For Marx, commodity prices are simply the form of appearance of the abstract labour performed in the period, and profits (inclusive of interest and rent) are nothing but the form of appearance of surplus value. Values and prices (or surplus value and profits) cannot be quantitatively compared with one another because the form of appearance of something cannot be put into quantitative relation with its own essence. The link that exists between them is purely qualitative.²⁰

The New Approach has done much service to the development of Marx's theory of value. The greatest of them is a decisive contribution to the sublation of the previous debates, and their recasting under a new light. This will help restore the transformation to its rightful place within *Capital*. It will no longer be seen as a self-contained exercise aimed at the calculation of equilibrium prices, and its connection with the theory of wages, accumulation and technical change, as well as the law of the tendency of the rate of profit to fall and the study of crises, will finally be recognized.

ACKNOWLEDGEMENTS

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NOTES

¹ The analysis below assumes that all labours are productive, that the production period is uniform and that wages and profits are the only forms of income.

² The wage rate is paid per unit of simple, unskilled labour power. Two other simplifying assumptions are involved; first, that the workers are identical to one another and, second, that they produce equal quantities of value per hour of labour power sold. The latter is discussed in Lipietz (1982); the former in Saad-Filho (1994), Chapter 2.

- ³ Matrix a is assumed indecomposable and productive in Hawkins-Simon terms; there are no joint products and no fixed capital. For a more general analysis, see Duménil and Lévy (1984, 1987, 1989, 1991), Ehrbar (1989) and Lipietz (1979).
- ⁴ This is a development of the 'flax and linen' example in Glick and Ehrbar (1987).
- ⁵ If $\lambda = l(I - a)^{-1}$, then $\lambda Y = l(I - a)^{-1}(I - a)X = lX$.
- ⁶ In accordance with the terminology of the New Approach, 'labour value' is the quantity of labour socially necessary to produce a commodity. 'Money value' is the ratio between the labour value of a commodity and the labour value of the money commodity, and 'price' is the sum of money for which a commodity may be exchanged on the market.
- ⁷ 'The advantage of interpreting the value of money as the ratio of aggregate labour time to aggregate money value added is that the sum of the value gained and lost by all producers in exchange will be zero. In other words, this interpretation of the value of money corresponds to the idea that value is created in production but conserved in exchange' (Foley 1982:41). The importance of dividing the value created by the value of money becomes clear if a country changes its currency from pounds sterling, say, to Ecus. This will change the sum of prices, even though the labour performed and the total value produced remain the same. The modified value of money is a reflex of the change of the currency, and it shows that an hour of labour now adds a different quantity of money value to the commodities.
- ⁸ 'If we assume that one hour of labour power sold yields one hour of labour time in production, the value of labour power will be a fraction between 0 and 1 and expresses the fraction of expended labour time the workers work –for themselves', or the fraction of labour expended which is 'paid labour'. The value of labour power is also, under the assumption that an hour of labour power yields an hour of labour time, equal to the wage share of value added' (Foley 1982:40; see also Duménil 1980:74-75).
- ⁹ 'What competition within the same sphere of production brings about, is the determination of the value of the commodity in a given sphere by the average labour-time required in it, i.e., the creation of the market-value. What competition between the different spheres of production brings about is the creation of the same general rate of profit in the different spheres through the levelling out of the different market-values into ... [prices of production] that are different from the actual market-values. Competition in this second instance by no means tends to assimilate the prices of the commodities to their values, but on the contrary, to reduce their values to [prices of production] that differ from these values' (Marx 1969b:208, emphasis omitted; see also pp206-07).
- ¹⁰ The relationship between competition among capitals of the same branch, technical progress, and conflict between workers and capitalists is discussed in Cleaver (1990) and Lebowitz (1992).
- ¹¹ Sraffa (1960:3) defines prices as 'a unique set of exchange-values which if adopted by the market restores the original distribution of the products and makes it possible for the process to be repeated; such values spring directly from the methods of production'.
- ¹² 'What is redistributed in the economy is the value created during each period, i.e. the value of the net product of the period. In the aggregate, productive workers expend in a given period of time a certain amount of labour which defines the added value during the period. This value is embodied in the net product of the period. The redistribution of value (the separation between its appropriation and realisation) must be interpreted on this basis, and not on that of the gross product of the period which leads to double-countings for inputs produced and consumed productively during the period or inherited from previous periods' (Duménil and Lévy 1991:363; see also Duménil 1980:26-30, 38, 55, 62-64, 79-82, 94-95; 1983:441, 448-49; and 1984:341-42, Duménil and Lévy 1984, 1987; Ehrbar 1989; Foley 1982:41, 45; 1986:22, Glick and Ehrbar 1987; Lipietz 1982:63, 76-78; 1983:34, 56-59, 85; and Mohun 1993:14).
- ¹³ This becomes even clearer if the technology of production of flax is allowed to change. If, in a subsequent period, we have technical progress in flax production, such that $2l \rightarrow 1l$ and $2l + 1l \rightarrow 1l$, the value of flax falls to $\lambda_F = 2l$. In this case the new value of linen is $\lambda_L = 2l + [2l] = 4l$. It follows that the labour value of the gross product is now $6l$ – a reduction of four hours, twice as much as the fall in the value of flax.
- ¹⁴ Hodgson (1981:83), for example, recognizes that '[a]lthough the Sraffa system is conceptually different from a general equilibrium system of the Walrasian type, or even the von Neumann model, these all have one thing in common: they do not include money. Clower has shown that money can never be introduced into a stationary-state, general equilibrium model'.

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- ¹⁵ 'Any particular commodity can be seen as embodying a certain fraction of the total abstract social labour expended in producing commodities; it also exchanges for a certain amount of money (its price), which represents a possibly different fraction of the aggregate abstract social labour expended' (Foley 1982:37). In this context, the unit of money is a 'claim to a certain amount of the abstract social labour expended in the economy' (Foley 1982:37; see also Foley 1983, Lagueux 1985, and Mohun 1993).
- ¹⁶ For Marx (1972:94) 'He [the worker] actually receives a share of the value of the product. But the share he receives is determined by the value of labour [power], not conversely, the value of labour [power] by his share of the product'. Marx adds below: 'It does not happen the other way round, that his share of the product is determined first, and as a result, the amount or value of his wages'. (See also Marx 1969b:418 and 1976a:1066).
- ¹⁷ See Foley (1982:42-43; 1986:15). The absence of a clear concept of necessary labour time makes the New Approach unable to show that '[i]ncrease or diminution in surplus-value is always the consequence, and never the cause, of the corresponding diminution or increase in the value of labour-power' (Marx 1976a:658).
- ¹⁸ In analytical terms, class struggle in production is more fundamental than class struggle in distribution, because the (qualitative) development of concepts of surplus value and exploitation, on whose basis the real existence of capital and wage labour depends, is prior to the (quantitative) dispute over their magnitude.
- ¹⁹ For Marx, constant and variable capital are conceptually advanced at the beginning of the production period, but this does not imply that credit cannot exist or that the wages must be advanced. By the same token, the payment of the wages does not depend upon the sale of the output produced by these workers, otherwise those employed in construction or agriculture would probably starve to death before they were paid.
- ²⁰ The most conspicuous case of quantitative comparison between prices and values is probably the use of 'price-value multipliers' in Bortkiewicz (1984) and Seton (1957), but value and price rates of profit are often compared (see Flaschel 1984, Lipietz 1984, Morishima 1973, and Steedman 1977). This procedure is criticized by Fine (1986a), Kliman and McGlone (1988), Pilling (1980), Smith (1990) and de Vroey (1982).

7 The transformation procedure: a non-equilibrium approach

Guglielmo Carchedi and Werner de Haan

7.1 INTRODUCING SOME BASIC CONCEPTS AND RESULTS

The method of research and the results of this chapter's inquiry diverge considerably from the well established discussions of the transformation procedure.¹ It is thus possible that the reader might have some initial difficulties in following the train of thought to be developed below. This first section is meant to highlight the red thread running through this chapter. This section is not meant to submit logical proofs (this will be done in the following sections) but only to acquaint the reader with an approach which diverges substantially from the mainstream discussion of Marx's transformation procedure. This is the reason why in this section the basic features of this chapter will be stated rather than argued for.

The transformation procedure is the core of the Marxist theory of price formation. It is characterized by four basic features. First, it explains *both a real and a tendential redistribution of value*, the process through which (more or less than) the value both transferred and newly produced is *actually* realized by each commodity (actual redistribution) and the process through which the value actually realized is *tendentially*, that is hypothetically, redistributed (tendential redistribution). Second, the tendential redistribution is explained not only in terms of *capital movements* (which tendentially equalise the rates of profit) but also in terms of *technological change* (which tendentially equalise the value of the inputs). Third, there are two aspects to the process of transformation, the *quantitative* and the *qualitative*. And finally, the transformation procedure depicts a *chronological process*, a succession of production and distribution periods.

Let us first of all distinguish between the quantitative and the qualitative aspects of the transformation. Quantitatively, transformation means redistribution of value. This is the aspect on which the commentators have focused their attention. Qualitatively, this approach is based first of all on the chronological succession of production and distribution periods. As such it is the very opposite of the equilibrium approach which has been surreptitiously smuggled into Marx's transformation procedure and generally accepted. Moreover, this chronological

perspective is paired with a dialectical one. This means that the process of price formation (and thus the transformation process as well) is seen as a constant change of individual into social values and of social values back into individual ones.² More specifically, there is a qualitative change either from potential social values (that is individual values) to realized social values or from realized social values to potential social values (that is individual values) every time a commodity is sold, even though there is not necessarily a quantitative change, a redistribution of value. In turn, the actually realized social values can be transformed into tendential social values. Let us then introduce the chronological dimension.

Consider a period, t_1-t_2 , and two commodities, a and b . Commodity a is bought at t_1 and enters t_1-t_2 as an input of b . Commodity b , the output, is immediately sold at the end of t_1-t_2 , that is at t_2 . The steps to be highlighted can be followed by referring to Figure 7.1.

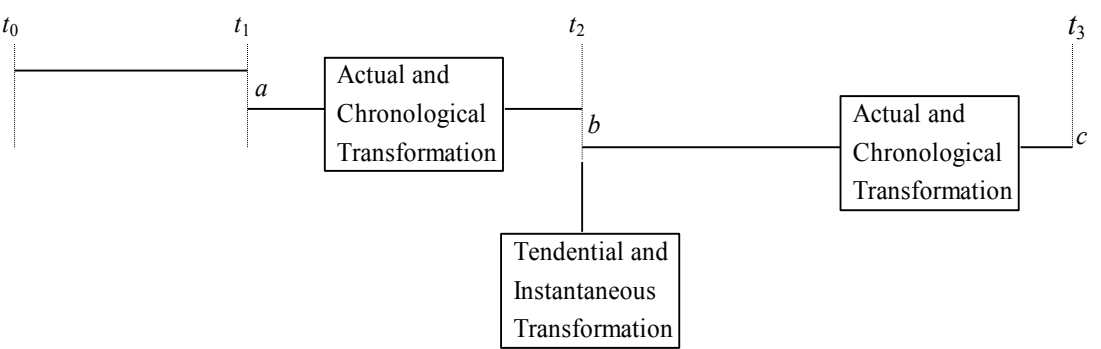


Figure 7.1 Actual and tendential transformations

Consider the input a first. At t_1 the input enters the t_1-t_2 period. Quantitatively, the value at which the input a enters t_1-t_2 is the value actually paid for it at t_1 as an output of the previous production period, t_0-t_1 . This value is the *market price* of a at t_1 . At t_1 this is a given. This is also the *value transferred* from a to b . Qualitatively, the *individual value* of the inputs (what has been paid for them as outputs of the previous period) is at the same time their *potential social value*, which may or may not realize itself, according to whether the commodity b , in which a is incorporated, is sold or not at t_2 .

Time t_2 . Quantitatively, what the producer of b has paid for a at t_1 is not necessarily what that producer realizes at t_2 for having used a . This depends on what the market is willing to pay the producer of b for having used a . For example, technological changes in the production (and thus in the value) of a intervening before b is sold at t_2 affect the market price of b . Qualitatively, it is only at the moment of, and through, the sale of b at t_2 that the value contained in a (its individual, or potential social value) is realized as part of the value contained in b . This is the *actually realized social value* of a at t_2 .

Time t_2 again. At this point, it is possible to compute the value tendentially realized by b for having used a . As it will be argued below, this is the *reproduction price* of a at t_2 . Quantitatively, this is equal to the constant and variable capital which has been invested at t_1 by those capitals which, at t_2 , operate under conditions of average productivity. Qualitatively, at t_2 it is possible to theorize (as opposed to compute) the social value tendentially realized by b for having used a . This is the result of a real movement, technological competition. It is this latter which lends an economic content to that average which is the reproduction price of the inputs.

Consider now the output b . Quantitatively, the value contained in b before sale at t_2 is the market price of a at t_1 plus the surplus value produced during t_1-t_2 . Qualitatively, the value contained in b is its individual value which is also its potential social value. In fact, the value which has been produced may or may not realize itself according to whether b is sold or not.

Time t_2 . Quantitatively, the value both newly produced and transferred during t_1-t_2 , that is the value contained in b , is not necessarily the value actually realized by the producer of b at t_2 , when b is sold. This is b 's market price at t_2 and is usually different from the value contained in b . Qualitatively, it is society which, by buying b or not, decides at t_2 whether b 's value contained, or potential social value, realizes itself as an actual social value or not.

Time t_2 again. At this point, the point of sale, it is possible to compute the value tendentially realized by b . This is its *production price*, or the sum of the reproduction price of a plus the average rate of profit computed on that reproduction price. This is the quantitative aspect. Qualitatively, this is the transformation of the actually realized into the tendentially realized social value. Here too, the economic significance of this transformation is due to the fact that it rests on a real movement, capital movement and technological competition. It is due to this movement that it is possible to theorize the tendential equalisation of profit rates and the value of the inputs.

At t_2 , then, there is an actual transformation, an actual redistribution of value. It is at this point that the production price can be computed on the basis of the actual values, or market prices. Or, the production price is a notion which applies only to the outputs, not to the inputs. It is a tendential price, not an actual one. It is a price which tends to emerge when the outputs are sold but which actually never emerges. As such it can be known only through computation.³ Nevertheless the production price is real, is part of reality, because it is the result of a double real movement, capital movement and technological change. Due to capital movements, the surplus value actually realized at t_2 can be hypothetically redistributed through sectors in such a way that each capital realizes the same, the average, rate of profit. Due to technological change, at t_2 the value actually realized for the inputs can be hypothetically redistributed into their tendential value, their reproduction price.

The quantitative aspects of the transformation can be summed up as follows. As far as inputs a are concerned, there is an actual transformation at t_2 from individual values (the market price paid for them as outputs of the previous period) to actually realized values (what the market pays the producer for having used that input) and a tendential transformation from these latter into reproduction prices (what the producer would realize for their inputs if they had used the average productivity techniques). As far as outputs b are concerned, at t_2 there is an actual transformation from individual values, that is the market price of the inputs at t_1 plus the surplus value actually produced during t_1-t_2 , into market prices (what the market actually pays for the outputs) and a tendential transformation of market prices into production prices (the average rate of profit computed on the inputs' reproduction price). Every time an output b exits a production process and is sold, the following tendential values can be computed: the reproduction price of its inputs a , the average rate of profit, and thus the production price of b , the outputs. However, that output does not enter a new process, t_2-t_3 , at its tendential value, at its production price: rather it enters the new process at its actual value, the market price at which it has been sold at t_2 .

Let us summarize the qualitative transformation. Commodity a enters t_1-t_2 at t_1 . At this point it has both a social value, as an output of t_0-t_1 , and an individual value, as an input of t_1-t_2 . Lack of understanding of this point has been the source of much confusion. Quantitatively, at t_1 a is sold as an output of t_0-t_1 at the same market price at which it is bought as an input of t_1-t_2 . But qualitatively, at t_1 a has both a realized social value (as an output) and an individual value (as an input). Let us now proceed to the next step. During t_1-t_2 there is both an actual and chronological transformation, that is an actual production and distribution of value taking place between two points in time, t_1 and t_2 , and continuing into the next period, t_2-t_3 . At t_2 , the individual value, which is the potential social value, of the output b is transformed into its actual social value, its market price. At this point it is possible to compute its tendential social value, its production price. This is a hypothetical and instantaneous transformation. Consider now the next period. At t_2 the realized social value of b as an output of t_1-t_2 becomes qualitatively the individual value of b as an input of t_2-t_3 , even though quantitatively the market price at which b is sold is obviously the same as the market price at which b is bought. Qualitatively, then, there is a continuous transformation of individual into actual social values and back from these latter into individual values every time a commodity is sold. But, at any point at which the outputs are sold, it is possible to compute the price towards which the actual social values tend, the production prices.

Figure 7.1 summarizes the basic concepts introduced above. It is meant to assist the reader, should the meaning of any of these concepts be lost sight of in the following sections.

7.2 INDIVIDUAL AND SOCIAL VALUES

In Marx's computation of prices of production, the outputs' production prices are calculated by adding to the prices of the inputs (means of production and labour power) the average rate of profit,⁴ rather than the rate of profit corresponding to the value actually produced and realized by each capital, the actual rate of profit. It is in this sense, through the substitution for each capital of the average rate of profit for the actual rate of profit that the (not yet transformed) 'values' are transformed into (the transformed) 'prices', that is into production prices. As is well known, this transformation procedure has been the object of sustained criticism, especially by authors in the neo-Ricardian tradition. One of the two major criticisms has focused on the supposed circularity in Marx's reasoning.

The 'circularity critique' objects that the outputs of a certain production process are the inputs of another process. As inputs, they are not appraised at their production prices, given that, as far as the inputs are concerned, the actual rate of profit has not yet been replaced by the average rate of profit. But as outputs they are appraised at their production price. That is, the same commodities are appraised at their 'value' as inputs of a certain process and at their 'price' as outputs of another process. Or, the same commodities are bought as inputs at one (not yet transformed) value but sold as outputs at another (transformed) value, the production price. This, it is held, is a logical inconsistency given that, at any given point in time, a commodity is bought by someone (as an input) and sold by somebody else (as an output) at one and the same price.⁵

As Carchedi (1991, Chapter 3) has shown,⁶ this critique rests on a logical mistake: it ignores the *chronological succession* of production and distribution cycles, thus wiping time and reality itself out of economic analysis. The basic point is that the output of a certain period, for example t_0-t_1 , becomes the input of the *following* period, for example t_1-t_2 . Suppose that the output of t_0-t_1 is commodity a . This commodity enters as an input the next production period t_1-t_2 which produces commodity b . At t_2 b is sold. This is shown in Figure 7.2 which sets the correct frame for the appreciation of Marx's transformation procedure.

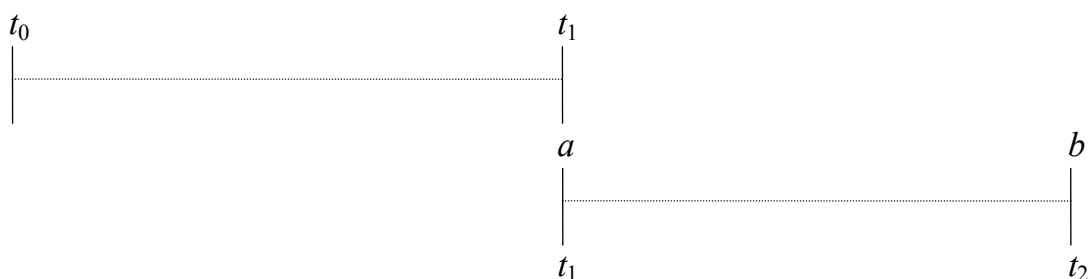


Figure 7.2

Having introduced the chronological dimension, we can now introduce another of the basic features of Marx's transformation procedure, the distinction between social value and individual value (1976a: 434). The terminology is Marx's own:

The real value of a commodity, however, is not its individual, but its social value; that is to say, its value is not measured by the labour-time that the article costs the producer in each individual case, but by the labour-time socially required for its production.

In other words, the *individual* value is the value a commodity has acquired during the production process. This is not necessarily the *social* value, the value that commodity realizes when it is sold. The social value can be either the value actually realized or the value tendentially realized. It follows that the individual value is only a *potential* social value and that the social value is an actually or tendentially *realized* individual value. Moreover, since the labour time a commodity realizes is the labour time society adjudicates to it at the moment of, and through, exchange, the individual value is the value that commodity has before it is sold and the social value is the value that commodity realizes at the moment of, and through, exchange.⁷

Four key terms have been introduced: potential, realized, actual and tendential. An individual value, the value contained in a commodity, is a potential social value because that value has not been realized yet through the sale of that commodity. It is only when the commodity is sold that the value contained in it, its potential social value, becomes value actually realized. The tendentially realized social value of that commodity is the value towards which the actually realized social value, and not the potential social value, tends. Only actually realized elements of reality can move (tend) towards a tendential situation. If this is so, the transformation process is first of all the transformation of individual into actual social values and from social values back into individual values, that is the transformation of potential social values into actual social values and vice versa. This is the *actual transformation*, the emergence of actual social values (market prices) from potential social values (individual values) and the subsequent change of market prices into individual values.

It is only after this has been understood that the *tendential transformation* can be properly framed. This is the transformation of actual social values (market prices) into tendential social values (production prices), the theoretical expression of the fact that market prices tend towards production prices, those prices at which the actual rates of profit are equalised into an average rate of profit. There is no direct transformation of 'values' into 'prices', or of individual values into production prices, as it is almost unanimously thought. Rather, the transformation of individual values into production prices passes through the emergence of market prices, the actual prices. The chain of logical causation is an actual transformation of individual (potential social values) into actual social values (market prices) and a tendential transformation of the actual social values (market prices) into tendential social values (production prices). *This* is the transformation

process, and these are the two inseparable aspects (the actual transformation and the tendential transformation) of that process.⁸ If IV stands for individual values, MP for market prices, and PP for production prices, then equations 1 below depict the wrong perception of the transformation procedure

$$\begin{aligned} \text{IV} &\rightarrow \text{PP} \\ \text{IV} &\leftarrow \text{PP} \end{aligned} \quad (1)$$

and equations 2 below depict the complete process of transformation, which is also the essence of a Marxist theory of price formation

$$\begin{aligned} \text{IV}(t_0) &\rightarrow \text{MP}(t_1) \rightarrow \text{PP}(t_1) \\ \text{MP}(t_1) &\rightarrow \text{IV}(t_1) \\ \text{IV}(t_1) &\rightarrow \text{MP}(t_2) \rightarrow \text{PP}(t_2), \text{ and so on} \end{aligned} \quad (2)$$

where the arrows indicate the direction of transformation and t_0 , t_1 and t_2 indicate different and subsequent moments in time. Relation 2 depicts this chapter's thesis in a nutshell: at each moment in time, the market prices (actually realized social values) of the outputs emerge from their individual values (values contained) and *immediately* tend towards their production prices. In terms of Figure 7.2 above, the market value of a as an output of t_0 – t_1 becomes the individual value a has as an input of t_1 – t_2 . This market price becomes an element of b , the next outputs' individual value. This latter will be transformed into b 's market prices at t_2 , the time of b 's sale. If b enters t_2 – t_3 as an input, the process repeats itself. In order to argue for this thesis, we shall first consider the actual transformation, the emergence of the market prices from individual values and their transformation back into individual (potential social) values. In terms of Figure 7.2, this is the emergence of the market price (actual social value) of b as an output of t_1 – t_2 from its individual (potentially social) value at t_2 and this market price's change into an individual value, also at t_2 , as an input of t_2 – t_3 . This is the object of section 3. Section 4 deals with the tendential transformation, that is with the tendency of the market prices of outputs towards production prices and of inputs towards reproduction prices, also at t_2 .

7.3 THE ACTUAL TRANSFORMATION

Our first step will be to apply Marx's distinction between individual and social value both to the inputs and to the outputs of a production process. We shall refer to Figure 7.2. Let us begin with the outputs, that is with a as an output of t_0 – t_1 . The actually realized social value of a as an *output* of t_0 – t_1 is the value a realizes at the moment of, and through, sale, that is at t_1 . It is its market price. After having been sold, a commodity can be sold and bought again. Every time it is bought and sold, the individual value is the value for which it has been bought and the actual social value is the value at which it is sold. The difference between the value contained and the value actually realized (market price) is due to the fact

that the latter is determined not only by the former but also by the demand for that product.

Consider now a as an input of t_1-t_2 . At t_1 , a is sold as an output of t_0-t_1 at its actually realized social value, that is at its market price, and is bought as an input of t_1-t_2 at the same quantitative value. There is no quantitative difference between the value at which a is sold by someone as an output of t_0-t_1 and the value at which a is bought by somebody else as an input of t_1-t_2 , *pace* the neo-Ricardian critique. However, there is a qualitative difference. Qualitatively, the actually realized social value of a as the output of t_0-t_1 becomes again a 's individual (potential social) value as an input of b , as an input of t_1-t_2 . The reason is the following. Once a enters t_1-t_2 as an input, its value becomes again a potential value both qualitatively (because it will realize its value only if at t_2 the output in which it is incorporated is sold) and quantitatively (because this value is not necessarily equal to the value a will actually realize at t_2 , when b will be sold).

At t_1 , then, a qualitative transformation takes place, from a 's actual social value as an output of t_0-t_1 to a 's individual value as an input of t_1-t_2 . However, this qualitative transformation is concealed by the fact that quantitatively the two prices coincide. At t_2 , there is again a qualitative transformation, from a 's individual value as an input of t_1-t_2 to a 's actual social value also as an input of t_1-t_2 . Now, however, there is also a quantitative transformation. In fact, at t_2 the producer of b realizes a 's actual social value and not necessarily what has been paid for a at t_1 , its individual value. Thus, the individual value of a as an input of t_1-t_2 is the value it has when it enters this period t_1 and it corresponds quantitatively to the actual social value (the market price) it has as the output of the previous period, t_0-t_1 . The actually realized social value of a as an input of t_1-t_2 is the value b realizes at t_2 for having used a as its input. To sum up, the actually realized social value of a as an output of t_0-t_1 is its market price at t_1 . The individual value of a as an input of t_1-t_2 is quantitatively equal to its actually realized social value as an output of t_0-t_1 . The actually realized social value of a as an input of t_1-t_2 is what the market pays the producer of b for having used a .

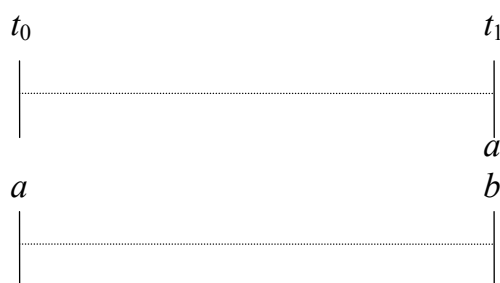
The dialectical movement of value distribution at the moment of sale (the actual transformation process) is a continuous process of transformation. At t_1 the actual social value of a as the output of t_0-t_1 is transformed qualitatively into its individual value as an input of t_1-t_2 , even if quantitatively these two values must be the same. At t_2 the individual value of a as an input of t_1-t_2 is transformed again (both qualitatively and possibly quantitatively) into its actual social value, that is into what the producers of b are paid for having used a . If, at t_2 , b becomes the input in the next production period, t_2-t_3 , the actual social value of b as an output of t_1-t_2 becomes again its individual value as an input of t_2-t_3 . Again, this is only a qualitative transformation.

It is then clear that at t_1 a is sold as an output of t_0-t_1 and bought as an input of t_1-t_2 at one and the *same* price. Once one steps out of the static, unrealistic and timeless neo-Ricardian world into the dynamic, realistic and chronological

Marxian frame of analysis, the ‘circularity critique’ simply melts away. Nothing could be further from Marx’s procedure than, as the circularity critique holds, the same commodity being sold by someone at its transformed (that is actual social) value and, at the same time, bought by someone else at its not yet transformed (that is individual) value. This applies also to the case in which a is both an input and an output of the same production process (that is steel needed to produce steel) during period t_1 – t_2 . Neither is its value at t_1 as an input equal (unless by chance) to its value at t_2 as an output, nor do the two values tend towards each other. If one chooses a dialectical, dynamic, approach, the equilibrium hypothesis must go.⁹

In considering the actual process of transformation, then, the supposed inconsistency, the supposed circularity in Marx’s transformation procedure, is the result of the application of a static frame of analysis, in which the succession of production and distribution periods is ignored, to a procedure specifically conceived to account for this succession, that is to a procedure aimed at explaining a real-life, dynamic, process. If the sequence of production and distribution periods is abolished, t_0 – t_1 and t_1 – t_2 become two contemporaneous processes, as it can be seen by shifting t_1 – t_2 under t_0 – t_1 . Then, given that the two processes (periods) are made to coincide and thus to become the same period, a becomes both the output at the end of a certain period and the input at the beginning of the same period, a becomes *at the same time* both the output of a process and the input *of the same process*. In this timeless dimension, a is sold by somebody at its transformed value and bought by somebody else at its not yet transformed value. This, however, is the realm of equilibrium analysis, not Marx’s method.¹⁰ This mistake is illustrated in Figure 7.3.

But the critique does not stop here. Even assuming there is no circularity in Marx’s computation of production prices, that is even assuming a succession of chronological periods, the critics continue, to know the production price of an output we must know the production price of its inputs. But this requires that we know the production price of their inputs, and so on in an infinite regression in time. This is the ‘infinite regression critique’.¹¹ It is clear that if this were sound, it would have to apply not only to Marx’s transformation procedure but to any social phenomenon inasmuch as it is determined by other phenomena, both present and past. Social sciences, then, would become an endless quest for the origin, for the inquiry’s starting point. However, this is not how matters stand. In fact, the choice of the starting point depends upon the scope and purpose of our research.



t_1 t_2

Figure 7.3

Suppose that, following the generally accepted tradition, we wanted to compute the production price of the outputs on the basis of the production price of the inputs.¹² In this case, if we wanted to find the production price of the output *b* at t_2 by adding the average rate of profit to the production price of its inputs, say *a*, it would be perfectly warranted to take the production price of *a* as given. If, for whatever reasons, we wanted to determine the production price of *a* as well, we would have to take the production price of its inputs as given. But, sooner or later, we would have to accept a starting point as given. Infinite regression is a figment of imagination based on a methodological blunder.

7.4 THE TENDENTIAL TRANSFORMATION

Section 3 has argued that Marx’s transformation procedure is free both from circularity and from infinite regression. On the basis of these results, we can now tackle the second aspect of the transformation, the tendential one. This deals, in a nutshell, with the following question: how should the inputs be valued in the computation of the outputs’ production prices? The almost unanimous answer to this question is: the inputs should be valued at their production prices.¹³ Yet, consider Figure 7.2. The input, *a*, has been produced in the t_0 – t_1 period and enters the t_1 – t_2 period. Take the point in time t_1 . Either we refer to the beginning of the period t_1 – t_2 , or to the end of t_0 – t_1 . In this latter case, *a* has a production price as an output of t_0 – t_1 , *not* as an input of t_1 – t_2 . The notion of production price, by implying a (tendential) redistribution of surplus value at the moment of, and through, sale, makes sense only at the end and not at the beginning of a production process. As an output of t_0 – t_1 , *a* can indeed be assessed at its production price. But as an input of t_1 – t_2 , at the beginning of a new production process, *a* has only an individual value which, to repeat, is quantitatively equal to the market price *a* has as an output of t_0 – t_1 . Consider now t_2 . Again, the production price can be computed only on outputs, not on inputs. But at t_2 *a* is not an output, it is an input. It is this value which must be determined. Consider Table 7.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A _I	600+300+300	1200	1250	66.7 + 33.3	2	10	9	90
A _{II}	5000+3000+3000	11000	11100	62.5 + 37.5	1.67	8	80	640
A _{III}	400+300+300	1000	850	57.1 + 42.9	1.33	6	7	42
B _I	700+200+200	1100	1200	77.8 + 22.2	3.5	15	9	135
B _{II}	6000+2200+2200	10400	10400	73.2 + 26.8	2.73	10	82	820
B _{III}	500+200+200	900	800	71.4 + 28.6	2.5	5	7	35
Total		25600	25600					

Table 7.1 Actual values

Table 7.1 is made up of two sectors, each of which is subdivided into three capitals with different levels of productivity (as indicated by the organic compositions of capital within sectors). Column 1 indicates value composition of capital, column 2 the value produced, column 3 the value actually realized (arbitrary figures), column 4 the constant and variable capital as percentages of the capital invested, column 5 the organic composition of capital, column 6 the output per unit of capital invested, column 7 the units of capital invested (1 unit of capital=100 units of value), and column 8 the total output. Capitals A_{II} and B_{II} are *average productivity capitals* (from now on, *APCs*). Let us now assume both capital mobility across sectors and technological competition within sectors. This is shown in Table 7.2.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A_I	562.5 + 337.5 + 337.5	1237	8	9	72	1189	32.1%
A_{II}	5000 + 3000 + 3000	11000	8	80	640	10568	32.1%
A_{III}	437.5 + 262.5 + 262.5	962	8	7	56	925	32.1%
B_I	659 + 241 + 241	1141	10	9	90	1189	32.1%
B_{II}	6000 + 2200 + 2200	10400	10	82	820	10832	32.1%
B_{III}	512 + 188 + 188	888	10	7	70	925	32.1%
Total A+B		25628				25628	

Table 7.2 Tendential values under conditions of both capital movement and technological competition.

Under these conditions, technological competition tends to equalise both the value composition of capital and productivity. That is all capitals within sector A tend to invest 62.5 per cent in constant capital and 37.5 per cent in variable capital (see column 4 in Table 7.1), thus producing 8 units of a per unit of capital; similarly, all capital within B invest tendentially 73.2 per cent in constant capital and 26.8 per cent in variable capital thus producing 10 units of b per unit of capital invested. The movement through which each capital tends to overcome the others (some jumping ahead of the others, some others being overtaken by the more dynamic ones) means that at each point in time all capitals tend towards an average level of productivity.¹⁴ In Table 7.2, column 1 gives the tendential value composition of capital (for example, A_I invests tendentially 62.5 per cent of 900 in constant capital, that is 562.5), column 2 gives the value tendentially produced on the basis of a rate of surplus value equal to 100 per cent, and column 3 gives the tendential output per unit of capital invested. This is the productivity of the average productivity capitals for all capitals. Column 4 gives the units of capital tendentially invested and column 5 gives the tendential output for each capital.

Before explaining the remaining columns, let us compute the average rate of profit. This is $\pi = (6228/19400) = 32.1$ per cent which is tendentially realized by *all* capitals. What will the production price per unit of output be? Let PP_a and PP_b be the two production prices per unit of output. Then, under these conditions, it does not matter on which capital's inputs the production prices are computed. For example,

$$\begin{aligned} PP_a &= (900 + 900 \times 0.321)/72 = (8000 + 8000 \times 0.321)/640 \\ &= (700 + 700 \times 0.321)/56 = 16.51 \end{aligned}$$

Similarly, $PP_b = 13.21$. Column 6 gives the value tendentially realized. This is obtained by multiplying in each sector the tendential price, or unit production price, by the tendential output, given by column 5. For example, A_I realizes tendentially $16.51 \times 72 = 1189$. Column 7 gives the rate of profit tendentially realized. For A_I this is $(1189 - 900)/900 = 32.1$ per cent. This is the same for all capitals.

Two points emerge from Table 7.2. First, technological competition is just as necessary as capital movement for the tendential equalisation of the rates of profit of all capital.¹⁵ Second, all capitals within sectors tend to invest the same proportion of constant and variable capital as the APCs, that is to adopt the same technique, and thus the same productivity, as the APCs. Thus, tendentially, all A's tendentially invest $62.5_C + 32.5_V$ and produce 8 units of output per unit of capital invested, and all B's tendentially invest $73.2_C + 23.8_V$ and produce 10 units of output per unit of capital invested. If all capitals tendentially realize the average rate of profit on the capital tendentially invested, then all A's tendentially realize the average rate of profit on $62.5_C + 37.5_V$ and all B's tendentially realize the average rate of profit on $73.2_C + 26.8_V$. But since this capital is simply the capital actually invested at t_1 redistributed according to the proportions of the APCs, non-APCs tendentially realize the sum of constant and variable capital actually invested at t_1 but in different proportions. Only the APCs tendentially realize both the sum of the capital actually invested and its constant and variable parts as they have been actually invested at t_1 .

In Table 7.2, A_{II} actually invests at t_1 5000_C and 3000_V . And B_{II} actually invests 6000_C and 2200_V at t_1 . Other capitals tendentially invest, and thus tendentially realize, more or less than the constant capital actually invested and more or less than the variable capital actually invested by the APCs. For example, as a comparison between figures 7.4 and 7.5 shows, A_I actually invests 600_C and 300_V at t_1 but tendentially invests and realizes 562.5_C and 337.5_V at t_2 . The value actually invested is equal to the value tendentially realized (900) but the proportion between its constant and variable parts changes. It is in this latter proportion that A_I tendentially realizes 900.

It is because all A's have been reduced to A_{II} and all B's to B_{II} , that the unit production prices, PP_a and PP_b , can be computed on any of the capitals within sectors. But this should not hide the fact that in each sector *the unit production price is the value invested by the APCs divided by their output*. Consider now non-APCs. If commodity prices within sectors tend towards the same unit production price, then not only the surplus value actually produced must tend towards the surplus value which corresponds to the average rate of profit but also the constant and variable capital actually invested must tend towards those tendentially invested, that is towards the constant and variable capital actually invested by the APCs at t_1 . This is also the actual value, or market price, paid by

the APCs at t_1 for their means of production and labour power. Let us call this tendential value the *reproduction price* of the inputs at t_2 . Then, the reproduction price of the inputs at t_2 is the *constant and variable capital actually invested at t_1 by the APCs*. This is also the *market price of the means of production and of labour power bought at (t_1) by the APCs*. It is by multiplying the reproduction price of the inputs by the average rate of profit and by adding to this result the reproduction price of the inputs that the value tendentially realized by the APCs is reached. And it is by dividing this value by the output of the APCs that the unit production prices are computed. It should be stressed that the assumption here is that there is no change in the technological structure between t_1 and t_2 . This assumption will shortly be dropped.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A_I	1237	8	9	72	1237	337	37.5%
A_{II}	11000	8	80	640	11000	3000	37.5%
A_{III}	962	8	7	56	962	262	37.5%
Total A	13200			768a			
B_I	1141	10	9	90	1141	241	26.8%
B_{II}	10400	10	82	820	10400	2200	26.8%
B_{III}	888	10	7	70	888	188	26.8%
Total B	12429			980b			

Table 7.3 Tendential values under conditions of technological competition only

Let us now consider the effects of technological competition (the tendential equalisation of techniques and thus of productivity) while temporarily suspending the effects of capital movements across sectors (the tendential equalisation of the profit rates). This is represented in Table 7.3.

In this table columns 1 through 4 are the same as in Table 7.2. Now, however, there is no equalisation of the profit rates across branches, given that the effects of capital movements are disregarded. However, there is an equalisation both of the profit rates within sectors and of unit prices, given that all productivities are tendentially equalised within sectors. How do we compute tendential prices and average profit rates? The total output in sector A is 768a (see column 4). The total value tendentially created in sector A = 13200, as indicated by column 1. Thus, the average unit price of a is $13200/768 = 17.19$. This is what Marx calls the *market value* of one unit of a , or unit market value. Take now column 5. This is the value tendentially realized which, under these conditions, cannot but be equal to the value produced by each capital. For example, for A_I this value is $17.19 \times 72 = 1237$, and so on. Column 7 is the surplus value tendentially realized. For example, for A_I it is $1237 - 900 = 337$. Column 8 gives the tendential rate of profit, that is $337/900 = 37.5$ per cent. This is the same for all capitals within A. Let us compute now the unit market value for sector B. The average price for one unit of b is $12429/980 = 12.7$. Thus, for B_I , the value tendentially realized is $12.7 \times 90 = 1141$. The tendential profit is $1141 - 900 = 241$. The tendential rate of profit is $241/900 = 26.8$ per cent. Similarly for B_{II} and B_{III} . There is an equalisation of the rates of profit within sectors but not across

sectors. In Table 7.3 too, the reproduction price of the inputs at t_2 is the constant and variable capital invested by the APCs at t_1 .

Let us finally consider the opposite case in which only the effects of capital movements are considered, while temporarily suspending the effects of technological competition. This is shown in Table 7.4.

Consider for a moment Table 7.2 again. If all capitals within sectors tendentially invest in the same technique and thus reach the same level of productivity, they all sell their products at the same price. In Table 7.4, the first 5 columns give the actual value composition of capital, the value actually produced, the actual productivity (units of output per unit of capital invested), the actual units of capital invested, and the actual output, as in Table 7.1 above.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A_I	600 + 300 + 300	1200	10	9	90	1485	585	65%
A_{II}	5000 + 3000 + 3000	11000	8	80	640	10557	2557	31.96%
A_{III}	400 + 300 + 300	1000	6	7	42	693	-7	-1%
B_I	700 + 200 + 200	1100	15	9	135	1822	881	98%
B_{II}	6000 + 2200 + 2200	10400	10	82	820	11066	2620	31.96%
B_{III}	500 + 200 + 200	900	5	7	35	577	-238	-34%
Total		25600				25798		

Table 7.4 Tendential values under conditions of capital movement only

However, given that we abstract from the effects of technological competition, there is no equalisation of productivities and thus of unit prices and of the profit rates within sectors. But, if different capitals within sectors have different levels of productivity (as indicated by the different organic compositions of capital), either they sell their commodities at different prices, that is at prices such that they realize the same rate of profit, or they sell their commodities at the same price and realize different rates of profit. The latter is obviously the case: all commodities of the same type tendentially realize the same value (sell at the same price). Therefore, capitals with different levels of productivity tendentially realize different rates of profit. As Marx remarks

We saw in the course of our argument how market value (and everything that was said about this applies with the necessary limitations also to the price of production) involves a surplus profit for those producing under the best conditions in any particular sphere of production. (Marx 1981:300)¹⁶

This means that above APCs tendentially realize more than the average rate of profit and that the opposite holds for below APCs. How do we compute these different rates of profit? We have seen above, in discussing Table 7.2, that the unit production price is computed by dividing the value actually realized by the APCs at t_2 , which is computed on the basis of the reproduction price of the inputs and the average rate of profit, by their output. Once this unit value is known, we can multiply it by each capital's actual output. The outcome is the value tendentially realized by each capital. In Table 7.4, the average rate of profit is $6200/19400 = 31.96$ per cent. If PP_a and PP_b are the unit production prices,

$$Pp_a = (8000 + 8000 \times 0.3196)/640 = 16.495$$

and

$$Pp_b = (8200 + 8200 \times 0.3196)/820 = 13.196.$$

It is on the basis of these unit production prices that the tendential rates of profit of the above and below APCs are computed. For example, for A_I the value tendentially realized (see column 6) is equal to $16.5 \times 90 = 1485$. By subtracting the value actually invested from this value, we obtain the surplus value tendentially realized, which for A_I is 585 (see column 7). Finally, by dividing this latter value by the value actually invested, we obtain the rate of profit tendentially realized (column 8) which, for A_I , is equal to 65 per cent.¹⁷

Table 7.4 is in line with the type of numerical examples dealt with by Marx in his discussion of the transformation procedure. Marx does not consider Table 7.2 because in it technological competition tendentially changes the organic compositions of capital and thus both the structure of production and the value created. But Marx is interested in the tendential redistribution of the value actually created and not in the tendential redistribution of the value tendentially produced. Therefore, he freezes, as it were, technological change. By so doing, he considers the situation exemplified in Table 7.4. However, it is Table 7.2 which depicts most consistently the tendential aspects of the transformation process.

Up to now we have considered the effects of technological competition on price formation under the assumption that no changes in the average technology, and thus productivity, occur between the beginning and the end of the period under consideration. We can now relax this assumption. Consider Figure 7.4.

In this example there are three categories of producers. Let us, for the sake of simplicity, define a as fixed capital only. Producers I invest a at t_0 which is the whole fixed capital needed to produce b in the two production periods t_0-t_1 and t_1-t_2 . Thus, producers I produce b with a part of a during t_0-t_1 and start again with the remaining part of a at t_1 to produce again b during t_1-t_2 . In period t_0-t_1 producers I are the APCs producing b , while in t_1-t_2 these producers are not the APCs any more because of producers II.

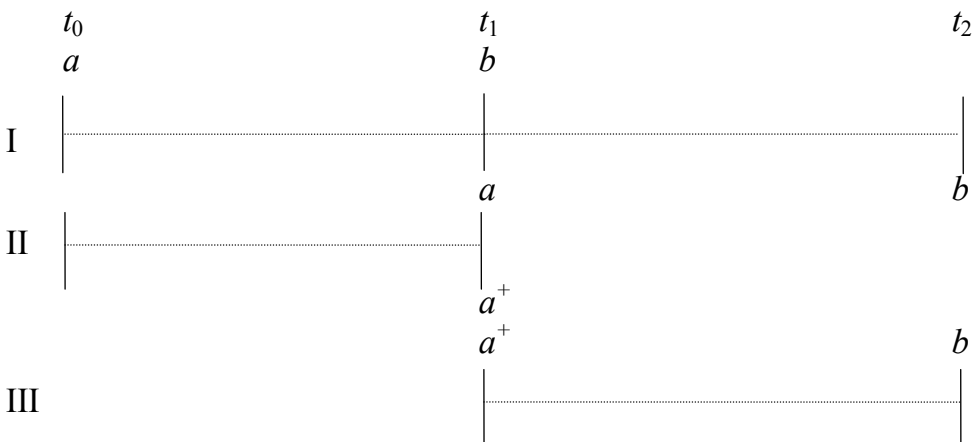


Figure 7.4 Effects of technological competition on value of stocks of fixed capital and on unsold commodities

Producers II produce a new a , or a^* , at t_1 . This becomes the input used by the new APCs, producers III, that is by the competitors of producers I. At t_1 , the stocks of producers I have an individual value equal to the market price paid for them at t_0 and this is the value transferred to b at t_1 . At t_1 producers I tendentially realize the reproduction price of the stock used up during t_0 – t_1 which is equal to the market price they, the APCs, paid for that stock at t_0 . At t_2 , producers I tendentially realize for the rest of that stock its reproduction price at t_2 , which is equal to the market price paid by producers III, the new APCs, at t_1 . A similar reasoning applies to producers I's stock of unsold commodities at t_1 . In Marx's words, the social value of a commodity

is to such an extent relative that when the labour-time required for its *reproduction* changes, its value changes although the labour-time really contained in the commodity has remained unaltered. (1972:129, emphasis added)

For example

The introduction of power looms into England ... probably reduced by one-half the labour required to convert a given quantity of yarn into woven fabric. In order to do this, the English hand-loom weaver in fact needed the same amount of labour-time as before; but the product of his individual hour of labour now only represented half an hour of social labour, and consequently fell to one-half of its former value. (Marx 1976a:129)

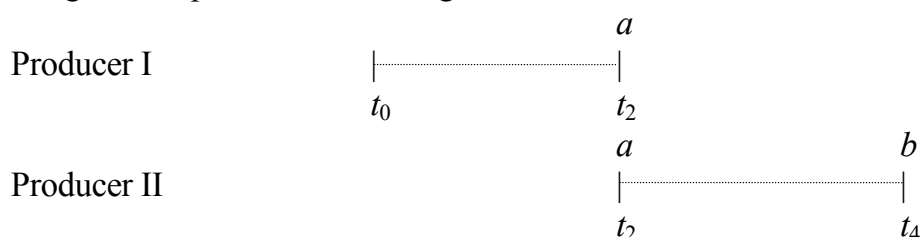
This case is important because it allows us to further specify the notion of reproduction price under realistic conditions, that is, under the assumption of technological change. Given the period t_1 – t_2 and assuming that technological change takes place at t_1 as in Figure 7.4 above, the reproduction price, or value tendentially realized for the inputs at t_2 is the market price paid at t_1 , that is, after technological change, for the means of production and labour power by those capitals which are the APCs at t_2 , that is, the constant and variable capital invested at t_1 by those capitalists which at t_2 are the APCs. If we disregard change in the technological structure between t_1 and t_2 , the *reproduction price* of the inputs, that is their tendential value at t_2 , is quantitatively equal to the *market price which would be paid at t_2 for the means of production and labour power used by those capitals which are the APCs at t_2* . Thus if we had a coefficient transforming money prices into quantities of homogeneous labour hours, we could calculate the value tendentially transferred from the inputs to their outputs, and thus the value tendentially realized by those outputs for having used those inputs (that is the input's reproduction price) by dividing the market price of the inputs which would be used by the APCs at t_2 by that coefficient. Section 5 below will submit a method to compute such a coefficient. Here suffice it to say that there is no question of using simultaneous equations. Such prices are available empirical data which only need to be collected. Moreover, for the computation of the production prices of the outputs in value terms it is not necessary to compute the reproduction prices of the inputs also in value terms. The production prices in

money terms can be computed as in section 4 above. The application of the above-mentioned coefficient to these money prices gives the production prices in value terms.

The inputs are the result of past labour, they are congealed labour, so many hours of past labour which has been needed to produce them. But these hours of labour count for more or less hours if technology changes, if more or less labour time would be needed to produce those inputs at the time of the output's sale. Quantitatively, value is not simply hours of labour used to create a commodity. Rather, given t_0 – t_2 with technological change at t_1 , there is a social valuation of those hours of labour at t_2 . Since this social valuation takes place at t_2 , that is when the outputs in which the inputs are incorporated are sold, there is no need to go further back in time than t_1 to compute the social value of the inputs at t_2 . That is, *the inputs transfer exactly their value to their output only in case of lack of technological change. In the opposite case, part of their value is appropriated by, and thus transferred to, other capitalists' outputs.* At the aggregate level, the principle of the conservation of value is maintained. Since Marx, propaedeutically, examines the transformation process abstracting from changes in the structure of technology, the wrong notion has arisen that the social value of a certain output of the previous period, say a , is always exactly transferred, when it becomes an input in the present period, to its own output in the present period, say b . But this holds only under exceptional circumstances.

It has been repeatedly stressed that the reproduction price is a tendential notion. It should be pointed out that there are in Marx two concepts of tendency, the future and past tendencies (Carchedi 1991:299-303). Present tendencies can be found by examining the real movement and asking the question: what would reality look like *now* if, given the *present movement*, only the tendency were to realize itself? The equalisation of the rates of profit into an average is a present tendency because it answers the question: what would the different rates of profit look like now, given the present actual rates of profit, if only the tendency (that is, the average rate of profit) were to realize itself? If the equalisation of the rates of profit is a present tendency, the other element of the production price, namely the equalisation of technologies within sectors, must also be a present tendency.

Here the question becomes: how much constant and variable capital would all capitals invest now, at t_2 , if only the APCs existed now – at t_2 – given present prices? These are the prices, and thus the values, which would have to be paid by the APCs at t_2 . Let us now consider a different example. Now we have 4 categories of producers, as in Figure 7.5.



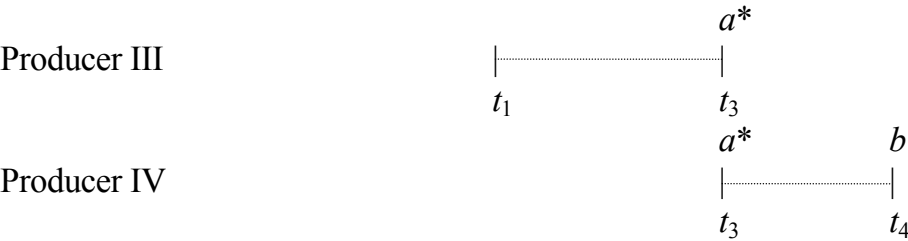


Figure 7.5 Effects of technological competition on value of fixed and circulating capital used up

Producers I produce a during t_0 – t_2 and producers II produce b by using a during t_2 – t_4 . Suppose producers II are the APCs. Then the actual as well as the tendential price paid by producers II at t_2 for a is the market price a has at t_2 . Suppose now that, before producers II complete their production cycle, say at t_3 , a new category of producers, III, becomes the APCs producing a new type of a . Let us call this output a^* . This becomes the new input of b . Suppose that a^* reduces both the length of b ’s production process, from t_2 – t_4 to t_3 – t_4 , and the value of a^* vis-à-vis a . At t_4 , the APCs producing b are category IV. Category II, then, tendentially realizes for its a the value of a^* . The fixed capital which is not realized by category II is realized by category IV. In both figures 7.5 and 7.6 there is a redistribution of value unless the commodities are not sold or the stock of inputs is not used because it has become obsolete. In this case there is destruction of value.

Notice the difference between the notion of reproduction price and that of *replacement price*. The former is meant to explain societal redistribution. The latter reflects the mentality of the individual capitalists. They consider the difference between the market price they paid at t_1 for the inputs and the market price they will have to pay at t_2 for those same inputs in order to restart production as a profit or loss due to the increase or decrease in the market price of those inputs between t_1 and t_2 . For them there is a destruction or a creation of value. But from a societal point of view there is no destruction or creation of value but only a redistribution of value.

The approach submitted here is not only faithful to Marx’s own method but also to reality itself. The alternative, neo-Ricardian, view is based on a mechanical extension to the inputs of what holds for the outputs. This mechanical application, in its turn, is the logical result of an approach based upon, and informed by, the notion of equilibrium in which simultaneous equations are used to calculate (production) prices. The assumption behind the use of simultaneous equations is that the price of a commodity as an input of a production process is determined *contemporaneously* with the price of the *same* (and any other) commodity as an output of the *same* (and any other) production process. This is patently absurd, that is it makes sense only in a timeless dimension. The consequence of accepting this approach is that, once the outputs are valued at their production price, the same must hold for the inputs as well. It is this equilibrium, timeless, and thus unrealistic framework which accounts for the theoretically empty notion of ‘production price of the inputs’.¹⁸ The assessment of

the inputs at their production prices, a notion of neo-Ricardian rather than Marxist matrix, has rooted itself so deeply in the literature that it has acquired the status of a self-evident truth. It is, nevertheless, mistaken.

7.5 FROM MONEY TO LABOUR QUANTITIES

We can now submit a method to compute the quantities of societal labour corresponding to the commodities' money prices. This possibility has repeatedly been questioned.¹⁹ This section will show that these doubts are unfounded. Consider t_1 – t_2 . First of all, we know that

$$\text{TLC}(t_2) = \text{LT}(t_2) + \text{NLC}(t_2) \quad (1)$$

where $\text{TLC}(t_2)$ is the total labour contained in the societal product, $\text{LT}(t_2)$ is the labour transferred from the means of production to the product, and $\text{NLC}(t_2)$ is the new labour contained in the product, all at t_2 . Our strategy is to count $\text{NLC}(t_2)$ first.

This problem can be solved. The hours of new labour contained can be empirically measured. These data could be collected through a special system of national accounting at the point of production. The difficulty here is not theoretical but practical, given that we have no such system at our disposal. But suppose we were given the means to set up such a system. This statistical office would collect data on the total *new* abstract labour expended during the time span t_1 – t_2 by counting the hours of labour needed for the production of the different commodities.²⁰ But this office would not only count the hours of labour, it would also carry out a double reduction. The first is the reduction of more to less intensive labour. To this end, we need a minimum rate of intensity of labour. This can be empirically observed, for example by developing indices of fatigue. People working under these minimum conditions could count as contributing the hours of work actually worked. The hours worked at above minimum intensity would count proportionally as more hours. For example, in an hour of labour of minimum intensity so many calories are consumed. This hour would count as one unit of value while an hour of labour during which twice the average quantity of calories is consumed would count as two units of value.

The second is the reduction of skilled to unskilled labour. This reduction is needed because the new value created depends not only on the length of the working day and on the intensity of labour but also on the value of labour power. Thus, *ceteris paribus*, a skilled labourer produces more value than an unskilled one. The reason why skilled labour power has a higher value than unskilled labour power is that it costs society extra labour (training, education, and so on) to form skilled labourers (the minimum training, education, and so on which characterize unskilled labour power being socially and historically specific). Suppose that, in order to form a skilled labourer, it takes society twice the hours of labour than to form an unskilled labourer. Then, it is as if two unskilled labourers had been formed instead of one skilled labourer. It follows that, as far

as the costs needed to form skilled labour power are concerned, one unskilled labourer's labour power costs one half the costs needed to form a skilled labourer. The value of the former is half that of the latter and thus the former produces half the value produced by the latter. But how much more value does a skilled labourer produce than an unskilled one? The answer is not found in reduction coefficients computed on the basis of simultaneous equations.²¹ Rather, *wages* are the reduction coefficients. To see this, consider Figure 7.2 again.

Sector A produces commodity *a* during t_0-t_1 and sector B produces commodity *b* during t_1-t_2 by using *a*. At t_1 *a* is bought by the producer of *b* for a certain money market price. Given that there is a quantitative correspondence between the quantity of money in circulation at t_1 and the value (that is society's labour) contained in (and realized through the sale of) the total output also at t_1 , the money market price paid at t_1 for *a* (the inputs of *b*), corresponds to a certain value (a share of society's labour) and this is the value with which those outputs enter as inputs the t_1-t_2 period. This is the individual value of the inputs at t_1 , which is quantitatively equal to the market price paid for them at t_1 as outputs of t_0-t_1 . This *in aggregate* is also both the value transferred from the means of production to the product and the value (re)created by labour power during t_1-t_2 .²² If the market price of labour power at t_1 is also its individual value as an input of t_1-t_2 , at the beginning of the period in question, t_1 , so much societal labour has been adjudicated to that category of wage earners by paying them that wage level. Consequently, each hour of unskilled labour (paid the minimum wage) could count as one unit of value and each hour of skilled labour (paid a higher wage) would count as a proportionally higher quantity of units of value.²³

This holds for categories of jobs, and thus for long term, moving, averages. Within each category it is always possible that some individuals might be paid more or less than the category's wage level. In this case, those individuals produce the same quantity of (new) value as if they were paid the average level, the only difference being that the value paid for, and the value of, labour power do not coincide any longer and that those individuals are subject to a different rate of surplus value.

Two objections could be raised against this approach. First, it could be objected that some category's wage might not reflect the societal labour actually needed to form that labour power. Rather, it might reflect more or less favourable power relations for that category or movements in the demand and supply of labour power at t_1 . But this is immaterial for our purposes. Consider the period t_1-t_2 . At t_1 it does not matter how the value with which that labour power enters t_1-t_2 has been formed. Any changes which affect categories of wages during t_0-t_1 affect the value of labour power entering t_1-t_2 because that is the social valuation of that labour power at t_1 , irrespective of whether that evaluation is technologically, politically, or otherwise determined. It is the wage paid at t_1 which determines the value of labour power entering t_1-t_2 .²⁴

From this angle, wage differentials among categories of labourers reflect not only different levels of skill but also a number of other factors influencing the value paid for labour power at t_1 , which is the value actually realized by labour power at t_1 and which at the same time also is the value at which that labour power enters the t_1 – t_2 period. If society decides to pay that much for a category of labour power for whatever reasons, that is the value labour power has when it enters the production process. In other words, it is impossible, but also unnecessary, to separate the effects skill differentials on the one hand and other factors on the other hand have on the value of labour power, and thus on the wages paid for it at t_1 . This hypothesis is consonant with the notion of the value of labour power being made up of two components, a physiological and a ‘moral’, that is socially determined one. The latter component, in its turn, is influenced by levels of skills as well as by other factors.

The second objection holds that the determination of the value of labour power by using wages as reduction coefficients implies circular reasoning. In fact, it is held, wages are determined according to the value of labour power but the value of labour power is determined according to the level of wages. The answer to this objection is not difficult to find. First of all, wages do not determine the value of labour power, they only measure it. Secondly, building upon our discussion of the transformation procedure, we know that we can take wages at t_1 as given. Then, labour power enters t_1 as an input with a value as measured by the level of wages. This value is what contributes to the creation of the value of the commodities at t_2 , including wage goods. At t_2 , the value of wage goods as outputs of t_1 – t_2 , in its turn, is what codetermines the value of labour power as an input of t_2 – t_3 . This latter is measured by the level of wages at t_2 . The cycle begins anew.

Thus, the production of new value during one hour of labour is a variable which depends on both the value of labour power entering t_1 – t_2 , as indicated by the different average wages paid to the different categories of labourers performing different types of labour, and the intensity of labour during t_1 – t_2 , as observed by the special statistical system. By summing the results of both types of reduction (from above minimum to minimum intensity labour and from skilled to unskilled labour), we would know the hours of *new homogeneous* abstract labour contained in all the commodities produced in the time interval t_1 – t_2 . The new hours of labour contained in the products are thus arrived at through a socially determined evaluation of labour hours actually worked. Value is both qualitatively and quantitatively a socially determined concept. Qualitatively, because it is labour carried out under socially specific production relations. Quantitatively because the quantification of both the minimum skills and the minimum intensity as well as the deviations from these minima are socially determined quantities. New value (and thus also the dead labour transferred to the next period) is not simply new hours of labour: it is also their social valuation.²⁵

Having measured $NLC(t_2)$, we can now proceed to estimate $TLC(t_2)$ as follows. Call $M(t_2)$ the total quantity of money in circulation²⁶ at t_2 and $MWP(t_2)$ money wages (of productive workers) and profits at t_2 , that is the money representation of the new homogeneous labour added in the course of t_1-t_2 . Then,

$$M(t_2) = \alpha(t_2)MWP(t_2) \quad (2)$$

where α is a proportion. Since in (2) both $M(t_2)$ and $MWP(t_2)$ are empirically known, $\alpha(t_2)$ can be derived.

The transformation procedure is based on the implicit assumption that all commodities are sold, that is that all value contained in them is also realized, so that the total value contained in the commodities produced during t_1-t_2 is equivalent to the total quantity of money in circulation at t_2 . That is,

$$M(t_2) \equiv TLC(t_2) \quad (3)$$

Given (3), the proportion between total quantity of money in circulation on the one hand and money wages and salaries on the other, that is $\alpha(t_2)$ in (2) above, is equal to the proportion between total labour contained and new labour contained. Then,

$$TLC(t_2) = \alpha(t_2)NLC(t_2) \quad (4)$$

Since in (4) both $\alpha(t_2)$ and $NLC(t_2)$ are known, $TLC(t_2)$ is known too. We can now rewrite (3) as follows

$$M(t_2) \equiv \beta(t_2)TLC(t_2) \quad (5)$$

from which we obtain $\beta(t_2)$, the coefficient which gives us the number of homogeneous labour hours corresponding to a certain quantity of money, or the quantity of money expressing one hour of homogeneous labour at t_2 . This means that *Marx's numerical examples can be interpreted both in terms of labour and in terms of money*. Let us then compute the labour contained in, actually realized by, and tendentially realized by, a commodity.

Take an output b at t_2 whose input, a , has been bought at t_1 . Its market price is $MP_b(t_2)$ and the *labour actually realized* through the sale of b at t_2 , or $LAR_b(t_2)$, is

$$LAR_b(t_2) = MP_b(t_2)/\beta(t_2) \quad (6)$$

If $LC_b(t_2)$ is the labour contained in b , $NLC_b(t_2)$ is the new labour contained in b , and $LT_b(t_2)$ is the labour transferred to b from a , all at t_2 , then the *labour contained* in b at t_2 is

$$LC_b(t_2) = NLC_b(t_2) + LT_b(t_2) \quad (7)$$

$NLC_b(t_2)$ is known from the system of national accounts after the two above mentioned reductions have been carried out. $LT_b(t_2)$ can be computed by calculating the wear and tear of a in money terms (a task which could be carried out by the special system of national accounts) and by dividing it by $\beta(t_2)$. More specifically, suppose a lasts two periods, t_0-t_1 and t_1-t_2 and depreciates by 50 per cent in each period. It thus transfers 50 per cent of its value to the product during each period. In case of no technological change, at t_1 the coefficient $\beta(t_1)$ is

applied to the market price paid for a at t_0 . At t_2 the coefficient $\beta(t_2)$ is also applied to the market price paid for a at t_0 . But suppose that, because of technological competition, the price of a falls in the second period. Then the value transferred remains the same while the value realized falls.

Notice that we use the coefficient β at t_2 to assess the labour transferred, something which not only disposes of the ‘backwards ad infinitum critique’ but also makes the assessment of the value transferred dependent upon the social evaluation of the new labour performed during t_1 – t_2 as well as upon the capital invested at t_1 (or at t_0 in case of unused capital stocks). What is important for the understanding of the system is not how much labour has been spent in the past centuries to produce these means of production, but their social valuation at the moment of assessment.

Finally, the *labour tendentially realized* by b at t_2 , or $LTR_b(t_2)$ is given by dividing the price of production of b at t_2 in money terms, or $PP_b(t_2)$, as computed in section 4, page 14 by $\beta(t_2)$; that is,

$$LTR_b(t_2) = PP_b(t_2)/\beta(t_2) \quad (8)$$

This is the unit price of production of b in labour terms. The practical difficulties met by actual computations of value in terms of labour would not be small. They would be compounded if we wanted to set up an international system of data collection (the only proper procedure). We need not elaborate on this point further because we are not arguing for the actual setting up of such a system. For us, it is sufficient to have shown that such computations are possible given that our aim is to discard definitely all notions of value which sever, either quantitatively or qualitatively, value from labour. *Value is labour*, abstract labour carried out under capitalist production relations and transforming, as concrete labour, existing use values into new use values. Money is the necessary manifestation of value but it is not value, unless it is commodity money.

If *unequal exchange* is defined as the appropriation of labour through the price forming mechanism, that is as the difference between the labour contained and the labour realized, then the unequal exchange inherent in the sale/purchase of b can be either the actual unequal exchange, that is the labour that has actually been realized through the sale of b less the labour contained in it, or the tendential unequal exchange, that is the labour which would tendentially be realized through the sale of b less the labour contained in it. The former is given by equation (6) minus equation (7) and the latter is given by equation (8) minus equation (7).

A consistent development of Marx’s transformation procedure not only wards off groundless critiques but also, by corresponding to the real movement of production and distribution periods, makes of that procedure the centrepiece of a realistic depiction of price formation.

7.6 CONCLUSIONS

The method submitted in this chapter can be characterized as dialectical, chronological, dynamic and realistic. *Dialectical* because it analyses the transformation of individual values into actual social values and vice versa as well as, at each point in time, of actual social values into tendential ones. *Chronological* because it examines the succession of production and distribution processes. *Realistic* because it theorizes real social processes, that is because it abstracts from reality the elements it needs for its analysis rather than negating reality. It is because of its dialectical, chronological, and realistic nature that the present approach is *dynamic*. And it is because of this that this method is the antithesis of both the neo-Ricardian and the neoclassical methods. Two important consequences follow from the above.

First, it should be stressed that this method is based on real, or chronological, time rather than on 'logical time'. 'Logical time' is time without time, a self-annihilating proposition. This is the neo-Ricardian theoretical terrain which, unfortunately, has been taken over by those critics of neo-Ricardianism who subscribe to the 'iterative' approach. Logical time can be usefully employed in order to deliver an internal critique of neo-Ricardianism but is an obstacle to the development of a realistic picture of the process of price formation. Price formation should be understood as a chronological sequence of production and distribution periods. Reality is not, and therefore cannot be understood as, a computational approximation of market prices to an unchanged production price (the method followed by the iterative approach) but rather, as far as the tendential transformation is concerned, it is a real movement of market prices towards an ever changing average of themselves, the production prices. It follows that market prices emerge as already tending towards production prices. The transformation of 'values into prices', that is price formation, either reflects this real movement or becomes irrelevant to understand reality.²⁷

Second, it has been mentioned that, under the conditions exemplified in Table 7.4, only the APCs tendentially realize the average rate of profit as well as the constant and variable capital actually invested. Higher or lower than APCs tendentially realize more or less than that average. Carchedi (1991, Chapter 3) shows that, while all APCs realize the average rate of profit, not all APCs also realize the surplus value they have actually produced. This is the case only for those APCs which also have an average organic composition of capital. This explains why Marx in *Capital* I breaks down the value of a commodity in constant capital plus variable capital plus the surplus value produced, or

$$V = C + V + S \quad (1)$$

This is both the value contained and the value realized. In fact, this is a representative commodity and thus operates under average conditions of productivity. Moreover, as mentioned above, technological change is temporarily

disregarded. It follows from the discussion above that the value contained in the means of production at t_1 is exactly realized at t_2 . The same holds for the new value created and corresponding to the value paid at t_1 for labour power. Finally, this capital, by operating under average conditions of productivity and of average organic composition, realizes exactly the surplus value actually produced. There is thus no difference between the value contained in, and the value realized by, that commodity. Relation (1) is usually seen as 'the' law of value operating in *Capital* I, supposedly modified, negated, and so on when Marx examines the formation of production prices in *Capital* III. But this is not the case. Relation (1) refers to the simplest case of a real process since Marx wants to disregard discrepancies between value contained and value realized in order to focus on the process of value transfer and production. This case, however, is the end result of a process of analysis of real price formation in *Capital* III which, for reasons of exposition, is presented as the starting point of the exposition of that analysis in *Capital* I.

To conclude, the interpretation submitted here goes further than vindicating Marx's method, the correctness of his transformation procedure, and the dynamism of the price theory of which that procedure is a centrepiece. It also rejects the equilibrium approach within which the great majority of Marx's commentators have framed the discussion. Equilibrium analysis is based on the hypothesis that individuals act rationally, that is that they aim to maximize their utility. But since any behaviour can be 'explained' by referring to utility maximization, this principle explains everything and nothing. All it says is that people do what they do because they want to do it (see further G. Carchedi, *Non-Equilibrium Market Prices* in this volume). In equilibrium analysis, the place where individuals express this rationality is the market and the result of each individual's utility maximization is the best possible allocation of people and means of production and thus a tendency towards equilibrium. But if the principle upon which the notion of equilibrium is theoretically empty, the same applies to the notion itself. And, in fact, a simple observation of reality shows that there is no reason to assume that the capitalist economy tends towards equilibrium, as recurrent economic and social crises show.

This means that the market loses not only its economic function of ensuring equilibrium; it also loses its social function of keeping the economy, and more generally, society together. It becomes then impossible to keep arguing that society is the summation of individual monads, each striving to maximize his or her own utility and kept together by a (non-existent) equilibrium. Society is kept together not by equilibrium but by social relations, by relations among people which reproduce themselves independently of which specific individual become carriers of those relations.²⁸ In the functioning and reproduction of these relations, that is of the social structure, the notion of equilibrium has no place whatsoever. It is only by throwing overboard this ideological constraint that we can hope to comprehend the dynamism of the process of price formation and of the

transformation process which lies at its heart. What economics most needs is to free itself from this most powerful, yet most deceiving, myth.

NOTES

- ¹ This chapter was developed from G. Carchedi and W. de Haan *From Reproduction Values to Production Prices*, Research Memorandum 9311, Faculty of Economics and Econometrics, University of Amsterdam, 1994.
- ² The terms individual value and social value refer respectively to the point in time before and after realization. In a different sense, they are both social, in that both of them are products of human labour performed under specific social relations of production.
- ³ Even if they are tendential, production prices are real, in the sense that they represent a real movement. They are tendencies which do not realize themselves, unless by chance. This corresponds to one of the principles of dialectical analysis according to which reality is made up of both what has actually realized itself and what is potentially present (see Carchedi 1991, Appendix). The neo-Ricardian critique, however, ascribes to Marx the notion that both the production and the market prices are actually realized entities.
- ⁴ In this paper the constant and variable capital are taken in percentage terms (unless differently stated) so that production prices are found by adding the average rate of profit to these percentage values.
- ⁵ For example, in terms of Table 7.2, if sector A produces means of production, the value of the means of production bought by both sectors is $562.5 + 5000 + 437.5 + 659 + 6000 + 512 = 13171$ while the value at which the same means of production are sold, after the equalisation of the rates of profit, is $1189 + 10568 + 925 = 12682$. This quantitative discrepancy, the critics hold, is due to the fact that the same means of production appear as inputs at their not yet transformed value and as outputs at their transformed value.
- ⁶ See also Giussani (1991), Kliman and McGlone (1988), Freeman (1984) and (1992a) and Ohno (1993 especially p169). For a review of the literature, see Carchedi (1991, Chapter 3).
- ⁷ Thus, the individual value is the value contained in a commodity *before realization* through sale, *not* the unit value of a commodity after realization; that is, not the market price or the production price of a unit of output.
- ⁸ Notice the terminology. Individual values are potential social values and social values are realized individual values. Social values are either actual social values (market prices) or tendential social values (production prices).
- ⁹ This means that production prices are *not* equilibrium prices. See Carchedi in this volume.
- ¹⁰ For a more detailed discussion of these issues see Carchedi (1991, Chapter 3, pp90-98). This paper should be seen as an improvement of sections 3.7.1 and 3.7.4.
- ¹¹ The classical statement of the infinite regression critique has been provided by J. Robinson (1977:365). Sraffa's attempt to escape infinite regression; that is, the reduction to dated quantities of labour (Sraffa 1960:34), is criticized in Carchedi (1991, Chapter 3). Here it is sufficient to mention that, even if Sraffa's method did find smaller and smaller physical residues; that is, greater and greater labour contents, of the means of production, these quantities would be the summation of the number of hours actually worked from the beginning of mankind to the present to produce the means of production of the period under consideration. This procedure disregards the issue of the heterogeneity of labour (see section 5 below). But, even more importantly, if it really counted, as Sraffa maintains, larger and larger quantities of labour, it would count quantities which are irrelevant to explain the way capitalism works. As we shall argue, for this purpose we need the reproduction prices of the inputs at the time the outputs (in which the inputs are incorporated) are sold.
- ¹² Notice that here we are merely assessing the logic of the infinite regression critique on the basis of the assumption that the inputs should be valued at their production price. The next section will argue that the evaluation of the inputs at their production prices is a wrong procedure. In computing the output's production price, the inputs should be valued at their reproduction price.
- ¹³ Carchedi (1991:94, 97) refers both to production and to reproduction prices of inputs and thus is basically not free from this mistake.

- ¹⁴ Marx refers to the mode; that is, to a situation in which the bulk of the products is produced by the modal capitals. It is also possible that no capital or no category of capitals is the modal one. In this case we should presuppose a different type of average, the mean. In this article we shall refer to the mode, but what said below applies equally well to the mean. See Carchedi (1991, Chapters 3 and 7).
- ¹⁵ The fact that almost all participants in the ‘transformation debate’ theorize the transformation of ‘values into prices’ disregarding technological competition and thus different levels of technology within sectors, further obstructs understanding the dynamic nature of the transformation process and thus, as we shall see, theorizing the tendential value of the inputs as their tendential (reproduction) prices rather than as their production prices. The absence of technological change is almost universally believed to be a feature of Marxian production prices while, as Naples (1993) stresses, it is a feature of neo-Ricardian models. Table 7.2 can be reduced to an example in which sector A invests $62.5_C + 37.5_V$ and sector B invests $73.2_C + 26.8_V$. These are two representative capitals investing one unit of capital each. But this depicts the tendential point towards which technological competition pushes the different capitals rather than portraying a situation without technological competition.
- ¹⁶ The fact that for Marx the market value implies higher and lower than average rates of profit for above and below APCs (contrary to Table 7.3) indicates that Marx considers price forming; that is, the formation of market values, under the hypothesis of the actual, rather than of the tendential, technological structure (as in Table 7.3). The case referred to by Marx can be exemplified as follows

	(1)	(2)	(3)	(4)	(5)	(6)
A_I	900	1200	90	1539	639	71%
A_{II}	8000	11000	640	10944	2944	39%
A_{III}	700	1000	42	718	18	2%
Total A		13200	772a	13200		
B_I	900	1100	135	1691	791	88%
B_{II}	8200	10400	820	10270	2070	25%
B_{III}	700	900	35	439	-261	-37%
Total B		12400	990b	12400		

where column 1 gives the capital actually invested, column 2 the value actually produced, column 3 the actual output, column 4 the value tendentially realized, column 5 the surplus value tendentially realized, and column 6 the tendential rates of profit. Columns 1, 2, and 3 are the same as in Table 7.1. Column 4 is derived by first computing the unit market values. That is, if MV_a and MV_b are the two unit market values, $MV_a = 13200/772a = 17.1$ and $MV_b = 12400/990b = 12.525$. Then Column 4 is derived by multiplying MV_a and MV_b by the figures in column 3. Column 5 is derived by subtracting column 1 from column 4 and column 6 is derived by dividing column 5 by column 1.

- ¹⁷ The total of column 6 in Table 7.4 (that is, 25798) is more than the total of column 2; that is, 25600. Or, the value tendentially realized is different from the value actually produced. This is impossible, given that redistribution neither creates nor destroys value. Then, either we assume that the necessary value can come from other sectors of the economy or not. In the latter case, all prices will have to fall. In case they fall proportionally, we apply a distributional ratio = $25600/25798 = 0.9923$. By applying this ratio to all figures in column 6 of Table 4, we obtain the total of 25600. See Carchedi (1991, Chapter 3) for further details.

The economic reality behind the application of the distributional ratio is the fact that the production price depends not only on the structure of production but also on the structure of demand. In fact, for all the rates of profit to be equalised, the structure of demand must be such that (1) all commodities are sold (2) at a price at which all APCs realize the average rate of profit. If demand, that is purchasing power, is insufficient, the APCs do realize the average rate of profit, only a lower one.

The production price is the socially necessary labour time. The notion that this latter depends also on the structure of demand is contrary to the commonly held opinion (see, for example, Meek 1973:179) that the socially necessary labour time depends only on the structure of production, and to what Indart seems to submit (1990:732); that is, that the socially necessary labour time depends on demand only in case technological competition within branches is disregarded.

- ¹⁸ This is in line with the following somewhat convoluted passage: ‘As the price of production of a commodity can diverge from its value, so the cost price of a commodity, in which the price of production of other commodities is involved, can also stand above or below the portion of its total value that is formed by the value of the means of production going into it’ (Marx 1981:265). In other

words, given that a 's price of production may differ from its individual value, the possibility exists that a might enter b 's production process and thus production price at its (that is, a 's) production price rather than at its individual value. Then, clearly, the cost price of b can be higher or lower than the individual value of a . This quotation has been taken out of context.

Marx is not arguing for the assessment of the means of production at their *production price as inputs of the present period*. Rather, Marx wants to point out that the difference between a 's individual value, before sale at t_1 , and production price (after sale) is 'immaterial' for the point he wants to make; that is, that as far as *this* period is concerned, 'the cost price of a commodity refers only to the quantity of paid labour contained in it, while its value refers to all paid and unpaid labour contained in it' (Marx 1981:265).

Even authors radically breaking with the equilibrium approach, such as Kliman and McGlone (1988), with whom we are in general agreement, submit numerical examples in which production prices are computed on the production prices of the inputs. However, they do not see these examples as attempts at describing a real movement of price formation. See the stimulating discussion with Naples (1993) and Kliman (1993).

¹⁹ See, for example, 'political economy failed to produce a convincing demonstration that the value of commodities could be measured in terms of socially necessary labour time' (Holton 1992:114-115).

²⁰ The objection that one can only count hours of concrete labour simply does not hold. The fact that hours of labour spent performing different types of concrete labour can be *quantitatively compared* shows that it is abstract labour that is counted.

²¹ For the original critique, see Böhm-Bawerk (1984). For a sample of 'solutions' along these lines, see Roncaglia (1974) and Rowthorn (1974a). See also Itoh (1987) and Devine (1989). Lack of space prevents us from comparing our approach to that of these authors.

²² This view, by the way, accounts for the reason why skilled labourers are paid higher wages years after those skills have been acquired. This is not to be sought in the higher costs to society in the past. Rather, the reason must be sought in the present reproduction prices of skilled labour power.

²³ Cases of individual labourers whose superior skills are due to innate abilities, rather than to extra training and the like, are an example of how natural differences are translated, under capitalism, into social inequality. This case is similar to that of the forces of nature which when 'appropriated to productive processes ... cost nothing' (Marx 1976a:508) to, and 'perform gratuitous service' (*ibid*:510) for, capital. Innate abilities too do their work gratuitously for capitalist society. In both cases the individual capitals produce more use values and thus *appropriate* more exchange value. Compare this approach to that of Meek (1973:173) for whom, in case of industries employing higher than average proportions of labourers with innate higher abilities, the labour theory could be applied 'only *at the margin*'.

²⁴ Under the assumption that at t_1 all value produced is realized, if at t_1 a higher (lower) value is paid for means of production and this is compensated by a contrary movement in the value paid for some other means of production, the total value transferred during t_1-t_2 does not change. Likewise for compensating movements in the value paid for categories of labour power: total new value produced during t_1-t_2 remains the same. However, a higher (lower) value paid for some means of production and compensated by a lower (higher) value paid for labour power does affect the new value produced during t_1-t_2 . Thus, in this latter case, distribution at t_1 does not affect the value produced during t_0-t_1 but it does affect the total value produced during t_1-t_2 and realized at t_2 . Similarly, distribution at t_2 does not affect the total value produced during t_1-t_2 and realized at t_2 . Rather, it affects the total value produced during t_2-t_3 and realized at t_3 . That the value of labour power is determined by factors other than the level of skills is consonant with the notion of actual (as opposed to tendential) socially necessary labour time. As seen above, this is determined both by technological factors and by the discrepancies between demand and supply (showing too little or too much time has been spent on a commodity). Instead of present wages, an average of past values could be used to offset incidental wage movements.

²⁵ This approach differs both from neo-Ricardianism, where no social weight is applied to labour hours, and from the 'value form' approach which severs all links between value and labour thus reducing value simply to its social manifestation, money.

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- ²⁶ Even though our analysis can accommodate both commodity money and non-convertible paper money, we assume the latter. We also disregard the velocity of money.
- ²⁷ The expression ‘market prices fluctuate around production prices’ or ‘market prices tend towards production prices’ could be interpreted as if market prices fluctuated around, or tended towards, pre-existing production prices. But this is not what is meant here. As soon as they emerge, market prices are pushed towards production prices by technological competition and capital movements. Thus, logically, market prices exist before production prices. The latter exist only because and inasmuch as market prices tend towards an average of themselves. Chronologically both categories of prices exist contemporaneously.
- ²⁸ This is discussed in Carchedi, G. *Determination, Individuality, and Structure in Marx*, unpublished paper.

8 Non-equilibrium market prices

Guglielmo Carchedi

8.1 INTRODUCTION

It is usually assumed, in the ongoing research on the transformation of values into prices, that such a process concerns the transformation of (individual) values into prices of production, that is tendential prices. It is on this level of abstraction that Marx's procedure has been criticized. This is the transformation debate around the so-called transformation problem. Recently, a growing literature has shown that the two major critiques, the circularity critique and the infinite regression critique, rest on errors of method and that Marx's transformation procedure is immune from these critiques.¹ This is the perspective of this chapter as well. However, contrary to the common conviction, the Marxian theory of prices also includes the formation of market prices. This theoretical step has been usually disregarded probably because of the belief that, if production prices are properly theorized, the formation of market prices presents no theoretical difficulties, these prices being simply the result of fluctuations around production prices. One of the claims of this work is that this simplicity is only apparent.

In the real process of price formation, production prices (tendential prices) do not realize themselves. Only market prices are actual prices, that is realized prices. Or, the real process of price formation is not a two stage process, the first stage being the transformation of individual values into, and their realization as, production prices and the second being the transformation of production prices into, and their realization as, market prices. Rather, individual values are *directly* transformed into, and realize themselves as, market prices, that is as actually realized social values. These latter, in their turn, tend towards production prices without ever reaching them. While this movement, the tendential transformation, has been theorized in G. Carchedi and W. de Haan in this book, the present chapter will analyze the process of market prices formation, or the actual transformation.

First, however, a necessary preliminary step must be taken. Given that production prices are averages computed on the basis of market prices, the latter can be seen as fluctuations around the former.² But then the following question arises. Given that neoclassical economics has a theory of actual prices as fluctuations around equilibrium prices due to discrepancies between demand and supply, that is, that prices are found at the intersection of the demand and supply

curves, could we not graft this theory on the Marxist theory of production prices in order to determine the fluctuations of actual prices around tendential prices? The first task is to answer this question.

8.2 PARTIAL EQUILIBRIUM PRICE THEORY: A METHODOLOGICAL CRITIQUE

Neoclassical economics is a variegated body of knowledge which only reluctantly lends itself to an all-encompassing definition. For the purposes of this paper, I shall identify it with that type of economics which rests upon the assumptions (1) that the basic unit of analysis is the individual and more specifically an ahistorical individual in her or his unique specificity, (2) that this individual is equipped with some kind of inborn ahistorical rationality, and (3) that the free exercise of the individual's rational behaviour results in the economy tending towards equilibrium. Here, I shall disregard the question as to whether those authors who do not share all three postulates should be regarded as neoclassical economists. Also, I shall consider a specific version of neoclassical price theory, that which is taught to undergraduate students in standard textbooks. It is on the basis of the arguments submitted in this version that neoclassical price theory is usually claimed to be congruent with Marxist price theory.

In section six of Carchedi and de Haan in this volume, it has been mentioned that neoclassical economics is based on a notion of economic rationality as utility maximizing behaviour. Under capitalism, this is assumed to coincide with profit maximizing behaviour. Profit maximization, then, is supposed to be the social form taken by a natural, that is not socially determined and thus necessary, human rationality. Profit maximization becomes a sort of natural impulse and is thus provided with a powerful ideological legitimization.³ However, the explanation of human rational behaviour according to utility maximization can be used to account for any kind of behaviour (both 'rational' and not) and thus comes down to the hardly useful insight that people (for example capitalists) do what they do (for example maximize profits) because that is what they want to do. If one were to assert that people want to do what they do because it is rational for them to do so, rationality would have to be explained in terms of utility maximization which, as just said, can be used to explain any type of behaviour, both 'rational' and not.

To escape this impasse, one could concede that capitalists maximize profits because they are so forced by the capitalist system (and not because they conform to an ahistorical, natural, rationality), but this would immediately destroy the claim that capitalist rationality is simply the social form of natural rationality. This would be an admission that profit maximization is rational in terms of the capitalist system but that this has nothing whatsoever to do with a human, ahistorical, rationality. In short, it is the rationality of the capitalist system in terms of an ahistorical human nature (one of the most powerful claims of

neoclassical economics) which would be called into question. To avoid this conclusion, neoclassical economics must cling to the theoretically empty notion of utility maximization as the rational form of human behaviour. This critique, in itself sufficient to undermine the whole neoclassical edifice, applies also to partial equilibrium price theory. But this theory can also be criticized on more specific grounds, that is on the improper use made by neoclassical economics of the *ceteris paribus* condition.

In neoclassical economics, the shape of the demand and supply curves is built on the basis of the *ceteris paribus* condition. But this is untenable both in terms of how individuals behave and in terms of how the economy works. Consider first an individual's demand and supply curves. People do not react to a variation in a certain price by assuming the *ceteris paribus* condition. Rather, they react by taking into account the highest possible number of variables influencing their decisions, like price changes in other goods, forecast future income, employment, and so on. For example, given a fall in the price of a certain commodity, the consumer's question as to what to do with the extra disposable income is dealt with not by assuming that (the price of) everything else remains constant but by examining various alternative expenditure patterns, one of which might be to increase the purchase of (only) that commodity. As for supply, suffice it to mention that on one of the most important markets, the labour market, people do not react to wage changes as indicated by the demand and supply curves. If wages increase, people might very well not increase their supply of labour. Rather, they either keep working the same hours or choose more leisure time. To higher wages there correspond either the same or a decreased supply of labour.

Consider now how the aggregate works. D_a , the demand for commodity a , is not only affected by a change in p_a , the price of that commodity. D_a is also modified by changes in the price of other commodities (for example p_b), by income changes and by a host of other factors. Or, $D_a = f(p_a, p_b, Y, \dots)$. Neoclassical economics knows this, and theorizes it in the form of cross elasticity of demand and income elasticity of demand. It then adds (a) the effects of the changes in a commodity's own price alone upon the quantity demanded of that commodity to (b) the effects of the changes in other commodities' prices alone upon the quantity demanded of that commodity and to (c) the effects of the changes in income alone also upon the quantity demanded of that commodity, and arrives at the determination of changes in D_a due to all these factors. But this procedure not only is not exhaustive of all possible factors affecting demand, it also does not capture the real movement, the *contemporaneous* determination of the demand for a certain commodity by all variables, because it does not eliminate the *ceteris paribus* condition. To add one methodologically wrong step (for example the own elasticity of demand, which is based on the *ceteris paribus* condition) to another methodologically wrong step (for example the cross elasticity of demand, which is also based on the *ceteris paribus* condition) does not correct the inherent methodological fault.

In other words, the superposition of two *ceteris paribus* conditions imply that the same factor (for example a commodity's price) is kept constant (for example under the hypothesis of cross-elasticity of demand). The superposition of two or more *ceteris paribus* conditions amounts to assuming that the same thing both changes and at the same time does not change. It is because of this logical contradiction that this method cannot account for contemporaneous determination.

However, in neoclassical economics the *ceteris paribus* condition cannot be ejected because without it the demand and supply curves cannot be drawn. Neoclassical economics must choose. Either it retains the *ceteris paribus* condition and it can draw the demand and supply curves but then it is unable to theorize the actual movement of demand, supply and prices (that is their contemporaneous determination by a multiplicity of factors); or it can drop the *ceteris paribus* condition in order to reflect the real world but then cannot draw (theorize) the demand and supply curves. If the 'abnormal' influence of p_a on D_a (for example Giffen goods or speculative goods) and of p_a on S_a (for example the backward-bent labour supply curve) as well as the other factors codetermining D_a and S_a are considered in their contemporaneous determination, the neoclassical demand and supply curves become both operationally useless and theoretically indeterminate.

The argument that the demand and supply curves are only ideal types and that abnormal behaviour can be explained as deviations from these ideal types (Walras 1984:71) does not hold water. There is nothing wrong in constructing a model of normal behaviour and then to consider deviations from this norm on condition either that (a) both the normal and the abnormal behaviour can be explained by the same principles or that (b), if two explanatory principles are needed, they are not mutually exclusive. In neoclassical economics, on the other hand, the principle of the contemporaneous determination of demand and supply by a multiplicity of factors excludes the *ceteris paribus* condition and denies the demand and supply curves. One must choose. If one chooses the *ceteris paribus* condition, one cannot choose the principle of simultaneous and contemporaneous reciprocal determination and vice versa. Notice, however, that what just submitted should not be construed as an argument against any use of the *ceteris paribus* condition. It is this specific use which is objectionable. The reason why neoclassical economics holds on to the *ceteris paribus* condition is that this condition is needed to draw the demand and supply curves and that these latter, as we shall see in the next section, are needed to 'show' that the capitalist system is both efficient in production and equitable in distribution.

8.3 PARTIAL EQUILIBRIUM PRICE THEORY: AN IMMANENT CRITIQUE

Neoclassical partial equilibrium price theory first presupposes all possible prices corresponding to all possible quantities demanded and supplied, including that equilibrium price which it wants to find, and then proceeds to ‘determine’, that is select, that pre-given price. Since one assumes what one wants to determine (the equilibrium price), neoclassical partial equilibrium price theory is circular and thus useless as a theory of price formation. The moment it attempts to analyse the formation of the equilibrium price, it falls into circularity. This price is, as all other prices, selected from a range of pre-given prices. Neoclassical economics has at most a theory of price selection, not a theory of price formation. This a consequence of the individualistic methodology upon which neoclassical economics is based. The demand and supply curves are constructed by generalizing the perspective of the individual capitalist⁴ whose demand and supply depends on pre-given prices. Since individuals can only react to pre-given prices and price changes (according to the demand and supply curves model), the aggregation of individual behaviours (that is of the individual demand and supply curves) cannot explain price formation.⁵ Neither the individual nor the collective demand and supply curves can explain the formation of prices, including the equilibrium ones.⁶

The same charge of circularity can be moved to the determination of the demand curve’s shape. The cardinalist, or marginal utility, approach assumes that, given two goods a and b , their marginal utility MU_a and MU_b , and their prices p_a and p_b , the consumer maximizes his/her utility when $MU_a/p_a = MU_b/p_b$. Suppose now that p_a falls. Then, $MU_a/p_a > MU_b/p_b$ and D_a increases. In other words, it is assumed that, if p_a decreases, D_a increases. But what is here assumed, an increase in D_a following a decrease in p_a , is precisely what had to be shown. In the ordinalist, or indifference curves, approach each budget line is associated with an indifference curve tangential to it. Here, the downward slope of the demand curve is implicit in the budget line. Suppose p_a falls. The budget line pivots because, it is assumed, more of a is demanded. But, again, this is what had to be proved. Finally, the same critique holds for the revealed preference theory which is designed to do away with the subjective element implied in the two above mentioned theories and which is based only on the choices actually made by the consumers. Here too it is assumed, rather than shown, that a fall in p_a causes a rise in D_a (and vice versa).⁷

But the determination of the downward sloping demand curve is not only circular, it is also based on a dubious argument: if the quantity consumed increases, consumer satisfaction (marginal utility) decreases and with it demand. This is certainly possible. However, first, this applies at most to people as consumers. The capitalists’ demand for means of production and labour power can in no way be explained on these grounds. In times of economic expansion,

the more the means of production and labour power are consumed, the more they are demanded. In times of economic depression and crises, the opposite is true. Secondly, even in the case of individual consumers, under capitalism an increase of the quantity consumed of a certain good can only be achieved through an increase in the purchasing power allocated to that good. Thus, the lower demand associated with an increase in the quantity consumed can be the result of 'the fact that with increasing purchases the purchasing power at the disposal of the buyer or demander declines' (Linder 1977 Volume II p120) rather than being the result of the lower MU_a . This is certainly the case for the great majority of the world population, the poor of the world.

Neoclassical economics has an alternative option: general equilibrium analysis. Even though the focus here is on partial equilibrium, it can be briefly mentioned that the general equilibrium model is based on a system of equations whose simultaneous solution provides the equilibrium prices. There are many objections which can be raised against general equilibrium analysis. The most important one is that the method of simultaneous equations cancels time. Instead of there being a determination of the prices of the production factors (inputs) at time t_1 and of the prices of the products (outputs) at time t_2 , the prices of the inputs and of the outputs of the *same* production process are determined simultaneously (the same criticisms can be levelled at the neo-Ricardian system of technical production equations). By seeking refuge in general equilibrium analysis, neoclassical economics retreats even more from, rather than rooting itself more deeply into, the real world.⁸ It follows that the quantities demanded and supplied cannot be read on neoclassical curves.⁹

8.4 THE SOCIAL CONTENT OF PARTIAL EQUILIBRIUM PRICE THEORY

If the critique submitted in sections two and three stands, the question which naturally comes to mind is: why are the demand and supply curves and partial equilibrium price theory so unquestionably accepted by economists? A first answer is that students, in their first encounter with economic theory, are not usually exposed to alternative views to, and critiques of, neoclassical economics. By the time economics students have become professional economists, the demand and supply curves have become so firmly entrenched in their perception of reality that even the most damaging critique fails to have any effect. Most of them choose to ignore the critique.

But there also is a second level of explanation: that of the social determination and social content of theories. The social determination of theories is given by their formulating views of social reality functional for the reproduction or supersession of the social system within which those theories have been generated. For any specific theory, the question is then: how has a specific social matrix been transfigured into a theory such that that theory can foster the

reproduction or the supersession of that social matrix? In class divided societies the reproduction or supersession of a social system is the outcome of the conflict between different classes with antagonistic interests. Therefore, the question becomes: how has a specific social matrix been transfigured into a theory such that that theory can foster the contradictory interests of different social groups and classes? This functionality, which a theory has for the reproduction or supersession of the social system within which that theory has been generated, and thus for the domination of one class upon the other, is that theory's social content. It is because it has a social content that a theory can foster the reproduction or supersession of the social (class) system which has generated that theory. Often, the social content of a social theory must be discovered by digging underneath the surface of that theory's apparently 'objective' and 'scientific' interpretation of reality.¹⁰ In the case of the neoclassical partial equilibrium price theory its social content is revealed by at least the following six points.

First, it has been seen above that the demand and supply curves are constructed by generalizing the behaviour of the individual capitalists who react to pre-given price changes. But, in neoclassical economics, the individual capitalist is at the same time the epitome of *the* individual, he *is* the individual. Therefore, the individual pre-supposed by the demand and supply curves, while being the implicit theorization of a socially specific individual, appears as a socially undetermined individual: he can be a capitalist as well as a labourer because the demand and supply curves implicitly assume that the capitalist's behaviour is everybody's rational behaviour. It follows that classes, and thus the production of value and surplus value, are excluded a priori from neoclassical analysis. If classes are excluded, so are class conflicts and ultimately the system's inner contradictions of which class conflicts are the expression. Another way to put this is that production is seen simply as production of use values rather than of value and surplus value embodied in use values. The fundamental insight that commodities are the produce of labour under specific, that is capitalist, conditions is irreparably lost. It becomes then impossible to inquire into 'who labours for whom?' at the level of production, rather than of distribution. The demand and supply curves imply an ideological notion of production, a notion which hides, rather than revealing, the class nature of production and its internal contradictions.

Second, neoclassical economics is not only class blind, it is also sex blind. In 'advanced' capitalist societies, both women and men are seen through sexist lenses: men are deemed to be assertive, egoistic, rational, and so on while women are seen as docile, altruistic, emotional, and so on. These stereotypes, whose obvious economic content is that of reducing the value of women's labour power, influence the socialization, and thus the behaviour, of both men and women from cradle to grave and this, in its turn, contributes to the reproduction of those myths. The rational, self-interest pursuing individual of neoclassical economics, then, is a 'he' in the sense that this is the stereotype man, which capitalist

ideology perceives men to be. The neoclassical image of the individual is supposed to apply equally to all classes as well as to both sexes because it is supposed to focus on what all people have in common, an ahistorical human nature and rationality. In reality, this image is abstracted from both what the capitalists really are and from what men are supposed to be, that is from a socially determined reality (capitalist rationality) and from a socially determined myth (male rationality).

Third, the demand and supply curves imply an ideological notion of exchange. The demand and supply curves presuppose individuals who, given some initial endowments, are free to exchange their goods and services, including 'labour'. But, neither the origin and unequal size of these initial endowments nor the social (in)justice inherent in their original distribution are taken into consideration. This blindness is made possible by the marginalist approach, by the focus on the last unit produced and exchanged, and this is the real, ideological, reason why neoclassical economics must rest on a marginalist approach. Moreover, the individual's freedom to exchange is purely formal. In reality, this freedom does not exist for the great majority of wage and salary earners who must sell their labour power: they are like those who, having been pushed into the sea, are free to swim or 'sink like a stone'.

Fourth, the demand and supply curves elevate the capitalist price system to the role of the most rational and most equitable allocation system. According to neoclassical economics, the prices emerging from the 'free' interaction of demand and supply on the one hand signal consumer needs and, on the other, satisfy those needs through the production of goods up to the point where marginal costs equal marginal revenues, that is where each 'factor of production' gets exactly the same as what it contributes. Society might want to interfere to protect those who cannot pay the 'freely determined' prices, but then it must face a tradeoff between efficiency and equity. Inefficiency and more generally the malfunctioning of the economy (crises, unemployment, and so on) are explained in terms of tampering with the forces of the market. The problem here is both theoretical and practical. Theoretically, prices reflect the most rational allocation of resources *for the capitalists*, that is they are the best indicators of how to make profits, not satisfy human needs. From the point of view of the great majority of the world population living in absolute or relative poverty there is nothing rational in a price system which prices most essential goods beyond the reach of those who do not have the purchasing power to buy them. Practically, if crises, unemployment, and so on are endemic to capitalism (as business cycles show) and if malfunctioning is caused by tampering with the market forces as revealed by the demand and supply curves, then tampering and malfunctioning must be endemic to the system. The demand and supply curves lose relevance as an explanatory tool.

Fifth, the demand and supply curves imply an equilibrating mechanism. Demand and supply gravitate towards a (pre-given) equilibrium price at which

they are equal. At this point the economy comes to rest. If reality tends to stasis, movement is a deviation from rest, from equilibrium. The static state is the economy's (and reality's) natural state.¹¹ But if the system tends towards equilibrium it is inherently harmonious. It follows that equilibrium and harmony are implicitly associated with the *status quo* and that change is associated with chaos and disorder. Of all features of neoclassical economics, this notion is perhaps the most patently at odds with reality. In the face of recurrent crises, financial cracks, unemployment, poverty, and so on in the developed countries, not to mention the underdeveloped ones, one cannot but admire the courage with which neoclassical economists keep claiming with a straight face that equilibrium is the economy's gravitational point and harmony is its essential feature.¹²

Sixth, the demand and supply curves are based on a notion of value as utility. But utility is not an objective quality and, even if it were so, it could not be that element which is common to all commodities and which thus make their exchange possible. In fact, 'Utility is the most abstract, most general notion indicating that each commodity has its own specific use, is useful for something in its own specific way, and not that all commodities share a common type of utility, are useful for the same purpose in the same way. *Utility is thus the most general concept of what makes things different.* As such, it cannot be used to indicate a feature things have in common' (Carchedi 1991:126-7).

Rather, utility is a subjective category. For neoclassical economics, the satisfaction of utility inherent in consumption implies (1) a relation between an individual and a commodity (2) that this commodity is considered simply as a use value and (3) that this use value is considered simply as an object of individual consumption. But here too difficulties loom large for neoclassical economics. In a society in which the superfluous portion of products are exchanged and, even more so, in a society in which products are exclusively made in order to be exchanged, the

commodity possesses for [the owner, and especially for the capitalist – G. C.] no direct use value. Otherwise, he would not bring it to the market. It has use value for others; but for himself its only direct use value is as a bearer of exchange value, and consequently, a means of exchange. (Marx 1976a:179)

It follows that the act of consumption implies (1) a relation between a (group of) person(s) and another (group of) person(s) whose labour has resulted into the object of consumption, in short between two (groups of) people, rather than between an individual and a commodity (2) that this commodity be seen both as a use value and as an exchange value and (3) that this commodity be considered as an object of both individual and of productive consumption.

With regard to productive consumption, the capitalists acquire labour power not to maximize their own utility but to maximize the rate of profit through the maximization of the rate of surplus value (Marx and Engels 1976:409). Similarly, when the capitalists purchase the means of production, they do that not because they want to maximize the utility they get from those means of production but

because they want to maximize their rate of profit through efficiency maximization. It is not denied here that individual consumers might want to maximize the utility they derive from the consumption of certain objects. This, however, cannot explain the demand curve because it refers at most to objects of personal (unproductive) consumption (thus excluding means of production and labour power) and because, even in this latter case, of the circularity inherent in the relation between quantities and prices (see section 3 above).

It follows that utility reveals its social determination in that it mystifies the specific nature of the capitalist production and distribution relations. In fact, utility theory (1) focuses on *unproductive consumption* (that is, on consumption for the consumers own reproduction, rather than on productive consumption, consumption of means of production and of labour power in the production process) (2) in which the objects of consumption are seen exclusively as *use values* (rather than also as products containing a share of the social, abstract labour which must be realized through exchange, in short as exchange values) (3) in which the act of consumption is seen as involving a relation between *persons and objects* (rather than between persons and other persons, since the former consume the product of the latter's labour) (4) in which persons are seen as ahistorical *individuals* (rather than as members of historically specific social groups and classes) and (5) in which the individual's *initial endowments* are unimportant. This latter point is most clearly seen in the case of marginal utility. As mentioned above, by focusing on the margin, initially different endowments and property are rendered irrelevant.

Through this partial and distorted view, utility theory obliterates historically specific social relations (the relations among individuals as representatives of specific social classes) and replaces them with ahistorical and fetishistic relations, relations between individuals and things in a social and historical void. Or, by explaining the 'intercourse of people ... from their material needs and the ways of satisfying them' irrespective of the specific, historical, context, utility theory reveals its real nature: 'a mere apologia for the existing state of affairs' (Marx and Engels 1976:413-4).¹³

To sum up, the social content of partial equilibrium theory is its functionality for the reproduction of the capitalists' system at the ideological level, its theorization of an economic system (1) excluding classes, and thus the production of value and surplus value (2) postulating a mythical, masculine, rationality as the natural form of human rationality (3) assuming equal power in exchange relations based on equal economic endowments (4) operating on the basis of the most rational and equitable price, that is distribution, system (on this point, more in the next section) (5) tending towards equilibrium and (6) reducing specific, that is capitalist, social relations to ahistorical utility relations between individual and things thus misrepresenting the former as 'the' natural form of economic relations.

It follows from this and the previous section that, if demand and supply curves, and the price theory which they symbolize and summarize, imply the above inherent theoretical flaws and socially coloured theoretical frame, the formation of market prices in Marxist economics should not be explained by grafting the neoclassical demand and supply curves onto Marxist price theory. Marxism needs an alternative theory.

8.5 NON-EQUILIBRIUM MARKET PRICES

The critique submitted above does not deny that market prices as well the quantities demanded and supplied might behave as predicted by the demand and supply curves. The point, however, is that they might just as well behave ‘abnormally’ and that both ‘normal’ and ‘abnormal’ behaviour require a different explanation than that provided by neoclassical economics. The discussion above indicates that this alternative explanation should be based on three cardinal points.

First, the relation between demand, supply and market prices should not be theorized on the basis of the *ceteris paribus* condition but on the basis of a total process of change. Suppose that the price of a good reacts ‘normally’ to that good’s demand variations, for example that it increases following a demand increase. The reason for this is not that that price increases because demand has increased under the *ceteris paribus* condition. Rather, the same forces which acted upon the structures of production, of demand and of prices and which increased the demand for that good *as part of a total process of change* at time t_1 cause a further change in those same structures such that at t_2 the price of that good increases, also a part of a total process of change.¹⁴ It is only if we focus on the net effect of a total process of change on the demand for a good at t_1 and on the price of that good at t_2 that we can say that that price increases at t_2 ‘because’ the demand for that good has increased at t_1 . It is this process, excluding by definition the *ceteris paribus* condition, that explains both ‘normal’ and ‘abnormal’ demand behaviour. From this angle there is nothing abnormal about, say, lower real estate prices followed by a falling demand for houses in a period of economic crisis. The same holds for similar changes in supply, demand and prices.

Second, the relation between demand, supply and market prices should be theorized in terms of value rather than of utility. Suppose that, given unchanged conditions of production of a good, its price increases because its demand has increased. The reason for it is that consumers are willing to allocate a greater share of societal value (purchasing power) to that good. This greater demand indicates *a posteriori* that insufficient societal labour has been allocated to the production of that good. That is, that more labour had to be allocated to it. Therefore, the labour contained in it must count as more labour; that is, that commodity realizes more societal labour. It is through the realization of extra

value by that good that the labour contained in it counts as a multiple of itself. Even though higher demand causes the allocation of extra value for the purchase of that good, it is the latter which explains higher prices, not the former.

Third, the relation between demand, supply and market prices should be theorized as market prices converging towards tendential, or production, prices. This means that the allocation of value to the different goods is not arbitrary but tends towards that allocation which allows all commodities to be sold at a price at which all capitals realize the average rate of profit.¹⁵ It is on these three points that an alternative market price theory should be based. Let us begin by defining some basic concepts.

In a capitalist society, *value* is abstract labour which has been performed under capitalist production relations and necessarily taking the form of money.¹⁶ The *structure of production* in a branch is given by the number of capitalist enterprises in that branch, by their size (capital invested), by their level of productivity (as indicated by the organic composition of capital), and by the rate of surplus value. The structure of the economy is given by the structure of all its branches as connected through commodity exchange. Changes in the structure of production are caused by capital mobility across branches, by technological innovations within branches, and by changes in the rate of surplus value. The commodities produced are at the same time physical outputs, that is use values,¹⁷ and (exchange) values. The structure of production determines the individual value of the commodities, that is their value contained. The *structure of supply* is the structure of production seen not as a process but as the result of that process.

If we now consider *demand*, we should distinguish between desire, or demand proper, and purchasing power. Demand is both an element of, and arises from the mutual interaction with, all other elements of a society's culture.¹⁸ The purchasing power with which economic agents enter the present period is the value the capitalists have realized at the end of the previous period through the sale of their products and the value the labourers have realized at the beginning of the present period through the sale of their labour power. The purchasing power allocated in the present period is then given by the expenditures of the capitalists as productive consumers (that is as purchasers of means of production and of labour power) at the beginning of the present period plus the expenditures of the labourers and of the capitalists as unproductive consumers during the length of the present period.¹⁹ Thus, the *individual demand* for a certain commodity is governed by an individual's need for it (both for his/her own individual consumption and for the firm's inputs for the next production process) and by his/her purchasing power, that is both by the willingness to purchase and by the ability to pay for that commodity. A commodity's *social demand* is given by the sum of individual demands and is thus measured by the total purchasing power allocated to it. The *structure of demand* is given by the distribution of a society's total purchasing power among the several commodities, that is by the way the

individual purchasers allocate their purchasing power among the different commodities.

Against this background, we now submit a theory of market prices. Once the *ceteris paribus* condition is dropped, the formation of the market prices of the individual commodities can only be understood within the framework of a general process of formation of all market prices. To this end let us start from the following relations

$$[SS(t_1) \Rightarrow SD(t_1)] \Rightarrow SP(t_1) \quad (1)$$

$$SS(t_2) \Leftarrow SP(t_1) \quad (2)$$

$$[SS(t_2) \Rightarrow SD(t_2)] \Rightarrow SP(t_2) \quad (3)$$

where SS is the structure of supply, SD is the structure of demand, SP is the structure of market prices, \Rightarrow indicates determination, \Leftarrow indicates overdetermination, and t_1 and t_2 stand for different points in time delimiting period t_1 – t_2 . Let us disregard for a moment the symbols \Rightarrow and \Leftarrow and let us consider relation (1) first. This relation indicates that, given a structure of supply at t_1 , the purchasing power redistributed both between capital and labour and among capitalists is allocated to the several commodities due to the structure of demand at time t_1 . At t_1 there emerges a price structure SP(1), due to the interaction between SS(t_1) and SD(t_1). Relations (2) indicates that the structure of prices thus formed modifies the structure of supply at t_2 , given the effect of the price structure of the profitability of the different capitals and thus on their decision to move to different branches, to introduce new technologies, or to attempt to change the rate of surplus value. Value and surplus value are created in period t_1 – t_2 , and this is redistributed at t_2 . Due to the new structure of demand at t_2 a new price structure emerges (relation 3).

To fully understand relations (1), (2) and (3), the notions of determination and of overdetermination must now be briefly explained. In general, to determine means to create the conditions of its own existence (reproduction) or supersession. What \Rightarrow indicates within the square brackets in relations (1) and (3) is that the structure of supply determines the structure of demand in the sense that the latter is the condition for the reproduction of the former, even though in a modified form. In fact, if the products are not demanded and thus sold, production and thus supply cannot restart in the next period. If we now consider the relation between the structure of supply and of demand on the one hand and the structure of prices on the other, the former (that is SS and SD in their relation of determination) determine the latter (that is SP). In other words, all elements determining market prices have been summarized in the structures of supply and demand. These two structures, then, in their relation of determination, are the determinant instances and the structure of market prices is the determined instance in the sense that the structure of market prices is the condition of existence of both structures. In fact, without price formation it would be impossible to sell this period's products and thus to restart production and supply. Without the latter, demand could not emerge again.

These are relations (1) and (3). Consider now relation (2). The notion of determination necessarily implies that of overdetermination. This means that the determined instance (the structure of market prices) reacts upon and modifies the determinant one. In fact, on the basis of these market prices, there arises a hierarchy of rates of profit which cause a change in the structure of production and thus of supply (relation 2). The new cycle begins with this new structure of supply which determines the new structure of demand (relation 3).

Let us now apply relations (1) through (3) to a specific commodity, say a and let us focus on the relation between the supply, the demand and the price of a . Let S_a , D_a , and p_a be respectively the supply of, the demand for, and the market price of a .²⁰ Then,

$$[S_a(t_1), D_a(t_1)] \Rightarrow p_a(t_1) \quad (4)$$

$$S_a(t_2) \Leftarrow p_a(t_1) \quad (5)$$

$$[S_a(t_2), D_a(t_2)] \Rightarrow p_a(t_2) \quad (6)$$

Take relation (4) first. This relation indicates how a change in the structures of production and of demand (including S_a and D_a) determines a change in the structure of prices (including p_a). Relation (4) extracts one aspect of this intricate process of determination: it focuses only on the *net changes* in S_a , D_a and p_a emerging from this process. This means that in relations (4) and (6) the meaning of \Rightarrow changes. It now shows the direction and scope of change in p_a (from $p_a(t_1)$ to $p_a(t_2)$), when (S_a, D_a) have changed (from $S_a(t_1)$ and $D_a(t_1)$ to $S_a(t_2)$ and $D_a(t_2)$) while serving as a reminder that (S_a, D_a) have changed as part of the total change occurring in the determinant instances (the change in the structures of supply and of demand) and p_a has changed as part of the total change in the determined instance (the structure of prices). In other words, S_a and D_a are not the only determinants of p_a (the *ceteris paribus* condition). Rather, they codetermine p_a together with all the other elements of SS, SD and SP. This is why there is no symbol of determination between S_a and D_a in relations (4) and (6). If we focus only on (4) we do not know how the structures of supply and of demand have changed, nor do we know how this change has determined a change in the structure of prices. All we can observe is the net result of a complex process of change, that is a change in S_a , D_a and p_a in which the *ceteris paribus* condition has no role left to play.

Consider next relation (5). This is a limited view of how a change in the structure of prices (including p_a) overdetermines a change in the structure of supply such that at t_2 the supply of a is $S_a(t_2)$. Again, relation (5) extracts from this wider process of overdetermination only net changes in S_a . All we know, if we focus only on (5), is that a change in p_a is related to changes in the prices of other commodities and that this change in the price structure has reacted upon and modified the structure of supply and thus of demand in such a way that, as relation (6) shows, the net effect of all these changes on S_a and D_a is $S_a(t_2)$ and $D_a(t_2)$.

Seen through the lens of the *ceteris paribus* condition, it is as if a change in p_a (a) happens independently of, and in isolation from, changes in other prices and (b) affects S_a and D_a only. Actually, exactly the opposite is true. The same can be repeated concerning the neoclassical optical illusion in which changes in S_a and D_a are not affected by changes somewhere else in the structure of supply and of demand and affect only p_a .

8.6 EQUILIBRIUM VERSUS NON-EQUILIBRIUM PRICES

On the basis of the what has been submitted above, it is now possible to outline the most important differences between price formation in neoclassical economics and in the version of Marxist economics developed in this chapter.

First, neoclassical price theory is circular, it presupposes the prices it wants to determine. Marxist price theory is not circular because it transforms individual values into social values, that is prices, through (surplus) value redistribution. These are either the market prices, that is the commodities' actually realized values, or the production prices, that is tendential prices towards which the market prices tend.

Second, neoclassical economics theorizes prices on the basis of the *ceteris paribus* condition while in Marxist price theory it is assumed that prices are affected by a large number of variables, including each other, and that they in turn affect all other prices and other variables. This difference is a consequence of a more fundamental difference at the level of method. Neoclassical economics theorizes an unreal and static world and superimposes this scheme on a real and dynamic world in a vain attempt to explain it. Marxist economics theorizes a real and dynamic world and proceeds to use this scheme to interpret reality.

Third, in Marxist theory a capitalist represents a unit of capital, which is composed of constant capital, variable capital and surplus value. This implies from the very beginning the existence of capitalists (constant capital and surplus value) and labourers (variable capital), that is of social classes in production. Individuals operate within a unit of capital and thus are representatives of classes. In neoclassical economics, the capitalist is a person whose social identity is not different from that of the labourer. The demand and supply curves are constructed by generalizing the capitalist's socially determined behaviour as if it were not socially determined, an unchanging feature of human personality. Moreover, in neoclassical economics this supposedly unchanging feature of human personality is ascribed to men rather than to women.

Fourth, tendential prices in Marxist economics are not equilibrium prices.²¹ In neoclassical economics, if actual prices did coincide with equilibrium prices, movement would cease (sometimes, it is even asserted that they do coincide). Lack of capital movement and of technological change become the essence of this (static) theory. In Marxist price theory, in terms of the tendential distribution

of the value actually produced (see Carchedi and de Haan in this volume, Table 7.2), if market prices did coincide with production prices, there would be no equilibrium situation: this situation would be immediately upset by the action of all capitals, including the high productivity ones, searching for (still) higher rates of profit. The moment at which the average capital realized the average rate of profit would also be the moment at which non-average capitals realized more or less than the average rate of profit. Or, the condition for the formation of the prices of production (tendential equalization of the rates of profit into an average and its realization only by average capitals) is also the condition for its immediate upsetting (tendential realization of different rates of profit by the non-average capitals in proportion to their level of productivity). The price movement is not chaotic, it has a direction, but this is not towards an equilibrium state.

Fifth, tendential prices in Marxist price theory are not simply statistical averages void of any economic content (contrary to so many statistical and mathematical manipulations in neoclassical economics). Tendential prices are real but unrealized and unrealizable tendential points. They are potential but real situations. If p_a is such that profits in sector A are sufficiently higher than in sector B, capital moves from B to A until p_a falls and p_b rises, that is until the realized rate of profit falls in A and rises in B. This is a real movement towards an average rate of profit. Only, the movement itself changes the average, the point towards the different rates of profit tend. This is the reason why the average rate of profit is a part of reality but a part bound to remain unrealized. Therefore, this average cannot take an empirically visible form. The only way to 'see' it is to construct a statistical average, a concept, a number giving somehow a form to a formless element of reality.

Sixth, both theories assume the equality of demand and supply, Marxist economics in determining production prices and neoclassical economics in selecting equilibrium prices. However, neoclassical economics hypothesizes equal quantities of goods, that is of use values, demanded and supplied. For neoclassical economics, $D = S$ only in physical terms. Marxist economics takes both the surplus value produced and the reproduction price of the inputs and then computes the prices of production of the outputs under the assumption that social demand is such that all commodities are wanted ($D = S$ in physical terms) and that purchasing power is so distributed that all commodities are sold at prices at which all (modal) capitals realize the average rate of profit ($D = S$ in value terms).

Seventh, in neoclassical economics an increase in the supply of a good causes a shift in the supply curve to the right and decreases its equilibrium price. Marxist economics argues that the effects of an increase in supply on production prices cannot be disjointed from the question as to whether more or less value is produced in that process. For example, it is possible that the supply of that good is increased by introducing a new technology (with a higher than average organic composition of capital), thus increasing the average organic composition of

capital. In this case, the new production prices, including that of that commodity, are lower. But it is equally possible that that increased supply is achieved through a higher rate of surplus value. In this case, the average rate of profit increases, and, with it, all production prices. A similar reasoning holds for a decrease in supply.

Eighth, in neoclassical economics equilibrium prices cannot alter demand and supply because they are those prices at which movement ceases. In Marxist economics production prices cannot affect demand and supply for a different reason, because they are unrealized instances.²² Only realized instances can modify other realized instances. Thus, only market prices can modify demand and supply.

Ninth, in Marxist economics the difference between a commodity's market price and its production prices is caused by the difference between the exchange value actually allocated to that commodity and the exchange value tendentially allocated to it. In neoclassical economics the difference between a commodity's actual price and its equilibrium price is caused by the discrepancy between the demand and the supply of that commodity as a use value. The same holds as far as the difference between a commodity's market price and its previous market price. In short, in Marxist Economics, changes in market prices (both around their previous level and around their prices of production) are explained in terms of discrepancies between the quantities of societal labour (value) allocated rather than in terms of demand and supply of use values.

Tenth, while in both theories diminished purchasing power is the cause of falling prices, in neoclassical economics (contrary to Marxist economics) purchasing power is not related to value allocated and even less to value produced: the value dimension is absent.

NOTES

¹ See, for example, Carchedi (1991, Chapter 3), Carchedi and de Haan (this volume), Giussani (1991), Kliman and McGlone (1988 and this volume), and Freeman (1984, 1992a and b). For a review of the literature, see Carchedi *op cit*.

² See G. Carchedi and W. de Haan in this volume, note 27.

³ It follows that the capitalist form taken by social phenomena is also seen as the reflection of natural, and thus necessary, phenomena. This is, of course, a powerful argument in favour of the *status quo*. A typical example is the application of the principle of the 'survival of the fittest' to explain and legitimate capitalist competition and entrepreneurship. First, natural selection is interpreted through the capitalist lens, that is, as being governed by the selection of the fittest through competition. Then, this principle is used to legitimate capitalist competition as the form of social selection reflecting natural selection.

⁴ 'In a competitive environment, the capitalist faces a hostile environment: workers as well as other businessmen are his enemies. The appearance is that of the individual standing alone, facing forces (the market) over which he has no control. Success in such an environment then seems to be based solely on the sagacity or luck of the individual' (Henry 1990:93).

⁵ This is a specific case of the limits of methodological individualism. 'Once one starts with a micro-individual logic, the only way to come to the social level is by aggregation of individual units'

(Carchedi 1989:106). Methodological individualism can explain neither socioeconomic regularities (laws) nor historical formations and change.

⁶ See also Horverak (1972:279). Neoclassical economics can also be criticized from a neo-Ricardian, an institutionalist, and a game-theoretical viewpoint. From the point of view of this paper, the neo-Ricardian school shares with the neoclassical school its emphasis on equilibrium while the institutionalists jettison the notions of value, class, and dialectics thus focusing on the reproduction, rather than on the supersession, of the capitalist system. For a recent example of the institutionalist critique of (a) neoclassical economics, see Hodgson (1992); of (b) neo-Ricardian economics, see Clark (1992a); and (c) of Marxian economics, see Klein, (1992). Carchedi (1991) can be seen as an answer to Klein's critique. Morgenstein (1972) is a sustained attack on neoclassical economics from a game theoretical perspective.

⁷ For additional elements of critique see Linder (1977 Volume II, Chapters 13 through 16).

⁸ In its Walrasian formulation, general equilibrium analysis is an extension of 'the study of the exchange of two commodities ... to the study of the exchange of several commodities ... In this connection all we need to do is to return to the case in which each party to the exchange is a holder of only one commodity and then generalize our formulae in a suitable way' (Walras 1984:153). The supply and demand functions, then, are still basically built as in partial equilibrium price theory and are thus subject to the same critique. In the more modern general equilibrium model associated with the work of Arrow and Debreu, convergence towards equilibrium depends on the form of the excess demand functions. There is such a convergence only if a commodity's excess demand is negative when its price is higher than the equilibrium price and positive in the opposite case. But recent work has shown that this is not necessarily the case and that, consequently, the excess demand functions can have any form (see Guerrien 1989, Chapter III). It follows that the convergence towards equilibrium has no theoretical foundation.

⁹ Lianos and Droucopoulos (1992) engage in an original and interesting attempt to construct a non-neoclassical supply curve. However, these authors insert in Figure 3, p. 95, a neoclassical, downward sloping, demand curve.

¹⁰ If A is the determinant instance and B the determined instance, $A \Rightarrow B$ means that A determines B as a condition of A's own reproduction or supersession. But B can fulfill this role only because it has a social content, only because B is a transfiguration of A. For a much more extended treatment of these issues, see Carchedi (1987 and 1991).

¹¹ Neoclassical economics does have a notion of dynamics as the study of the path between two equilibrium points. This, however, does not change the static nature of the theory. This 'dynamic' path is a deviation from two equilibrium points, just as oscillations around the same equilibrium point are a deviation around that point. This is comparative statics, rather than dynamics.

¹² For example, a recent textbook asserts that 'The process of price adjustment moves the economy towards potential GDP. When the price level is too high, GDP is less than potential, prices fall, demand rises, and eventually full employment is restored' (Hall and Taylor 1993:219). The tendency towards equilibrium is based on the negative relationship between demand and prices which is extended from the individual to the economy as a whole. This negative relationship, in its turn, needs the *ceteris paribus* condition, a point criticized above. It is amusing to notice that in this text the term 'economic crisis' does not appear in the 20 page long subject index.

¹³ The notion of utility finds its corresponding concept in the notion of use value in Marxist theory. Both use value and utility are socially determined concepts, that is, both derive from the contradictory nature of bourgeois society. Use value reflects the point of view of the collective labourer who draws the distinction between use value and exchange value to understand the specific nature of this society in order to change it into one in which exchange value will be abolished and only use values will be produced (on the basis of different social, and thus production, relations and thus with a different technical division of labour). Utility reflect the view of the global capitalist whose interest is the mystification of the specific, exploitative, nature of bourgeois society and who therefore focuses on the supposedly eternal features of this society, that is on what this society has supposedly in common with all other types of society, that is the satisfaction of material needs and economic behaviour based on utility considerations.

¹⁴ Thus, the elasticity of demand measures the percentage price change at t_1 corresponding to a certain percentage change in demand at t_2 not because everything else remains the same (and thus not under

the *ceteris paribus* condition) but because the total process of change causing that percentage change in the price of a good at t_1 further evolves into a different situation at t_2 of which that percentage change in the demand for that good is a part.

- ¹⁵ See Carchedi and De Haan in this volume, Figure 7.5. If the case dealt with in Figure 7.6 is considered, only the average productivity capitals tendentially realize the average rate of profit.
- ¹⁶ This statement seems to contradict Marx's own notion of value: 'Human labour power in its fluid state, or human labour, creates value, but is not itself value. It becomes value in its coagulated state, in objective form' (Marx 1976a:142). In other words, during the process of production, the commodity, and thus its value, is still being produced by labour. Or, in its fluid state labour creates value but cannot be yet value, the value of the product, because the product as such, the product in its completed form, does not exist yet. Should the production process be interrupted before completion, the unfinished product would have no use value and thus no value. But as soon as the production process ends, labour ceases to create value and the labour contained in the product becomes its value. Confusion is bound to arise if the difference between labour in its fluid state and in its congealed state is overlooked. It is on this basis that some commentators deny that value is labour. But it is labour in its fluid state which is not (yet) value. The value of a product *is* labour (in its coagulated state). Thus, in the definition above, value is labour which has been performed under capitalist production relations and not labour which is being performed under capitalist production relations. This is quite obvious, given that it is the value of the products which is being discussed. Notice that only productive labour creates value because only productive labour transforms, by definition, use values into new use values. If this further refinement is taken into consideration, value is defined as abstract labour which has been performed under capitalist relations of production and which, as concrete labour, has transformed old use values into new use values. This point need not be pursued further in this context.
- ¹⁷ As I argue in 1991, Chapter 2, use values are both material (physical) and mental. This distinction is fundamental in a different context but can be disregarded here.
- ¹⁸ For the present purposes, the following definition is sufficient: *culture* is a specific combination of knowledge and behavioural patterns shared by the members of a social group and creating in them a feeling of identification with that group. A group's culture is not necessarily homogeneous but is often structured in different, and often contradictory, subfields. One of these is the norms and values (including consumption patterns) characterizing a group.
- ¹⁹ I disregard here other forms of allocation of purchasing power, such as financial speculations.
- ²⁰ Notice that S_a refers both to the quantity of use values a and to the value contained in them.
- ²¹ This interpretation contrasts with that of a large number of authors. For two recent examples, see Horverak (1972) and Wolfson (1988).
- ²² Production prices are tendential and unrealized phenomena. But not all tendential phenomena are unrealized. See Carchedi (1991), appendix, for a distinction between three types of tendential phenomena.

9 Demand, supply and market prices

Paolo Giussani

It is noteworthy that the classical Marxist school, surely the main supporters of the primacy of objective conditions of production in price formation, has not yet produced a critique of the foundations on which neoclassical theory has erected its theory of the relation between demand and supply of goods in fixing market prices of goods, although this foundation is a fragile one, clearly based on conscious tautologies.¹

Any manual of basic economics explains that the demand curve for a given good is constructed in such and such a way, the supply curve in another, and the equilibrium price of the good in question is their point of intersection. Yet the textbooks without exception are fairly ambiguous about the position of these curves on the plane. If these were unequivocally and directly determined prior to, and independent of, the formation of prices, the result would be an immediate tautology: already knowing all correspondences between prices and quantities demanded or offered, the assertion that market clearing requires those prices common to the two sets of correspondences would be trivial and there would be no need for any further theory. If the *equilibrium price* of a good is defined as the unique market price at which the market clears with no residuum of that good, it is a pure tautology to add that at this price, supply and demand equalise. Otherwise a positive or negative residuum would remain on the market.

What counts from a scientific point of view is to be able to *construct* the two curves from given information, so that they can automatically return the unique equilibrium prices of various goods. But, as we shall see, this is not possible. We begin by examining the demand side.

9.1 DEMAND

Textbooks normally teach the demand curve *first* as a table of correspondences between the quantities demanded and unit prices in order *then* to transform these tables into functions or curves. The problem still remains: how are the tables of correspondence derived? If the unit prices of various goods are not known, demand has a single starting point to fix the desired quantities to hypothetical prices, which is given by the quantity of money in the possession of the purchasers. This money sum is conceived as independent of prices and of the

whole process of production and circulation, but in no conceivable circumstance can this actually be the case.

To fix ideas, let us assume that the quantity i of a certain good demanded in a given period of time (D_i) is a function of its market price (p_i). Common sense suggests that the lower the price, the greater the quantity of the good demanded on the market (the quality of the good remaining equal) and vice versa. In this way, recalling that the dimensions of D_i are those of units of use value (for example 10 quarters of grain, 5 pairs of shoes, 1 vehicle, and so on) and that those of p_i are units of money divided by units of use value, we can write the function giving quantity demanded of good i as $D_i(p_i)$. This function, common sense informs us, must therefore possess the following properties: $D_i \geq 0$, $D_i' < 0$.

On their own these two characteristics of $D_i(p_i)$ clearly determine a vast class of functions, and in no sense fix the position of D_i in the plane. Since, nevertheless, the textbooks present the demand curve as if it were uniquely determined in the plane – a necessary condition for demand and supply curves to establish equilibrium market prices, it is reasonable ask how this can be done. Taking the simplest case where D_i is a linear function of p_i , at least two points would need to be known to determine the position of D_i .

It would be difficult to admit a nonlinear function. Not because the reality of demand functions must necessarily be linear, quite the contrary. But because if the curve is nonlinear, even an infinite number of points would not suffice to determine its position on the plane. Precisely the case of nonlinear functions, the most general, shows how the formulation of determining equilibrium prices as the intersection of the two curves *cannot* be considered a purely theoretical construction, but a simple assertion of facts which are still to be explained. If the relation between quantity demanded and prices is not linear, the only thing which we have is a table of correspondences between (hypothetical) magnitudes of quantities demanded and (hypothetical) unit prices. It should be noted that one cannot deal with effectively observed quantities in reality inasmuch as this is not observable in reality. What is observed are solely determinate quantities *sold* of a certain good at a given moment, and that is the result of an interaction, already arrived and continuing to take place, between demand and supply.

Proceeding on the simplest assumption of a linear demand function, if we take the data point $D_i(0)$ as known, that is the quantity of the good demanded defined by the pure needs for use value i so that price, and even the existence of money, is no longer an obstacle to consumption, then only one further point is needed. What could this second magnitude of $D_i(p_i)$ be which is already known from the outset? We can hypothesize three main cases (see Figure 9.1).

1) Commodity i could represent the totality of wage goods which workers consume in each period. In this case it is at least known that one point of the line $D_i(p_i)$ must be determined by the nominal wage paid in a given period, which we can designate p_{iw} , inasmuch as this magnitude constitutes the total monetarily disposable income in the hands of the consumers of i , that is the quantity of

money which on the demand side can be used to acquire commodity i . Now, p_{iw} in its turn is nothing other than a determinate price for a determinate good (labour power) sold in a determinate amount, whose price must therefore be *already* known since the curve $D_i(p_i)$ can be constructed on the plane. Presupposing that p_{iw} is already known equally necessarily implies that the prices of all goods are known.²

2) Commodity i could represent the totality of capitalist goods (means of production) demanded by the capitalists for their activity. In this second case, even accepting with various difficulties that $D_i(0)$ is known, the other known value of D_i must be that determined by the total gross disposable income of the capitalists, which we shall designate by p_{iy} , or more precisely $D_i(p_{iy})$. Knowledge of this quantity also obviously presupposes knowledge of the prices of all the commodities produced and sold by the capitalists, from which they have obtained their own income available for spending on new means of production.

3) The most general case is that of an economy of independent noncapitalist producers. If there is no money, each producer offers his or her own commodity seeking to retrieve from it those goods which they need at the most advantageous conditions of exchange. In this case p_i is a particular commodity side by side with others, with dimensions analogous to those of D_i . If the curve $D_i(p_i)$ is a demand curve, there will be another curve, the supply curve $p_i(D_i)$. In practice, each pair of commodities produced in the economy will have a demand curve and a supply curve with different properties. With the aim of being able to fix a sale price for their own commodity, each producer must know his or her own gross disposable income and also his or her own costs, but cannot do so since a general term, in which income and costs can be expressed is missing.

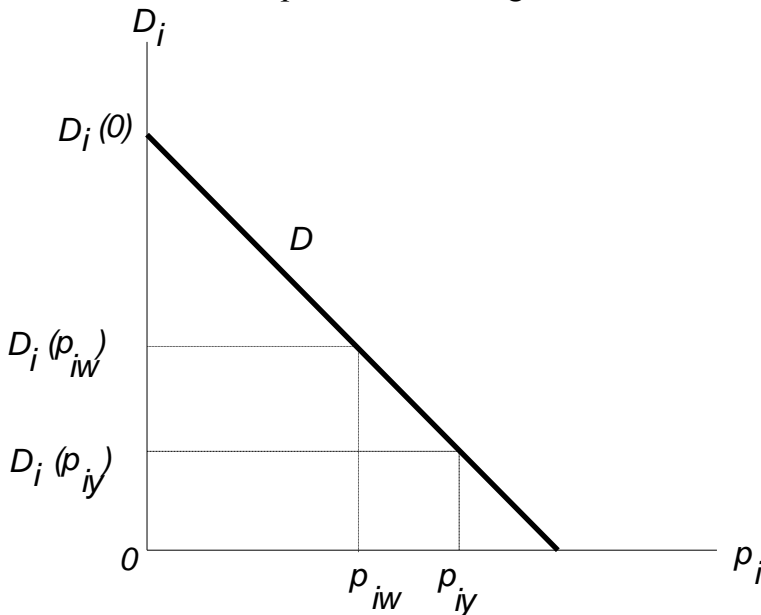


Figure 9.1 Standard linear demand function

If this 'natural barter economy' is replaced by a 'monetary economy' of small producers in which a particular commodity functions as a unit of measure and

means of circulation, this case would reduce in practice to those already discussed.

It is noteworthy that Frank Hahn, in relation to the system of General Economic Equilibrium, has confirmed that 'the best that money can expect in such a system is that of simply not finding a place'. The impossibility of introducing money in general equilibrium systems derives precisely from their foundation, the idea that equilibrium prices can be determined solely through the relation between demand and supply. In the demand curve money is a simple nominal ratio without any production costs; if in fact it were a commodity it would enter the market with cost known to its producers, which would imply, as seen, a prior knowledge of other prices, at least the price of the goods needed to produce the commodity money. Finally, however, no means has been found to place a purely nominal magnitude like neoclassical money in relation with various produced and sold commodities.

9.2 SUPPLY

The standard supply curve is postulated in the manuals as possessing properties opposite to those of the demand curve. It is assumed that, just as consumers naturally tend to maximize the yield of the money they possess by varying their own purchases in inverse relation to unit prices, a producer seeks spontaneously to get the maximum return from the goods produced by modifying total production in *direct* relation to the unit price achievable in the market.

It can immediately be seen that with this type of supposition regarding to the supply function rather little is natural or obvious. One cannot see, for example, why on earth the producer of a given commodity cannot take, as reference for deciding the quantity to produce, the *total* price (or at least the price of the total saleable quantity, instead of the unit price. If a fall in the unit price permits the producer/seller to increase total gross receipts through a rise in sales, the supply function with respect to unit prices could well have the same properties (negative slope) as the demand function.

Indeed as we shall see, the long term supply function, that is when technique and productivity can be increased indefinitely, effectively possesses analogous properties to the demand function. For example the negatively sloped supply curve shown in Figure 9.2 effectively possesses the property of guaranteeing growing total receipts through increasing unit price:

In reality, in orthodox microeconomics the supply function is constructed not as a function in its own right, with its own peculiar characteristics, but as a speculative function of demand.

Designating the total quantity of commodity i offered by the producers in a given period by S_i , the function $S_i(p_i)$ is supposed to possess properties such that $S_i \geq 0$, $S'_i > 0$. Once again assuming for the sake of simplicity the most elementary case of a linear function (see Figure 9.2), this the point $S_i(0)$ –

analogous to the point $S_i(0)$ for the demand curve – cannot be fixed, in that while there is a meaning for the consumption of goods which cost nothing, there is no sense in the commercial production of use values which yield no positive price. However, again accepting the absurd proposition that an arbitrary point of $S_i(p_i)$ can be known, it turns out to be impossible to establish a second point except through hypotheses which end up destroying the concept of supply function. In fact there is one point which must be known. This is the point for which total receipts from sales balance the total costs of production. There is a positive supply S_i only beyond this point, and not before it. One can however conceive that for the value $S_i \times p_i = S_i \times p_{ik}$ (where p_{ik} indicates the unit cost of production of good i) this means that where $p_i = p_{ik}$, S_i would be 0, with $S_i > 0$ for $p_i > p_{ik}$. Now, the value p_{ik} is precisely the unit value of the costs of production sustained by the producers, that is, the unit price of the use values which the former has used or needs to use for the production of various quantities of commodity i . Once again, in order to be able to trace a uniquely defined supply curve, commodity prices must already be known.

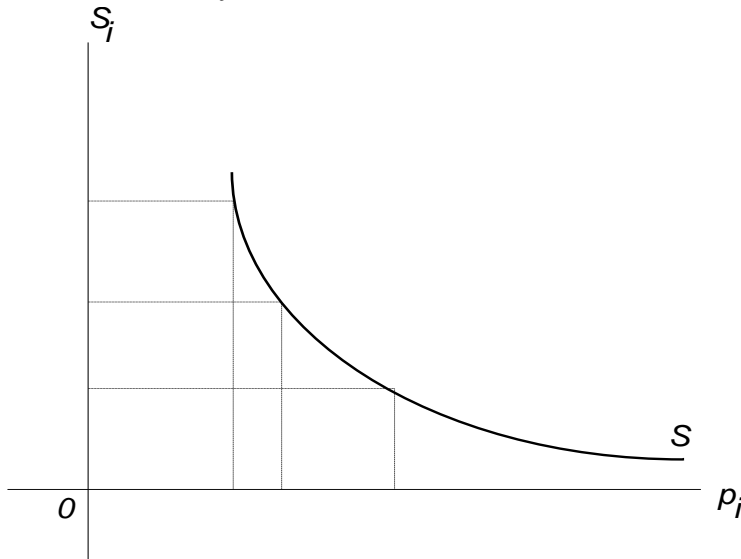


Figure 9.2 Negatively sloped supply curve with increasing total receipts

Traditional theory itself admits this. One of the central propositions of orthodox microeconomics is that a firm will choose to produce and to supply that quantity of product for which the total price realized will be such as to equalise the marginal revenue with marginal costs. The unit cost of production of the commodity must therefore already be known in order for the firm to be able to make its calculations about the level of production. This, however, implies that the price of inputs (which, precisely, give us the cost) are known independently of demand. On the latter definitively depends only the selling price of the product of the firm in question.

Traditional theory could respond that the price of inputs is the result of an intersection between supply and demand which has already been achieved; but that is manifestly impossible in that demand for the input on the part of the

producers is obviously linked to the quantity of product which they decide to supply, which in its turn depends on the price which can be achieved on the market. The cost of production, that is the price of inputs, cannot be known until the demand for inputs on the part of the producers is known, but this cannot be determined if the cost of production is not known a priori. From this magnificent vicious circle there is no way out without assuming that supply prices are established on the basis of factors *independent* of demand. These *pure* supply prices can, in this case, be successively modified by demand to reach effective market prices. Independent of any other consideration, the essential defect which one encounters in all possible models of general equilibrium (including the neo-Ricardian system for determining prices of production) consists in the assumption that input prices and output prices are determined simultaneously. If there were circulation of goods, that is a change of form from goods to money, it would be simply impossible. In order for a price to be imputed to various products it is necessary to wait for a price to be fixed for the various means of production, which must therefore circulate simultaneously with the outputs, that is at the same time in the form of productive capital and commercial capital.

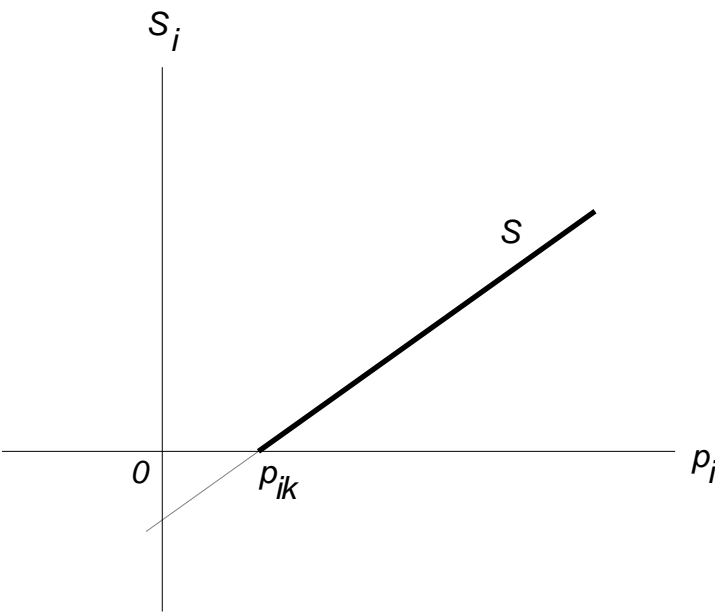


Figure 9.3 Standard supply curve³

9.3 INTERSECTION

It is clear enough that the traditional supply curve is constructed in a somewhat arbitrary manner since, limiting itself to mimicking the demand curve, it cannot fix prices autonomously for the produced commodities themselves. To furnish a modicum of realism, it will be treated in a completely different manner from the standard one.

Taking the supply of a single producer in the short term, that is when technique and productive capacity are given, the quantity produced (and hence supplied to the market) varies in direct proportion to the level of utilisation of productive capacity

Unit production costs of a given good tend to fall up to the point of optimal use of existing productive capacity, beyond which they tend to rise to the point of simple exhaustion of usable capacity. If supply prices are fixed in relation to the costs of production (as in both classical and Marxist theory) the supply curve which arises will be a relatively short curve in the form of a \subset , as shown in Figure 9.4.

At this point orthodox economic theory introduces returns to scale, that is variation of costs with changes in production. Changes in returns to scale belong, however, to the long and not the short term, that is changes caused by the accumulation of fixed capital which will alter the totality of usable productive capacity. And when there is accumulation of fixed capital, the problem of returns to scale changes its nature because, in the general case, it changes the material characteristics of the means of production, whereas if it is simply growing uniformly, it makes no sense to speak of returns to scale.

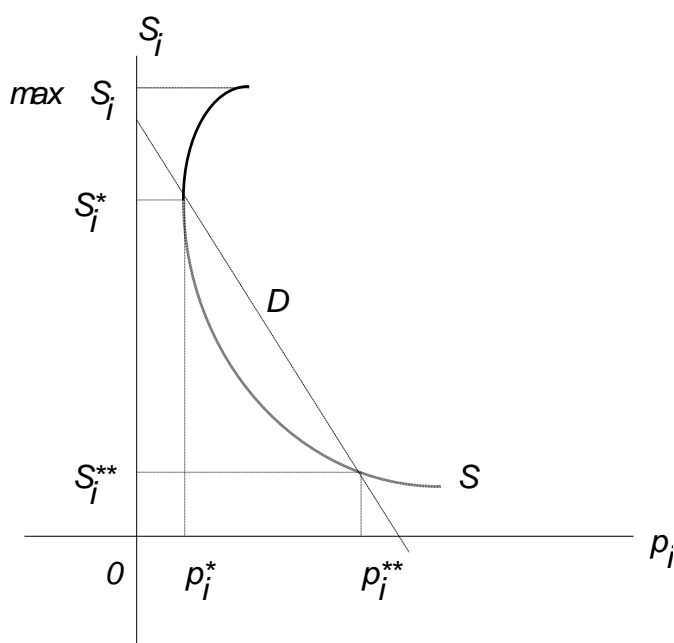


Figure 9.4 Supply with variable capacity utilisation

Returning to the curve in Figure 9.4, therefore, and given the form of the supply curve S , the indicated linear demand function D intersects it in two points giving two equilibrium prices p_i^* and p_i^{**} , of which however the second (and greater) is false since the area included between S and D constitutes a zone of excess demand which will push producers towards production of the quantity $S_i^*(p_i^*)$.

If i represented not a single producer but an entire sector producing the same type of good, it would be possible to order all the individual producers belonging to the sector according to their productivity. It would thus be possible for example to obtain a logistic supply curve as a function of the individual prices referred to individual costs, which would offer a complete panorama of the sector. The quantities produced and supplied would indicate the various optimal capacities of the sector in relation to the different individual prices between which the depend could perform its selection. Demand would thereby be limited to selecting which of the various existing individual prices in the sector is destined to become the market price for the use value i (Figure 9.5).

Demand is therefore charged with determining the market price p_i^* of the commodity i by selecting from the range of individual prices of the various producers in the sector the optimal level of utilisation of productive capacity. The total quantity produced will be fixed at the value S_i^* , and the magnitude $(p_i^* - p_{im})$ will represent the unit superprofit gained by the producers who in sector i enjoy the highest productivity. The less efficient producers, who cannot sell at unit prices lower than or equal to p_i^* , must leave the scene.

But what would happen if these also decided, or in some manner were able to produce and sell, at the price p_i^* , renouncing any profit or indeed selling below costs? The total quantity offered would rise, we must assume, to the value S_{is} , the maximum that the sector can produce at the optimal capacity of the single producers. However, at the price p_i^* demand does not exist for the quantity $S_{is} - S_i^*$. This excess supply would give rise to competition between the producers of the sector, forcing them to lower the selling prices of *already produced* quantities to the point p_{im} , the price at which all the production S_{is} can be absorbed by demand. The effect would be equivalent to that of a violent displacement of the supply curve towards the left (from S to S' in Figure 9.5).

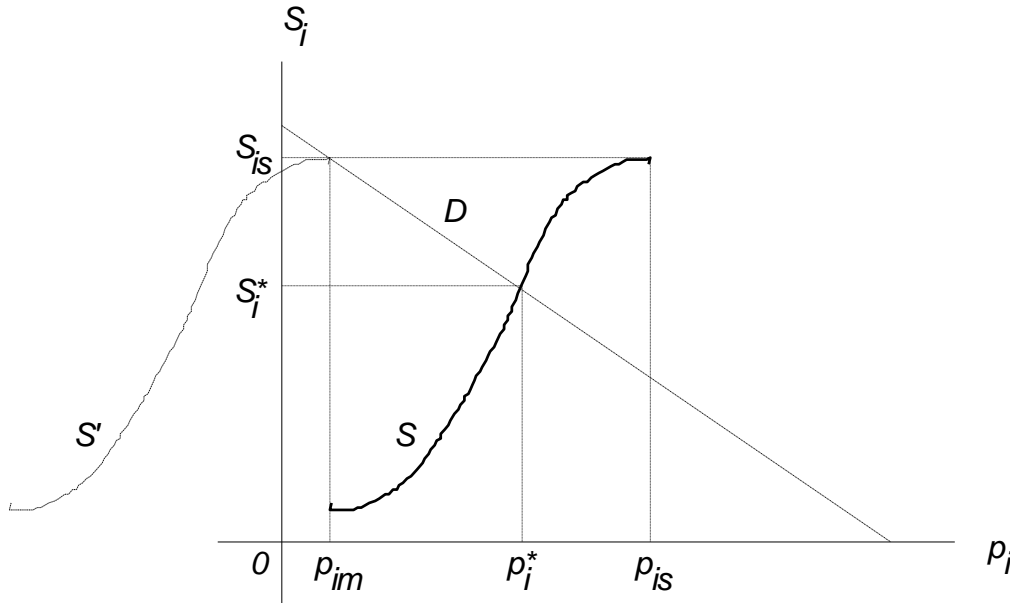


Figure 9.5 Supply curve for whole sector, with demand interaction

Save for the producers with the highest productivity, normal profits would disappear and, paradoxically, as a very result of this violent effort exercised by each one of them to remain in business, at the minimum possible price p_{im} many producers would be thrown out of the market. This in its turn would reduced the quantity supplied, resuming on the contrary the preceding movement, but reaching a more or less stable value for p_i such that all remaining producers could at least achieve sufficient profits to stay in business.

When demand is so high (line D in Figure 9.6) as to admit a price above the individual price given by the costs of the least efficient producers of the sector making optimal use of existing capacity, the various producers can use their full capacity (as if the supply curve moved from S to S' in Figure 9.6 as a result of the movement of point S_i^* to the maximum point S_i in Figure 9.4) where it could satisfy demand. In such a state of things the least efficient producers could not realize a superprofit, but the most efficient would realize a unit superprofit equal to $p_{is^*} - p_{im^*}$. If demand then rises yet again (from D to D'), this would bring to an end practically all competition between individual producers leading them simply to raise the unit selling price to the value p_{in} at which they are able to sell off the maximum produceable quantity S_{is^*} . This is equivalent to a virtual displacement of the supply curve from S' to S'' . In such a situation, the most efficient producers in the sector would attain a unit superprofit equal to $p_{in} - p_{is^*}$, and the least efficient a unit superprofit equal to $p_{in} - p_{is^*}$.

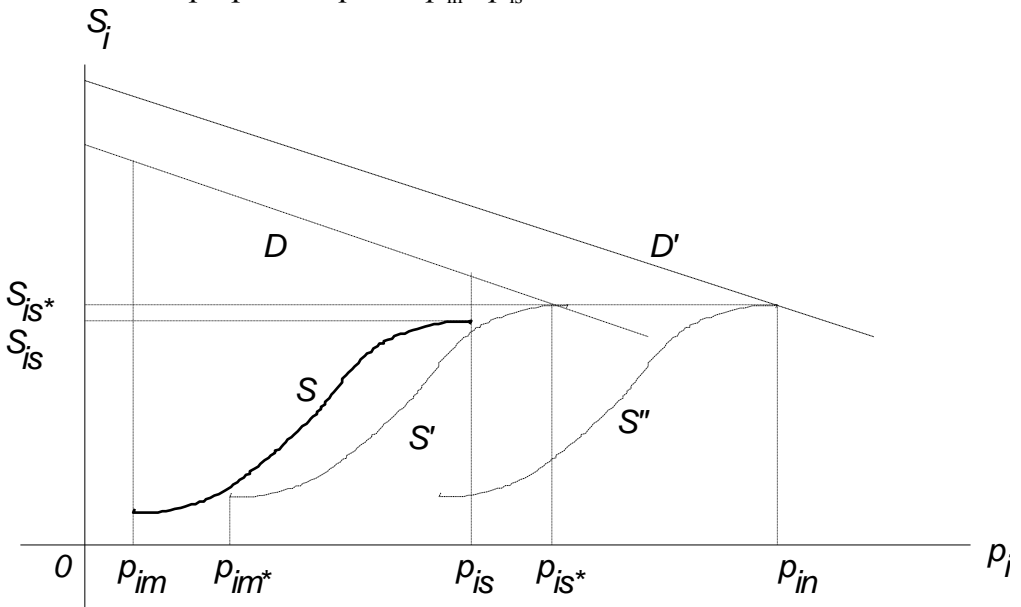


Figure 9.6 Excess demand

Thus far, apart from all else, a substantial element of indeterminacy is evident, constituted precisely by supply prices. Yet theory speaks of 'prices determined by costs', without however explaining how this determination arises, that is, what is the exact relation between prices and costs of production. Given that demand cannot do other than limit itself to the selection of one of the multiple individual

prices for the different producers of a given sector, it remains to be established how supply prices are fixed. In this area all traditional theories are highly deficient. Textbook neoclassical theory, as we have seen, resolves the problem by simply postulating that prices are established by demand in a void; the modern markup theory asserts that prices are fixed by multiplying variable costs by a given coefficient, which is however indeterminate; neo-Ricardian theory adds a magnitude to production costs which is fixed by the uniform profit rate, which is only valid for the whole of a sector and cannot in any case be known a priori. The only theory which succeeds in escaping this vicious circle is Marxist value theory, on the basis of which supply prices can be defined only on the basis of the conditions of production, considered as expenditures of human labour time.⁴

9.4 MARKET VALUES

It is known that Marx gave *two* distinct definitions of the magnitude of value of a given commodity: (a) The amount of labour time *socially necessary* for its production; (b) the amount of labour time needed to satisfy *social demand* for this. These are two distinct definitions which coincide if and only if social need which pays (demand) for production of a given sector is exactly equal to the produced quantity.

Marx treats market prices and the relation between demand and supply in Chapter 10 of the Volume III of *Capital*. Although the concepts are the same, the terminology used there is different from that used in the present work, and that with the aim of being able to distinguish between market price and market value, for reasons which will become clear. Marx designates the average value of a given commodity *market value* whilst here it is termed *social value*. In its turn, that which Marx defines as *market value* is here termed *market price*.

Definition (a) regards the magnitude of values *in the absence of demand*, or more precisely if it is assumed that demand automatically and passively adapts to the conditions of supply. In such a situation, all products from a given sector form a single mass and the sector itself constitutes a single producer. The magnitudes of social values are determined by dividing the total labour time expended in the sector by the total number of units produced.

The magnitude of value, defined in this way, is therefore given by the weighted average of the various magnitudes of individual values. That is, designating the social value of a given commodity as λ^* , the physical production of the i^{th} individual producer by q_i , and the individual value of q_i by λ_i , we have

$$\lambda^* = \Sigma q_i \lambda_i / \Sigma q_i.$$

Each individual producer operates at an optimal level of productive capacity utilisation, that is at its maximum level of productivity of labour.

Definition (b) applies when the conditions determined by (a) are modified by the intervention of demand (social need) to select those magnitudes of individual

value which satisfy it in the sector. Operating in this manner, demand creates, in the general case, a shift (positive or negative) in the those individual values which have been preselected to become the market value with respect to social value, that determined in relation to (a). We can clarify this with a simple example. Table 9.1 contains a description of the sector which produces commodity i , composed of three individual producers with different techniques and different labour productivities.

Producer	Labour expenditure	Production in use values	Individual value	Individual deviation	Total deviation	Total receipts	Excess or deficiency of value
I	20	10	2	+ 1	10	10	- 10
II	40	40	1	0	0	40	0
III	10	20	0.5	- 0.5	- 10	20	+ 10
Total or average	70	70	1		0	70	0

Table 9.1

Table 9.1 shows that the magnitude of *social* value of commodity i is equal to 1, the total social value produced is equal to 70, and the three individual values are respectively equal to 2, 1 and 0.5. We shall now show the effect of the intervention of social demand (Figure 9.7).

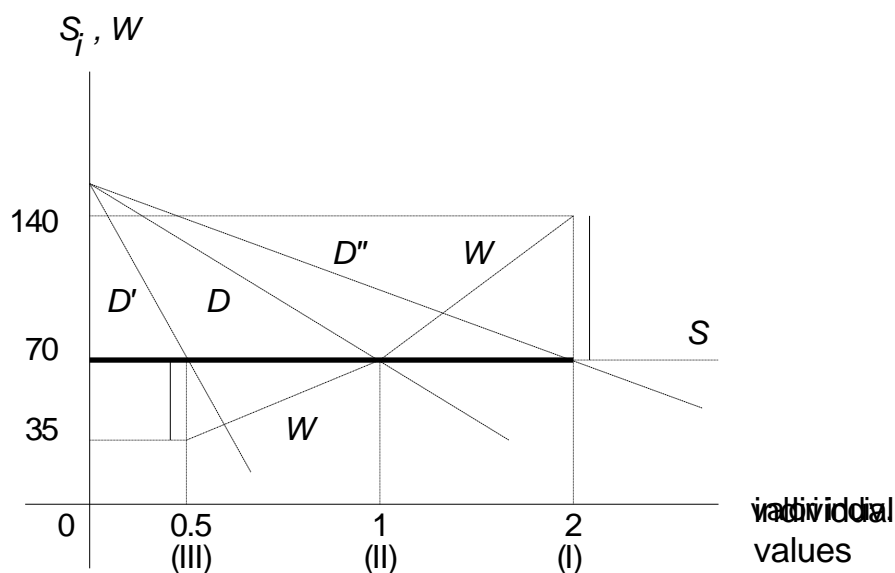


Figure 9.7 Demand and supply according to Table 9.1

Figure 9.7 has been constructed on the hypothesis that all three producers of i are in a position to furnish their optimal supply for whichever magnitude of individual value is preselected by demand as the market magnitude (the supply function S_i is therefore a constant = 70), in order to demonstrate the effects of a variation of social need, that is the price which the consumers are prepared to pay to acquire 70 units of good i . If this price were equal to 1 (demand fixed at D), market value would coincide with social value and we would have the situation

described in Table 9.1; if the price were equal to 0.5 (demand fixed at D'), then as the line W (total value realized in the sector) shows, only the most efficient producer (III) would manage to realize its entire sustained expenditure in labour terms (10 units), producer II would realize half (20/40) and producer I only a quarter (5/20). The sector as a whole will realize only 35 units of labour out of 70 expended, leading to a loss of labour of 50 per cent.

If on the other hand the market value is fixed by demand at 2 units of labour (demand at D'') the producer III will extract extra value from the market equal to three times its expenditure in labour (40–10)/10; producer II extra value equal to 100 per cent of its expenditure in labour (80–40)/40; producer I will find itself in an equilibrium since market value would coincide with its individual value. Sector i would realize overall an excess value equal to 100 per cent of expended labour (140–70)/70.

We can now drop the hypothesis that all producers are in a position to remain active at any level of market value by introducing consumed capital. The new hypothesis is that only those producers can stay on the market for whom the market value determined by demand is such as to ensure at least the recuperation of the value of the used up fixed capital plus the circulating capital consumed; that is, those who can repay the costs of production. Suppose that the unit cost of production (which we indicate by k) for the three producers of Table 9.1 are respectively equal to 1(I); 0.6(II) and 0.1(III) units of labour time, with the same production of use values as before. It follows that for a market value less than 1 only producers II and III will manage to work, while at a market value lower than 0.6 only the most efficient, that is III, will stay in the game. The relation between demand and supply is modified as a result, as shown in Figure 9.8.

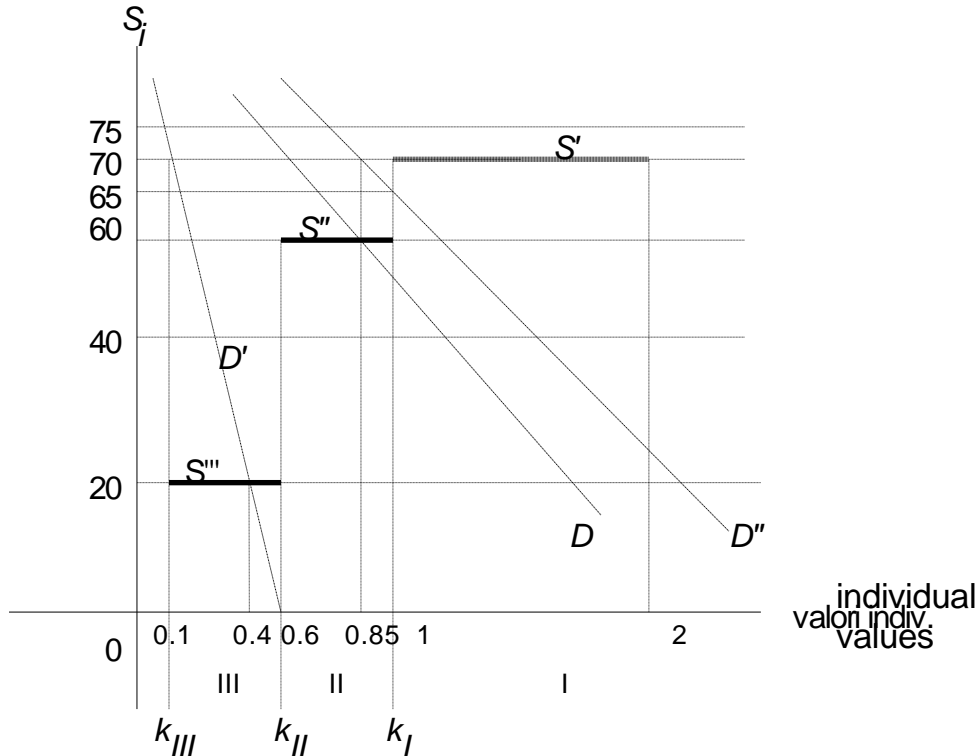


Figure 9.8 Variable supply

The supply function is thus transformed into a discontinuous series of three straight line segments ($S''' + S'' + S'$) which each expresses the productive possibilities in the sector for the various intervals of market values. In the case of demand D' market value would be equal to 0.4, since only the values attainable by producer III fall in this interval. Producers I and II cannot even keep their businesses going. If position D' represented a more or less sudden contraction in demand, taking place *after* the total production of the sector (70 units of i) had already been made available, the market value would fall as shown by Figure 9.8, to 0.1 units of labour, to rise in the next period to 0.4 when supply reduces to 20 units of the commodity as a result of I and II leaving the scene.

The demand curve D , intersecting the quantity supplied 60 at a price of 0.85, also lets producer II enter the competition, letting it realize a gross earnings of 34 units of labour (while I realizes 17 corresponding to an excess value of 7) with a deficit equal to 6 units with respect to the expenditures undergone. In this case, sector i overall would realize 51 units of labour with an excess value of 1 (social value being fixed at $50/60 = 0.833$). However D also intersects the quantity supplied 20 for one value, let us say 1.7, which in theory would also allow producers II and I to work. The entry onto the scene of these two producers would however raise total supply to 70 units, a quantity which the demand D could only absorb if the unit price was fixed at 0.7. This price would eliminate producer I from the market, cutting total production thereby to 60 units where a price equal to 0.85 would reign.

The demand curve D'' is the most interesting. This curve intersects none of the three segments of supply; however for a market value of 1 this is in a position to absorb 65 units of commodities. Now, producers I and II together can only supply 60 units of the product, so that there is room for 50 per cent of the productive capacity of III. At this level of capacity utilisation, the marginal producer III cannot however offer anything because its costs would surely exceed the maximum value equal to 1. It must therefore produce 10 units of commodity to add to existing supply; this raises total supply to 70 units, simultaneously reducing unit market value to 0.85. The result is that I is eliminated from the market, while the sector as a whole realizes a magnitude of value equal to 59.5, with a total deficit with respect to expenditure in labour equal to 10.5. This deficit falls only on II (−6) and on I (−11.5) while III would realize excess value equal to 7 units of labour. Producer II would however be in a position to stay in operation thanks to a surplus over costs of 10 units, while producer I would confront an absolute loss over costs of 2.5 units.

Turning to the central demand curve D : this signifies that at the individual value of producer III (0.5) social need is in a position to absorb, let us suppose, a quantity of product equal to 75 units (25 per cent more than the quantity at present absorbed at a price of 0.85). Producer III can in theory increase its own supply correspondingly by 220 per cent (from 20 to 75 units) thanks to its

superior technology, which however it can do only by using its own investment funds or by counting on the transfer of funds from other sectors. The possibilities of enlarging production in the given sector by means of the most productive techniques are not directly signalled to those producers who are active in the market by the demand curve (which as such is obviously not known) but as the differences between on the one hand the various individual values (and costs) and on the other the quantities produced in realizing these individual values. The greater the interval of variation of individual values and the greater the positive difference between total production of the sector and the individual production of the most efficient producers, the greater will be the space for growth of production on the part of the latter.⁵

As producer III tends to increase its own supply, the social value of the sector will tend more and more to become determined by the individual value of III, and the range of choices effected by demand will reduce correspondingly to a smaller quantity of social value.

9.5 MARKET PRICES

The question now naturally posed is the following: how is it possible to realize a magnitude of value which diverges from the magnitude of social value? In other words, considering society as a whole, that is to say *all sectors simultaneously*, can it give rise to a *total* market value (the market value of the whole of social production) which is smaller or greater than total social value?

Market value is determined by the action of demand on supply, that is, the action of a quantity of labour existing in one form (money = directly social labour) on a quantity of labour which exists in another form (commodities = private labours). Demand represents that part of total labour expended by society which at a given moment finds itself in a directly social form, and the supply of that part of the total labour expended by society which is found in a private form. The total labour of society is therefore given by the sum of labour expended for the production of the various commodity use values, and the labour expended on the commodity which functions as money, and on the market one can only exchange a quantity of labour against another quantity of labour.

Both quantities must therefore be initially fixed by average values in each sector of production. In a situation in which all sectors succeed in selling off the whole of production at the optimal level of capacity utilisation there can be no divergence between total supply and total demand, these quantities representing equal quantities of labour. Eventual deviations between the market values of various goods and their social values will be compensated on the social plane giving rise to a zero sum. But nothing guarantees that demand must always be in a position to absorb the totality of the social product. Given that demand is constituted of labour in a directly exchangeable form this can be conserved and remain unused, even indefinitely. In this case, it is as if a part of overall labour

which society expends is dispersed; on the contrary, when demand which has been inactive for a certain time is newly thrown onto the market, it is as if society had spent an insufficient quantity of labour to satisfy total social need. Knowledge of the social value of total production can help us determine the various market values only under the assumption that the totality of society's production is completely absorbed by paying demand.

However we can ask if the eventual divergences between total demand and total supply, that is between total market value and total social value, which manifest themselves in each period, must tend to compensate one another during the course of various periods, in such a manner that considering a sufficiently large period the total divergence will tend to zero. To demonstrate this assertion it would be sufficient to demonstrate the equivalent assertion that these social values constitute the points of equilibrium around which market values oscillate. This is a challenging proposition, rich in consequences, which the modern neo-Ricardian school has adapted from the classicals and from Marx but until now has not sought to demonstrate.

Figure 9.8 describes a very simple mechanism through which market values λ of the produced commodity in sector i can oscillate around social values (λ^*) determined by the average productivity of the sector. This effect naturally presupposes that supply changes continuously in relation to demand, that is, the market value, in turn causing social value to diminish constantly as a result of improvements in productivity, which can take place in two ways. Either because the most efficient producers raise their share of production in the sectoral total (the segments S of supply are displaced upwards) or because in the whole sector new techniques are adopted (the segments S are displaced upwards and to the left). Out of pure convenience of illustration we assume that the demand curve D has a concave form, but any other form which respects the already noted characteristics of the demand function would do as well.

Until there is a positive difference between market value and the minimum individual value of the sector supply will tend to be pushed upwards. When the market value coincides with the maximum value of the sector (that is, with the lowest productivity) the pressure on supply to rise on the basis of given techniques is a maximum and the pressure for productivity to grow is minimal. On the other hand, when the market value coincides with the minimum individual value of the sector (that is with the highest individual productivity) the pressure for productivity to grow is a maximum and the pressure for a growth of supply on the basis of existing techniques is minimal. In Figure 9.9, with the supply curve moving progressively from S_0 to S_6 , social or average value must however tend upwards and to the left, continually oscillating around the curve D. The general result is that the market value and social value of the commodity i will follow each other constantly in their general tendency towards the base determined by the more or less continuous changes in the conditions of production.

It should be noted that Figure 9.9 is drawn on the hypothesis that for each level of supply all the individual producers are in a position to stay in the market, and that all of them will react to the differences between average values and market values (or to the differences between social values and market values), raising supply and/or productivity whilst individual productivity differences persist. The symbol \blacklozenge in the middle of each segment of supply indicates the position of the social value of the commodity for that level of overall supply. The continuous line indicates a hypothetical curve of changes in social value. The dashed line is the demand curve. Naturally, there is no need for the demand curve ever to succeed in intersecting the various supply segments. When pressure towards the growth of productivity becomes excessive, the segment of supply may well be displaced too high, as if the curve D became separated from S to the right, which would in succession produce an opposite movement of S towards the left where it could sell off the whole of the supply at lower prices tolerated by demand. We would see a tendential movement always in the same direction but zigzagging.

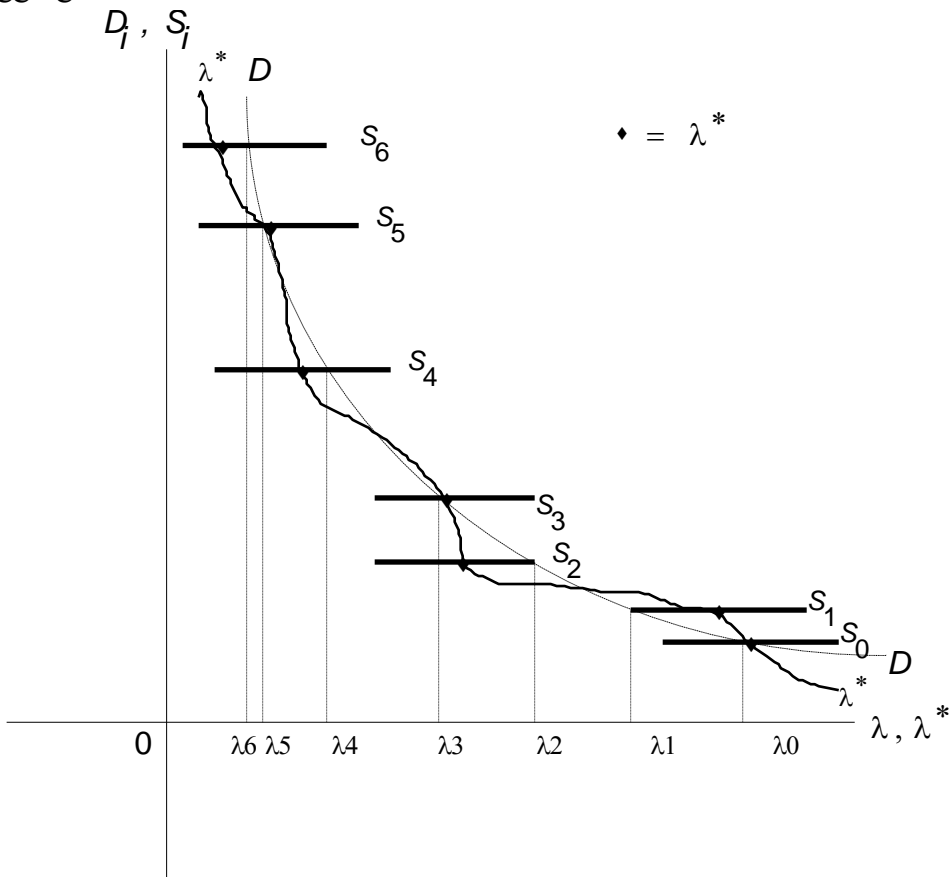


Figure 9.9 Interaction between social values and market values

Assuming fixed technical conditions, it is clear that there would be no movement. If, for example, we found ourselves in the starting situation given by S_0 and λ_0 , the total supply of the sector would be able to rise to the height of S_1 ,

the position at which the market value would coincide with the individual value of the best producer, where it would become fixed forever.⁶

It should be noted that one of the important premises leading to the neo-Ricardian approach is the hypothesis of a uniform profit rate in all the various spheres of production; this assertion is also treated with the force of an axiom or postulate without indicating the eventual mechanism which leads to the levelling out of the sectoral rates of profit. However, excluding from consideration the uniform profit rate as a simple institutional principle of the economy, the mechanism can be based only on a variation of the effective sale prices such as to produce a tendency towards equal profitability in the various sectors. In practice, the movement generated by the interaction between demand and supply must be such as to install those particular market values which, sector by sector, yield a profit equally proportional to invested capital. The autonomous drive of the various producers to valorize their own individual conditions of production, that is to impose supply prices equal to individual values, must be corrected and levelled out not only through competition between the producers and from the normal action of demand but through a supplementary action which tends to depress market values in those sectors in which expenditures in labour with respect to invested capital are relatively high and to raise them in sectors which find themselves in the opposite situation. If the totality of these two movements is sufficiently continuous, the dynamic of prices appears as dominated by a tendency towards an equal profitability in the various spheres of social production, which seems, finally, to become a kind of *prius* in the formation of prices even though it can only be their result.⁷ The logical sequence of the factors which determine the movement of prices is therefore the following:

Social values \Rightarrow market values \Rightarrow prices of production \Rightarrow new social values
 \Rightarrow and so on.

To pass from social values to market values it is sufficient that demand exercise an action on the conditions of supply, that is on the conditions of production in each individual sector. For a further movement towards prices of production (which in reality happens at the same time as the former) there is a further requirement: the action of the various sectors on each other, which means an alteration from outside the sectoral demand curve provoked by expansions and contractions arising from the rest of effective social demand.

Market prices therefore are nothing other than the same market values in the course of their perpetual displacements towards and away from prices of production.⁸ This must definitively indicate how the genuine pole stars and the central motors of the whole movement are not prices of production, as the neo-Ricardian school believe and perhaps also the classical school also believed, but precisely average or social values established on the basis of the weighted average of the different individual producers of value in each sector.

We now seek to represent the movement of market values towards production prices with a simple numerical example of a model of a productive system with

two sectors (1,2) in which profits are invested where the rate of profit is the highest, eventually expelling funds generated in this sector out of the sector. We leave out of account intersectoral competition and assume, following an already old tradition, that sector 1 produces the elements of constant capital (there is no fixed capital) and that sector 2 produces wage goods. We imagine that in the initial situation market values of the various goods are equal to social values. The symbols are the following:

- Q_c Physical quantity of constant capital
- Q_w Unit of real wage
- L Direct labour used
- N Total value produced
- C Value of constant capital
- V Value of variable capital
- K Total costs ($C+V$)
- S Total surplus value
- Q Total product in physical units
- r rate of profit

The real wage rate is constant and equal to 0.5 units of product 2 per unit of labour. The technical coefficients are constant: $Q_c / Q = 3$ for the two sectors; $Q_c / L = 1$ in sector 1 and $e = 0.5$ in sector 2; as a consequence $Q_c / Q_w = 2$ in sector 1 and 1 in sector 2. The initial prices (values) are equal to $p_1 = p_2 = 1$. Table 9.2 shows the initial situation for the two sectors.

	Q_c	Q_w	L	N	C	V	K	S	Q	r
1	90	45	90	180	90	45	135	45	180	0.33
2	40	40	80	120	40	40	80	40	120	0.5
Total	130	85	170	300	130	85	215	85	300	0.396

Table 9.2 Expanded reproduction in two sectors

If each sector, regardless of the difference between sectoral profit rates, limits itself to accumulating new capital internally, accumulation will proceed in perfect equilibrium, given that sector 1 will throw on the market an amount of means of production equal to 180, less the replacement of consumed capital (90) less the quantity needed for accumulation (30), that is 60 units. This will be exchanged against the excess of wage goods produced in sector 2, which is 120 minus 40 (replacement) minus 20 (accumulation), that is 60 units. Of these 60 units of wage goods sector 1 would use 45 for replacement and 15 for accumulation of a new labour force. In the same way, sector 2 would use 40 units of means of production to replace and 20 to add new constant capital.⁹

In the situation as described, this equilibrium exchange could not however take place from the moment that sector 1, noticing the greater profit rate attainable in sector 2, would tend to invest its own disposable funds in this latter sector.¹⁰

In this way, searching the highest profit rate and in conformity with the initial hypothesis, the capitalists of sector 1, basing themselves on ruling prices in the

previous, already completed, period, decide to maintain in the sector 120 units and to accumulate 45 units, or all their surplus value, in sector 2. On the other hand, sector 2 cannot but choose to invest all its capital in enlarging its own production. The total investment demand in sector 2 thus remains at 120 units, while the demand for total investment in sector 2 comes out to be 165 units. This must provoke a disequilibrium between demand and supply given the previous prices ($p_1 = p_2 = 1$) since the value composition $(C/V) = w$ is different in the two sectors ($w_1 = 2$; $w_2 = 1$). Total demand for means of production would in fact reach 172.5 units against a supply of 180; and the demand for wage goods at 127.5 units against a supply of 120. There will as a result be a shift of market prices with respect to equilibrium prices: $p_1 = 0.9583$, $p_2 = 1.0625$. With these new prices, the rate of profit in sector 2 will later rise, together with its production, to about 0.58, and that of sector 1 will fall to around 0.28.

The situation would be however destined to change quite radically in the following period. Given fixed technical coefficients, the production of sector 1 would be constant, while the output of 2, as a result of the mass of investment effected, would rise finally to about 248 units, generating overproduction of wage goods with respect to the new demand, determined on the basis of the same mechanism of transferring funds from 1 to 2, equal to about 43 units; whilst sector 1 would find itself unable to deal with the growing demand for capital goods caused by its production over two periods stopping at 180. Here the excess of demand would be equal to about 80 units. This new discrepancy would bring about a new variation in prices, which would change to approximately $p_1 = 1.45$, $p_2 = 0.83$. Given these new selling prices, the relation between the profit rates would turn around: $r_1 = 0.62$ and $r_2 = 0.25$; and the transfer of capital from one sector to another would have to be reversed. The general movement, conducted over 9 periods after the starting point, would appear as shown in Figure 9.10.

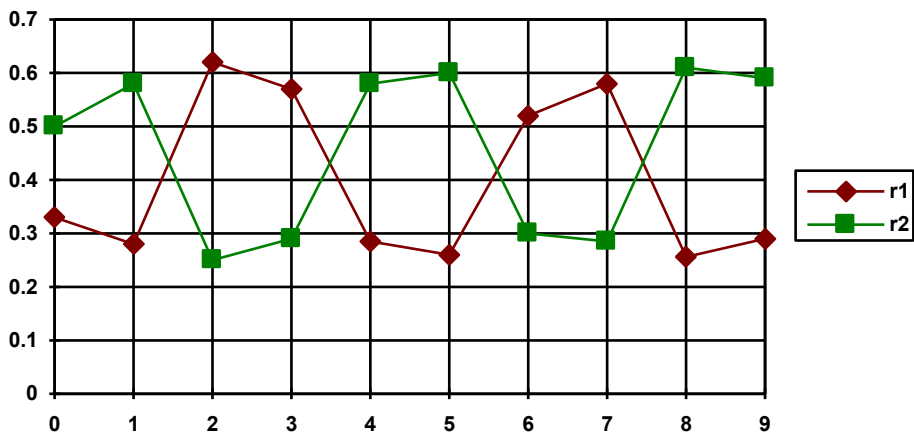


Figure 9.10 Profit rate movements derived from Table 2

9.6 PROFESSOR ITOH'S CRITICISM

An interesting criticism of the Marxist theory of market values has been given by Professor Makoto Itoh from Tokyo University, one of the most brilliant contemporary Marxist economists.¹¹ Itoh maintains that in the treatment given in Chapter 10 of Volume III of *Capital* there are *two* different notions of market value: (i) the weighted average of individual values in a given sector (ii) the market value as determined by demand which makes a selection between various individual values. To this Itoh adds that market value and market price are two distinct concepts.

Notion (i) corresponds to that which is here called social value, and notion (ii) to that which is here called market value proper. In order for the exchange value of supply and the exchange value of demand of a given commodity to be independently determined – or we would fall into the void typical of orthodox theory – there has to be a mechanism which fixes the exchange values of production supplied in a given sphere *before* demand can exercise its effect.

The notion of weighted average of individual values offers this mechanism, which operates as a pure reciprocal pressure of the producers belonging to the same sector without the action of any ulterior force coming from outside. Each one of them tends naturally to the optimum use of its own productive capacity, thus reaching its own maximum productivity. The initial result is *not* yet a uniform exchange value for the commodity produced by the sector but a series of individual exchange values which reflect the different techniques in use. *Independently* of the action exercised by demand, the levelling of individual values must necessarily lead to an average (or social) value; and the total value produced is precisely given by the sum of the magnitudes of the average or social values of all goods produced in the totality of all spheres of production, since it is only the latter which expresses the contribution in labour time contributed by each single sphere to social labour, or, in other words, the division of social labour between the various spheres. Demand intervenes successively by creating shifts between the values at which it wants to absorb the production on offer, and the latter's social value. Acting in this way, social need for the various commodities is able to select particular values and individual productivities in various sectors, constraining individual producers to align themselves with these market values.

Adopting a particular interpretation of the theory of differential rent rather similar to Ricardo's theory,¹² Itoh elaborates a theory of market value which is able to synthesize the two different interpretations found in Chapter 10 of *Capital* Volume III. According to this third notion, the market value would be determined by that productive technique which can expand in the given sector to satisfy the fluctuations of demand.

Itoh considers the theory of market value itself to be a generalization of the theory of differential rent developed by Marx in Chapters 38-44 of Volume III of

Capital and in Chapters 11 and 12 of volume II of *Theories of Surplus Value*, but this is a reference which seems to encounter some problems. Differential rent does not arise because the natural conditions impose an objective limit on the growth of production in response to the fluctuations of demand, necessarily imposing a recourse to land or mines with a lower natural productivity in order to raise the supply of the product. It arises because these natural conditions are *non-reproducible and therefore not subject to the investment of capital* and so are subjected to the monopoly of private property in land by a someone who can intercept the superprofit arising from these particular natural conditions and wrest it from the productive capitalist (see for example the argument developed by Marx at the beginning of Chapter 38 in Volume III of *Capital*). The fact that, in sectors dominated by these non-reproducible natural conditions which are monopolized by landed property, market value is determined by the worst productive conditions, is not caused by special natural circumstances but precisely by the circumstance that the worst land must give rise to a rent which simply represents its subjection to private property.¹³

A number of questions surround Itoh's theory. If in a sector there coexist different techniques with different productivities there is no objective obstacle to the growth of production using any technique in use, equally to the simultaneous growth of all of them. On this premise, market value would be determined exactly as the weighted average of individual values. In practice, however, the probabilities would always be in favour of a growth in the total production of the sector via the extension of the most efficient technique, which has higher productivity, lower costs and a greater difference between value and unit costs. In this case what would market value be? Clearly the individual value of the most efficient producers. It would therefore be sufficient to declare that in each productive sphere the market value is in practice that of the most advanced technique. This would, however, have nothing to do with the adaptation of supply with respect to oscillations in demand, but only with the probability that such adjustments would be effected, as is logical, by resorting to the most productive techniques in use.¹⁴ The market value would be determined by the highest productivity only *after* the adjustment to a growth in demand. *Before* this can happen, or before the fluctuations of demand are perceived, the market value must however be determined from the average of the individual techniques employed. The matter appears particularly clear if we suppose, as moreover happens with every technical change, supply is adjusted to demand by means of the use of absolutely new techniques not yet in use. In such a case it is, after all, obvious that the market value determined by the technique developed to respond to the new demand cannot be known before the change.¹⁵

NOTES

¹ Translation by Alan Freeman

- ² The real wage paid to the workers constitutes, for them, a disposable income, but for the capitalist who has engaged them it is only one part of the costs of producing the commodity. In practice, the total demand for wage goods is given by the total cost of the labour force sustained by the capitalists. The former cannot therefore be known if the latter is not known. But if the capitalists have already remunerated the workers, who can use their own income on the market, this means that market prices are already fixed
- ³ The chart of the linear supply function is normally shown with S entirely in the positive quadrant, that is making it intersect the S axis in a positive point. But this is totally absurd since it presupposes the possibility of positive quantities being supplied at a zero unit price. It is obvious that supply can appear only when the unit price that can be obtained on the market is above a minimum level, which can be assumed given by the costs of production.
- ⁴ In reality the theory of 'markup', even though it is normally applied to the case of monopolistic production, can be considered a rudimentary form of the Marxist theory of supply prices.
- ⁵ The growth of these two differences corresponds to an enlargement along both positive directions of the two Cartesian axes of the sectoral logistic supply curve in Figures 9.4 and 9.5.
- ⁶ As can be seen, the long term supply curve (assuming, that is, continuous changes of technique and of productivity) has the average negative inclination of the demand curve inasmuch as greater quantities would be associated with lower social values.
- ⁷ If the relations between supply and demand in the various productive spheres come back into equilibrium in such a manner as to generate a tendency towards market values which produce a uniform profit rate, then in the establishment of market values in those sectors with an organic composition above average those with higher individual values must dominate, that is those with lower productivity, while in sectors with an organic composition lower than average those with individual values which are lower, that is with higher productivity, will prevail. Only in this way can value be transferred from sectors with a relatively low organic composition towards those with a relatively high composition.
- ⁸ Occasionally Marx employs the expression 'market price of production' as equivalent to the concept of social value in the field of the magnitude of value. Definitively, the market price of production is that market price which yields an equal rate of profit to the totality of each productive sector, but different profit rates to the single producers who enjoy different productivities due to differences in the techniques in use. Supposing that the tendencies towards re-equilibrium of sectoral profits are in full operation thanks to the continual transfer of funds to increase production towards those sectors which offer a superior profit rate, it will be the difference between the effective market price, established between the various individual market prices of production and the minimum individual market price of production of the sector to create the drive towards a rise in production and/or the productivity between the sector's producers.
- ⁹ In the case of expanded reproduction in two sectors in which all profits are reinvested, the general equation of exchange in equilibrium between the two sectors is as follows:
- $$\Delta C_1 + \Delta C_2 - S_1 = S_2 - (\Delta V_1 - \Delta V_2)$$
- ¹⁰ In the model presented here there is no fixed capital, but in reality it is fixed capital itself which constitutes one of the major obstacles to capital mobility between different productive spheres. It is not enough to suppose that any given sphere can bypass this through the sale of its fixed capital, since if this capital migrates somewhere else its exit would be compensated by the entry of another. To simulate reality most closely without introducing fixed capital into the model (and hence to avoid unnecessary complications) we should therefore hypothesize that only surplus value (or profit = *net* investment) is transferred from sectors with low profitability towards those with high profitability. In this way we approach most closely the real situation, in which, with fixed capital in the process of being used up, all *gross* investment (profits + depreciation) would be transferred to the sector with the highest productivity. The sector with an inferior profit rate would continue its own production on an unchanged scale and all material accumulation would take place in the sector with the highest profit rate.
- ¹¹ See Itoh (1988:226-235) and Itoh and Nobuharu (1979).
- ¹² Ricardo founds the whole of his theory of differential rent on the arbitrary presupposition that new land is necessarily brought into production from the best to the worst. Only thus can he conceive that, in

contrast to what happens in industry, it is always the lowest individual productivity which determines market value.

- ¹³ The existence of rent in general and of absolute rent in particular therefore naturally depends on the fact that the organic composition in agriculture is lower than the average. Only thus is the sale of agricultural products grown on the worst land able to give a rent, and the sale of the products of the best lands generates a differential rent to the landowner.
- ¹⁴ Since Itoh, and in general the Uno school, intend the adjustment of supply to changes in demand to take place in the short term, everything comes naturally to depend on what in reality is considered to be the 'short term'. If the short term is that period in which changes in production are obtained without accumulation of additional fixed capital, which means using hitherto unutilized capacity, then in the general case, the technique which determines market value will be the worst, since it will be this technique which is only partially used. If the short term is intended to mean, on the other hand, a period in which the adjustment to a growth in demand is achieved through a growth in productive capacity, then the productive conditions which regulate market value would be the best in the sector as we have seen. Moreover, since neither bad nor good weather last all the time, neither does the short term remain short for ever. After an initial growth of supply through a greater use of the least efficient techniques, invariably better conditions of demand will draw into the sector new investments in more advanced techniques, changing the market value. If this latter movement is rapid enough, or if on the market there are sufficient quantities of means of production available corresponding to the best techniques, one could eventually anticipate the first type of movement, thus finishing up with the determination of market value. All this is in no way different from the assertion that market value is determined by the action of demand on the existence of multiple conditions of production within each productive sphere, as is argued in this article, an idea which however seems to be rejected by Itoh.
- ¹⁵ Naturally, since demand oscillates as much above as below, there would be cases in which supply would reduce in order to adapt to changed demand. Also in breaking the fall in production, the use of all techniques available in the sector could in theory be cut. In practice, however, this would come about always through a reduction in the use of inferior techniques. Also here it would be the best techniques which would determine the new market value since these would be the only ones in a position to respond to fluctuations in demand.

10 A value-theoretic critique of the Okishio theorem

Andrew Kliman

10.1 INTRODUCTION

This chapter will vindicate Marx's contention that mechanization can cause the rate of profit to fall. It will assume profit maximizing behaviour and a constant real wage, and thus demonstrate precisely that which the Okishio (1961) theorem is generally thought to have refuted. The 'catch', as it were, is that value will be conceived as I believe Marx conceived it, as a quantum of dead labour owing its existence to the extraction of living labour, and existing in historical time. It will not be conceived as an equilibrium magnitude derived from technological data or as an incidental numéraire in an equilibrium model in which only relative prices (values) matter.

It is no accident that I here reiterate themes voiced elsewhere in this volume, in connection with the transformation of values into production prices. Since Bortkiewicz (1952), the attempts to show logical inconsistency in Marx's profit rate theory and in his account of the value-price transformation have gone hand in hand; the modern, 'Sraffian' critique of Marx kills the two birds with one model. Conversely, McGlone and I (Kliman and McGlone 1988), by repudiating that model and its conception of value, vindicated Marx's account of the value-price transformation. Emerging from that exercise was the recognition that our alternative conception of value was the foundation upon which Marx's law of the falling rate of profit could be defended against the Okishio theorem (Kliman 1988).¹ Independently, on the basis of similar critiques of the Sraffian concept of value, Ernst (1982) and Alan Freeman (see this volume) have also developed rather similar models of falling profitability due to mechanization.

By rooting falling profitability in mechanization, these works differ from the better known critiques of the Okishio theorem, as I discuss in section 2. Section 3 contrasts the Sraffian concept of profitability with Marx's, laying the groundwork for section 4's demonstration that the profit rate can fall due to mechanization itself. Finally, section 5 provides several reasons why profit maximizing capitalists would adopt such mechanized techniques. Before turning to these issues, however, I wish to comment briefly on the significance of the debate surrounding the falling rate of profit.

The global capitalist economy is now entering its third decade of slump. Growth of output and productivity have declined markedly throughout this period in the West and in Japan. The same story holds for Eastern Europe and Russia, even before the accelerated economic collapse of the past few years. The 1980s are commonly spoken of as ‘the lost decade’ for both Latin America and Africa.

Official unemployment in OECD countries has more than tripled over this period. In the USA, an increasing share of those who escape official unemployment can only find temporary and/or part time jobs offering low or no benefits or security.

Especially in the USA, economic ideologues are responding to the slump by calling for, and state and corporate planners are implementing, policies intended to enhance international ‘competitiveness’ by lowering costs and raising productivity. This vision of the future thus offers us more of the present – more automation, robotization and unemployment, intensification of labour, new threats in the workplace to life and limb; unionbusting; and lower wages, benefits, and income support – plus, of course, promises that ‘prosperity is just around the corner’.

Both the crisis of automation and working people’s search for a different future, a new way of working and living, were foreshadowed as far back as 1950. In that year, automation was first introduced in the form of the ‘continuous miner’. Called the ‘mankiller’ by the coalminers, it would soon bring permanent mass unemployment to Appalachia. Yet ‘with automation, *the workers* began to question the very mode of labour. Thus they began to make concrete, *and thereby extended*, Marx’s profoundest conceptions’ (Dunayevskaya 1992:102). These conceptions were not those of the ‘young Marx’ alone; it was the mature Marx of *Capital*, Volume III who analysed the falling rate of profit thus:

The *true barrier* to capitalist production is *capital itself*. It is that capital and its self-valorisation appear as the starting and finishing point, as the motive and purpose of production; production is production only for *capital*, and not the reverse, i.e. the means of production are not simply means for a steadily expanding pattern of life for the *society* of the producers’. (Marx 1981:358)

If indeed the production of capital as an end in itself is capitalist production’s immanent barrier and source of crises, then ‘[t]he true realm of freedom, the development of human powers as an end in itself’ (Marx 1981:959) is neither mere rhetoric nor utopian morality. On the contrary, this humanist perspective becomes the concrete, practical alternative to capitalism and its unending crises – and not only as a goal, but also as the way to achieve it. The development of human powers as an end in itself is inherently a process of *self-development* as well as a goal. Its realization therefore requires that the separation of ends and means, and the division between thinkers and doers, begin to be broken down in the here and now, not put off until ‘after the revolution’.

The very opposite impact of the Okishio theorem has been to turn radical theorists' attention away from the capitalist mode of *production*, its labour process, and towards forms of distribution and competition. It has exerted a decisive influence over recent theories of the falling rate of profit and the contemporary world economic crisis. The theorem purports to demonstrate that, if the real wage rate remains constant, mechanization introduced by profit maximizing capitalists cannot, in and of itself, lower the equilibrium profit rate. Thus, rising real wages are the true source of falling profitability. Marx's contention that the rate of profit must fall because of incessant mechanization, even if workers labour 24 hours a day at zero wages (Marx 1981:523), is simply wrong.

10.2 CRITIQUE OF OTHER CRITIQUES

Various critiques of the theorem have shown that the profit rate can in fact fall. By themselves, such demonstrations do not vindicate Marx's theory of the falling profit rate against Okishio. His theorem does not purport to show the impossibility of a falling profit rate. Rather, as Roemer (1981:113, my emphasis) has stressed, 'the problem has been to understand whether a FRP [falling rate of profit] can be construed to be due to technical innovation *itself*, independent of changes in the real wage'. In most prior critiques, something other than mechanization *itself* causes the profit rate to fall.

One critique, for instance, abandons Okishio's assumption of a constant real wage as unrealistic and shows that the profit rate can fall when real wage increases accompany mechanization (Laibman 1982; Foley 1986; Lipietz 1986). Yet since the fall is due to rising wages, not mechanization *per se*, Okishio's critique of Marx's theory emerges unscathed.

A different critique, suggested by Alberro and Persky (1981), posits the unexpected appearance of new techniques that yield a higher potential stream of returns than existing techniques. If this is a recurrent phenomenon, existing techniques again and again become unexpectedly obsolescent and are scrapped prematurely. Because they fail to yield their full stream of potential lifetime returns, the rate of profit may fall. While it is undeniable that capitalists lack perfect foresight, it should be noted that, again, it is not mechanization itself, but this lack of foresight, that causes the profit rate to fall in the Alberro-Persky model. Unless one can adduce some inherent, systematic bias to capitalists' expectations of technological advance, moreover, the falling rate of profit in this model rests on a contingent phenomenon, in contrast to the lawful, necessary character of the fall in Marx's own theory.

The theorem has also been shown to be invalid when joint products are produced (see, for example, Giussani 1986). This demonstration is more promising as a vindication of Marx's theory, since it does focus on how mechanization itself affects the profit rate. Like the Alberro-Persky model,

however, it rests on a purely contingent factor, in this case the mathematical characteristics of particular technologies.

Much controversy has surrounded the Shaikh-Nakatani critique of the Okishio theorem, which suggests that cut-throat competition forces firms to adopt 'suboptimal' techniques, that is, techniques failing to yield the highest profit rate when 'costed up' at current equilibrium prices. Shaikh's (1978) paper was widely misinterpreted as arguing that firms are forced by competition to maximize profit margins *instead of* profit rates; he (Shaikh 1987) later endorsed Nakatani's (1979) paper, which argues in terms of profit rate maximization. For Nakatani, cut-throat competition takes the form of price reductions. Firms adopt the technique that will maximize their profit rates when their prices are forced down to some minimum acceptable level, instead of the technique that yields the highest profit rate at current equilibrium prices, as the Okishio theorem assumes. Because the technique chosen is suboptimal, its adoption can result in a falling rate of profit. Yet in whatever way it is interpreted, the cut-throat competition argument fails to defend Marx's theory of the falling rate of profit. As Giussani (1986) has noted, the Shaikh-Nakatani view diverges from Marx's by positing the competitive process, not mechanization itself, as the root cause of declining profitability.

Of course, Marx recognized that 'Capital exists and can only exist as many capitals' – a phrase widely quoted by those who would turn one particular form of appearance of capitalism, characterized by competition and private ownership, into an immutable 'essence' of capitalism.² Yet the remainder of the sentence reads: '... and *its self-determination* therefore *appears* as their reciprocal interaction with one another' (Marx 1973:414, my emphases). Marx's point was that competition manifests and enforces the inner laws of capital, but does not invent them or impose them externally on capital. As he wrote later in the same work:

Smith explained the fall of the rate of profit, as capital grows, by the competition among capitals ... as if competition imposed laws on capital from the outside, laws not its own. Competition can permanently depress the ... rate of profit, only if and in so far as a general and permanent fall of the rate of profit, having the force of a law, is conceivable *prior to* competition and regardless of competition. Competition executes the inner laws of capital; makes them compulsory laws toward the individual capital, but it does not invent them. (Marx 1973:751-52)³

Thus, Marx argued from the inner nature of capital outward: mechanization, the growing preponderance of dead over living labour stemming from the drive to expand relative surplus value, results in falling profitability; this in turn unleashes a cut-throat competitive struggle (Marx 1981:361, 365). For Shaikh and Nakatani, conversely, cut-throat competition induces mechanization.⁴ The tendency for the rate of profit to fall is therefore absent, and a falling profit rate is inconceivable, apart from competition. Competition here not only executes the laws of capital, but also invents them and imposes them on capital from the

outside. This strand of the literature therefore ends up by criticizing the outer form in which capital appears, only to give capitalist production relations themselves a clean bill of health.

A possible response to this objection is that Shaikh and Nakatani have simply engaged Okishio on his own terrain, one that assumes the presence of competition. This is false. While Okishio and subsequent *theorists* are concerned with competition and its consequences, the Okishio theorem itself does not require competition or multiple firms. While it does depend on profit rate maximizing behaviour, its conclusions for a profit maximizing, isolated, ‘planned’ state-capitalist society are the same as for a competitive, private capitalist one. Indeed, when only a single capital and one output exist, the proof is almost tautological (see Appendix, part I).

An adequate defence of Marx’s theory must therefore show that mechanization itself can lower the profit rate, ‘independent of changes in the real wage’ (Roemer 1981:113) and ‘regardless of competition’ (Marx 1973:752).

10.3 CONTRASTING CONCEPTS OF THE RATE OF PROFIT

Profitability, for Marx, expresses the degree to which accumulated, dead labour is augmented by the surplus labour pumped out of living labourers in capitalist production. In the Okishio theorem, profitability – at least in equilibrium – expresses the degree of physical productivity. The theorem’s refutation of the law of the falling rate of profit rests on this difference, not competition. Its ‘bottom line’ is simply that, given constant real wages, new techniques adopted by profit maximizing firms to raise their own profitability are so productive that they cannot, in the end, lower the general profit rate.

While the theorem is undoubtedly a landmark, its underlying conflation of value production and use value production is ubiquitous. As noted above, today’s economic ideologists propose reversing capitalism’s long term economic slump through high tech and productivity increases. Prior to Okishio, moreover, several other theorists undertook to refute Marx’s theory of the falling profit rate; all rooted their critiques in the notion that greater productivity translates into greater profitability.⁵

As Ernst (1982) and Naples (1989) have recognized, the theorem (and the Sraffian model generally) measure profitability in physical or quasi-physical terms, as the ‘self-expansion’ of use value. In a one sector (‘corn’) model, its profit rate is what Ernst terms the ‘material rate of profit’: the ratio of surplus corn (corn output minus corn input) to corn invested. Yet in multisector versions, too, profitability is computed solely from physical data and relative prices (themselves only ratios of physical quantities), without reference to either money or labour time. Hence, if corn is the numéraire, the terms of the profit rate reduce

to corn equivalents and the profit rate is computed as the rate of ‘self-expansion’ of corn equivalent.⁶

Such profitability measures implicitly assume that a *unit of corn at harvest time is worth exactly as much as a unit at planting time (and at the moment of investment), irrespective of any changes over time in the labour time needed to produce it or in its money price*. Two interpretations of this assumption are possible. First, as a metaphysical materialist primitive: value is a veil, only relative prices (ratios of things) matter. A thing’s ‘value’ is the quantity of another thing it commands. A unit of corn commands a unit of corn, so it is always selfsame economically as well as physically.

This denial of a commodity’s ‘intrinsic value’ (Marx 1976a:126) is precisely what Marx strove to overthrow, in his critique of Bailey (Marx 1972:124ff) and in *Capital*’s opening pages. By treating value as the capitalistic *relation between* a thing and the social labour time needed for its production, he sought to destroy the independence fetishistically imputed to the world of things (Marx 1972:129). Hence, if the Okishio theorem indeed relies on a ‘use value theory of value’ (Naples 1989:146-47) alien to Marx in order to refute his theory, it refutes nothing, demonstrates no internal inconsistency. As will be shown in section 4, technical change that raises the ‘material rate of profit’ can lower the Marxian value (and price) rate.

A second interpretation of the Okishio theorem is possible, however. It is a comparative static equilibrium exercise. ‘Absolute’ values (and prices) play no role in static equilibrium measurement, so even if values (and prices) are determined by labour time, the profit rate is still expressible in terms of relative prices (physical quantities) alone.

This is correct. Yet treated as a comparative static equilibrium exercise, the theorem sorely lacks the generality that would be needed to refute Marx. It treats mechanization as a one-time-only ‘disturbance’, while even a cursory reading of Marx’s law of the falling tendency of the profit rate reveals that it refers to continuous mechanization:

The progressive tendency for the general rate of profit to fall is thus simply the expression, peculiar to the capitalist mode of production, of the progressive development of the social productivity of labour. ... Since the mass of living labour applied continuously declines in relation to the mass of objectified labour that it sets in motion ... the part of this living labour that is unpaid and objectified in surplus-value must also stand in an ever-decreasing ratio to the value of the total capital applied. But this ratio ... constitutes the rate of profit, which must therefore steadily fall. (Marx 1981:319)⁷

Hence, by failing to treat mechanization as continuous, the Okishio theorem neither refutes this law nor even bears any clear relationship to it. Moreover, that the theorem appears to refute Marx has everything to do with its treatment of mechanization as a disturbance of static equilibrium. It relies crucially on the unproved assumption that the economy ‘fully adjusts’ to a new static equilibrium

after mechanization (see Appendix, part I). Under continuous mechanization, however, full adjustment will not occur and the Marxian profit rate can fall.

This will be demonstrated in section 4. Here I wish to note that, given continuous mechanization (and in general, outside of static equilibrium), the Okishian profit rate is a defective measure of the rate of ‘self-expansion’ of value. The theorem, and the Sraffian model generally, use the same price vector to value fixed capital,⁸ inputs, and outputs. Outside of static equilibrium, this is illegitimate, tantamount to a *retroactive* revaluation of old fixed capital and preproduction inputs at postproduction prices. Since mechanization *itself* tends to lower values over time, it is inadmissible to ignore intertemporal changes in values when assessing the impact of mechanization on profitability. If preproduction inputs and (especially) old fixed capital are revalued according to lower, postproduction values, the capital advanced to production – the denominator of the profit rate – is reduced artificially, raising the profit rate artificially. To ignore intertemporal reductions in values is to sweep under the rug a key immanent obstacle to capital’s self-expansion of already existing value.

To put the issue in accounting terms, the Sraffian model values assets at replacement cost instead of historical cost (actual purchase prices). While replacement cost valuation is appropriate for some purposes, historical cost valuation must be used to ascertain the actual movement of profitability over time. Just as, from the standpoint of capital’s inner nature, the profit rate is the rate at which value ‘self-expands’, from the standpoint of the practical manager and state planner, the profit rate is the rate of return on their actual, original investment.

This point has been made by others, in somewhat different ways (Ernst 1982; Harvey 1982; Weeks 1982), and not only as a belated attempt to circumvent the Okishio theorem. In a 1946 essay, Dunayevskaya (1991:43; cf. Dunayevskaya 1981f:442) argued that

[t]he constant technological revolutions make the time necessary to *reproduce* a product tomorrow less than the time it took to *produce* it today. Hence there comes a time when all commodities ... have been ‘overpaid.’ The crisis that follows is not caused by a shortage of ‘effective demand’ ... that ‘inability to sell’ manifests itself as such *because of the fundamental antecedent decline in the rate of profit, which has nothing whatever to do with the inability to sell.*

By reducing unit values over time, in other words, mechanization itself causes the ‘overaccumulation’ of capital: yesterday’s capital, acquired at higher values, is too large relative to today’s lower valued output. The immanent devaluation of commodities eventually manifests itself in a lack of new value to acquire inputs and workers, and thus sell – at the old, higher values.⁹ Devaluation is manifested outwardly in and through crisis.

On the other hand, declining unit values also result in the devaluation of capital assets. A contradiction between historical and replacement costs develops. Yet when mechanization’s immanent devaluation of capital is made manifest, the contradiction is resolved: capital does eventually become revalued in practice at

its new, lower reproduction cost. This tends to raise the profit rate. Here Marx and the Sraffians agree. Yet this contradiction, too, is ‘resolved’ in and through crisis, through the *forcible* reduction of old values to the new. Whereas the Sraffian model treats devaluation as an unalloyed blessing to the capitalists, as if capital is wiped off the books painlessly and ahistorically, without entailing capital losses, Marx (1981:358, 362ff) recognizes that it involves the eradication of already existing capital, through physical destruction, bankruptcies, the writing-off of capital losses due to falling asset prices, and so on. All such processes imply a lower, not higher, rate of return on the *original* outlay of capital.

Measurement of the profit rate at devalued capital values (replacement costs) therefore accurately appraises the actual rate of return on investment only at the trough of the slump, after so much capital has been annihilated that it is again profitable to resume the normal course of business. Even then, replacement cost measurement only expresses a new potential of capital to ‘self-expand’ – a potential that will not be realized when mechanization begins again to reduce values, and so on. It is not an exaggeration, then, to understand the comparative static equilibria of Okishio’s model as a comparison of slumps.

The foregoing analysis implies that, though mechanization produces continuous declines in unit values and profitability, these processes need not and generally will not manifest themselves as such. The reduction in values will generally not be reflected in falling prices when business is brisk; that is, until the crisis produces a sudden ‘deflation’. Largely for this reason, the ‘observed’ rate of profit typically reflects the continuous tendency of the profit rate to fall only discontinuously, in recurrent crises.¹⁰

It is beyond the scope of this chapter to model the movement in the observed profit rate. The discussion below is confined to an investigation of the *tendency* of the rate of profit – that is, to the historical movement of the rate of profit considered in abstraction from the forms in which it appears. It will thus be assumed that new commodities and capital are valued at their current historical value and existing capital is ‘kept on the books’ at its historical value.

10.4 THE PROFIT RATE UNDER CONTINUOUS MECHANIZATION

This section shows that the Okishio theorem’s treatment of mechanization as a single episodic disturbance is crucial to its result. An alternative, continuous ‘model’ of mechanization is then developed. Given the determination of value by labour time and historical cost valuation of capital, it is shown that the profit rate under continuous mechanization tends to diverge systematically from the ‘material rate of profit’ and can fall when the latter rises. Indeed, if the extraction

of living labour does not increase as the economy grows, the profit rate approaches zero over time.

Initial assumptions

Roemer (1981, Chapter 5) has generalized Okishio's theorem to include nondepreciating fixed capital. A single-capital/one-output version of that generalization, adapted for continuous mechanization (in discrete time), is developed here. The real wage per unit of living labour extracted, w , is constant. Q , F , A , and N stand for output, (nondepreciating) fixed capital, circulating constant capital, and living labour. To subject Marx's law of the falling rate of profit to a very strong test, I assume a form of mechanization that keeps the (constant) capital/output ratio unchanged. For simplicity, growth is assumed. Thus Q , F , and A all grow at the same rate; b (> 1) is their growth factor ($1 +$ growth rate). The growth factor of living labour extracted is c . Under continuous mechanization, $c < b$ (but one-time-only mechanization will also be considered).¹¹ Thus output per worker and the technical composition of capital both rise continuously. Solving difference equations of the form $Q_{t+1} = bQ_t$, one obtains

$$Q_t = Q_0 b^t \quad (1)$$

$$F_t = F_0 b^t \quad (2)$$

$$A_t = A_0 b^t \quad (3)$$

$$N_t = N_0 c^t \quad (4)$$

The path of unit value and price

In considering one-time-only mechanization, the Okishio theorem models a single change in technical coefficients. Thereafter they (and the real wage) remain constant. Hence, given growth of output, adjustment to a post-mechanization static equilibrium depends solely on the full adjustment of prices from pre- to postmechanization levels. To show the fragility of this unproved assumption and to simplify profitability computations, I here develop intertemporal value and price equations based on Marx's concept of value.

Marx holds that the total value of output is the sum of the value of the used up circulating constant capital, preserved in production and transferred to the value of output, plus depreciation of fixed capital (assumed = 0 here), plus the value added through the extraction of living labour in capitalist production. Call V_t the unit input value in period t ; the unit input value of period $t + 1$ is, then, V_{t+1} . One period's inputs consist of the previous period's outputs, so V_{t+1} is also the unit output value of period t . One can therefore write

$$V_{t+1}Q_t = V_t A_t + N_t \quad (5)$$

Dividing by Q_t and substituting the solution values from (1), (3), and (4), one obtains a unit value equation

$$V_{t+1} = V_t a + n(c/b)^t \quad (5')$$

where $a = A_0/Q_0$ and $n = N_0/Q_0$, for which the solution is

$$V_t = (V_0 - n/[c/b - a])a^t + (n/[c/b - a])(c/b)^t \quad (5'')$$

(except in the unimportant case, not considered here, in which $c/b = a$). Assuming the economy yields more output than it uses as material input, $a < 1$.

Now to consider price as distinct from value. In Marx's theory, 'price, taken by itself, is only the *monetary expression of value*' (Marx 1971:35). As the universal measure of value, money is ever present, even in the absence of exchanges, since it 'serves only in an imaginary or ideal capacity' (Marx 1976a:190).¹² Since a single sector and a single capital are assumed here, we have a case of price 'by itself'; no redistribution of surplus value causes deviations of individual prices from values. The 'monetary expression of value' can be represented using ε , a factor indicating the quantity of the monetary unit that represents a unit of socially necessary labour time (Foley 1982). The relationship between unit price 'by itself' and unit value is thus

$$p_t \equiv \varepsilon_t V_t \quad (6)$$

where p_t is the unit price. Assuming ε is constant, so that purely nominal deviations of price from value are ignored, (5'') multiplied by ε gives the intertemporal path of the unit input price:

$$p_t = (p_0 - \pi)a^t + \pi(c/b)^t; \pi = \varepsilon n/(c/b - a) \quad (7)$$

V_0 and p_0 are initial, premechanization magnitudes. In the case of one-time-only mechanization, Q_0 , A_0 , and N_0 (and F_0) can be treated as the magnitudes prevailing *immediately after* mechanization, which all grow at the same rate thereafter. Hence $c = b$. As time proceeds, (7) converges in this case to the static equilibrium price $p_e = \varepsilon n/(1 - a)$, proportional to the labour time needed to reproduce a unit of net product. As noted above, given one-time-only mechanization (with growth thereafter), price convergence implies that the profit rate converges to a postmechanization static equilibrium level.¹³ Confirmation of this assumption likewise confirms Okishio's theorem in this case.

In the case of continuous mechanization, Q_0 , A_0 , and N_0 (and F_0) can be treated as *premechanization* magnitudes. As time proceeds, the amount of labour needed per unit output falls continuously (since $c < b$), so the unit price in (7) asymptotically approaches zero. Yet it is incorrect to infer that a new static equilibrium price – a new identity of input and output prices – is approached. Were that the case, the ratio p_{t+1}/p_t would converge to one over time, but it follows from (7) that

$$\lim_{t \rightarrow \infty} \left(\frac{p_{t+1}}{p_t} \right) = \begin{cases} c/b & \text{if } a < c/b \\ a & \text{if } a > c/b \end{cases} \quad (8)$$

a number always less than one. The unit price converges to what is known as a moving equilibrium level, not a static equilibrium.

Under a regime of continuous mechanization, then, historical and replacement costs of a unit of capital do not converge, but increasingly diverge. The

replacement cost continually falls (ignoring purely nominal differences between price and value), while the historical cost, of course, remains unchanged. Assume, for example, the following data: $a = 0.5$, $b = 1.05$, $c = 1.008$, $n = 0.92$, and $\varepsilon = 1$. The initial, premechanization static equilibrium price is $p_0 = \varepsilon n / (1 - a) = 1.84$. Substituting the data into (7), one obtains $p_t = -0.16(0.5)^t + 2(0.96)^t$, upon which Table 10.1 is based.

t	0	1	2	3	4	10	20	30	40
p_t	1.840	1.840	1.803	1.749	1.689	1.330	0.884	0.588	0.391

Table 10.1

After 40 periods, a unit of fixed capital acquired in period 0 could be replaced at 21 per cent of its original cost. This cheapening of the elements of constant capital implies not a higher rate of ‘self-expansion’ of value, but a lower rate: everything else being equal, the rate of return on the original outlay of capital is only 21 per cent of what it was initially.¹⁴ Or, were the fixed capital suddenly revalued at its replacement cost in the 40th period, 79 per cent of its original value would be annihilated.

Everything else does not remain equal, of course. While the divergence between historical and replacement costs implies that ‘too much’ was paid for capital today by the standards of tomorrow, new capital is acquired more cheaply and, when the real wage remains constant, profit per unit output will continuously rise. The net effect of these consequences of continuous mechanization must now be examined explicitly.

Capital itself as the barrier to capitalist production

For simplicity, assume a premechanization static equilibrium. The profit rate is

$$r_0 = \frac{p_0 Q_0 - p_0 A_0 - p_0 w N_0}{p_0 Q_0 + p_0 A_0 + p_0 F_0} = \frac{1 - a - wn}{a + wn + f} \quad (9)$$

where $f = F_0/Q_0$. (9) will be useful as a benchmark with which the ‘material rate of profit’ and the value/price rate of profit can be compared.

As noted above, the material rate of profit, r^m , expresses the rate of ‘self-expansion’ of use value. Alternatively, it can be regarded as the static equilibrium equivalent of the value/price rate of profit, that is, the rate of profit calculated on the basis of replacement costs. Since fixed capital, inputs, real wage components, and output all have the same unit price in static equilibrium, the unit price cancels out in profit rate calculations, leaving a profit rate that, again, expresses a ratio of physical quantities alone. For the sort of continuous mechanization under consideration, the material rate of profit is

$$r_t^m = (Q_t - A_t - wN_t) / (A_t + wN_t + F_t)$$

which, using (1) – (4), can be rewritten as

$$r_t^m = (1 - a - wn[c/b]^t)/(a + wn[c/b]^t + f), \quad (10)$$

so that, as time proceeds

$$\lim_{t \rightarrow \infty} (r_t^m) = \frac{1 - a}{a + f} \quad (10')$$

The limit of the material rate of profit is clearly greater than the premechanization rate, r_0 (unless workers live on air). The ratio of constant capital to output ($a + f$) remains unchanged but, as the wage cost per unit of output diminishes continuously, the material rate of profit rises continuously, asymptotically approaching its limit, (10').

To compute the value/price profit rate, it is necessary to introduce a new term, K_t , the total (historical) value of the fixed capital in period t , that is, the sum of monetary investment in fixed capital over time. Each increment to the fixed capital is valued at its historical cost, so that the cost of any increment depends on when it was acquired. Formally,

$$K_t = \sum_0^t p_t(F_t - F_{t-1}) \quad (11)$$

The value/price rate of profit, calculated on the basis of historical costs, is

$$r_t = (p_{t+1}Q_t - p_tA_t - p_twN_t)/(p_tA_t + p_twN_t + K_t), \quad (12)$$

but since, using (5) and (6), one can write

$$p_{t+1}Q_t - p_tA_t = \varepsilon N_t \quad (13)$$

then

$$r_t = (N_t[\varepsilon - p_tw])/(p_tA_t + p_twN_t + K_t) \quad (12')$$

If $c < 1$, that is, if mechanization leads to an absolute decline in the extraction of living labour (N), the profit rate approaches zero over time. The numerator of (12') – the mass of profit – declines to zero as time proceeds, while the value of the capital stock (K) and thus the denominator of the profit rate remain positive. Even if $c = 1$, so that extraction of living labour stays constant, the profit rate still approaches zero, because the mass of profit stagnates while the value of the capital stock rises without limit.

These propositions are proved in the Appendix, part 2, A and B. It should be noted that they hold even though both output per worker and the rate of surplus value (s/v) become infinite over time. Expressed as a ratio of money terms,

$$s/v = (\varepsilon N_t - p_twN_t)/p_twN_t = (\varepsilon - p_tw)/p_tw$$

which rises without limit as the unit price, and thus the value of labour power, approach zero. Hence, *if extraction of living labour fails to increase, the profit rate must tend towards zero, irrespective of any and all increases in productivity or decreases in the value of wages*, and in striking contrast to the continuous rise in the material profit rate.

In Marx's theory, as (13) indicates, the new value generated in any period is only the (money expression of the) living labour extracted in that period. If the latter fails to increase, then profit must eventually stagnate. It should be clear that

in (5) and (13), labour time does not function as a convenient numéraire, but expresses the fundamental proposition of Marx's value/surplus value theory. Control and use of other people's labour is the organizing principle of the capitalist system, the only fuel on which the capitalist engine runs. Expulsion of living labour through mechanization spells the doom of the system.

When expulsion is only relative, that is, when $c > 1$, evaluation of the profit rate is aided by using (3), (4), and (7) to rewrite (12') as

$$r_t = \frac{n[\varepsilon - (p_0 - \pi)wa^t - \pi w(c/b)^t]}{(p_0 - \pi)[a(ab/c)^t + wna^t] + \pi[a + wn(c/b)^t] + \frac{K_t}{Q_0}c^t} \quad (14)$$

Part 2C of the Appendix shows that all terms containing time superscripts vanish as time proceeds, except K_t/Q_0c^t , which rises to the limit

$$\pi f(c/b)[(b-1)/(c-1)].$$

Using the full expression for π in (7), one thus obtains

$$\lim_{t \rightarrow \infty} r_t = \frac{1 - a/b/c}{a(b/c) + f[(b-1)/(c-1)]} \quad (14')$$

Comparison of (10') and (14') shows that the value/price and material profit rates tend to two different limits under continuous mechanization. The limit of the material rate is always higher. It is easily shown analytically that the material rate is higher in every period. Neither result depends wholly on the presence of fixed capital; even when $f=0$, the value/price rate and its limit are lower than the material rate and its limit because the output price is always lower than the input price.

While the material rate always rises asymptotically to its limit, the behaviour of the value/price rate may be rather complex. The main factors governing its movement are the initial value of labour power and the pace of mechanization. It will tend to rise (fall) at first when the initial value of labour power is high (low), and it will ultimately fall (rise) when mechanization is rapid (slow) – that is, when b/c is high (low).¹⁵ (Table 10.2 illustrates the movements of the two profit rates, using as data $a = 0.4$, $n = 0.2$, $\varepsilon = 1$, and thus $p_0 = 1/3$, as well as $w = 0.5$, $f = 2$, $b = 1.06$, and $c = 1.02$.)

t	$r_t^m(\%)$	$r_t(\%)$
0	20.00	20.00
1	20.18	19.27
2	20.36	18.76
3	20.53	18.34
4	20.69	17.98
5	20.85	17.65
10	21.55	16.26
20	22.63	14.36
50	24.08	11.86
100	24.87	10.03
150	24.98	9.44
∞	25.00	9.11

Table 10.2 Profit rate comparisons over time

As (14') indicates, moreover, the tendency of the value/price rate is very sensitive to the pace of mechanization – of which the term $(b - 1)/(c - 1)$ provides an index. *Ceteris paribus*, the greater this pace, the greater is the tendency of the profit rate to fall.

The value/price profit rate may or may not fall in the sense of its limit being lower than the premechanization profit rate r_0 . The relationship between them is influenced by the pace of mechanization, the initial value of labour power, and the output/constant capital ratio. The higher the initial value of labour power or output/constant capital ratio, the greater is the pace of mechanization needed to produce a falling rate of profit. Given the pace of mechanization, the higher the initial value of labour power, the lower the output/constant capital ratio must be if the profit rate is to fall.

This exercise has thus not demonstrated that the rate of profit must fall, though it has shown that it will fall if the extraction of living labour fails to increase or if the pace of mechanization is rapid enough. It bears repeating, however, that the law of the tendency of the rate of profit to fall has faced two very strong tests here – not only the constancy of the real wage rate, but also the constancy of the output/constant capital ratio.

10.5 MICRO-ENFORCEMENT OF THE LAW

Would a profit maximizing capitalist adopt the mechanized techniques modelled above? There are several possibilities to consider here. The capitalist might ‘cost up’ the next period’s technique at the current price, or at the static equilibrium price corresponding to the present technique. The expected profitability of the new technique might be compared to the present period’s value/price rate, or to the current material rate.

As long as the same set of prices is used to value output, inputs, and fixed capital, each possible combination of these methods would indicate that the new technique should be adopted. Since the same price is used to cost up all terms in the expected profit rate, it is identical to next period’s material rate. As we have

seen, the latter is higher than the current material rate and thus higher than the current value/price rate as well. The board of directors or central planning agency would therefore always ‘give the go ahead’ to the new technique.

It is reasonable to object that the capitalist might anticipate the fall in the unit price, and therefore not use a constant price to evaluate the new technique. Yet it should be noted that the Okishio theorem itself assumes expected profitability calculations are made on the basis of current prices – even though labour time values will fall throughout the system when the new technique is employed. Hence, as a refutation of the theorem, the demonstration above is sufficient.

Even if the fall in the unit price is anticipated, however, the new technique might be adopted under competitive conditions. As Marx (1981:373-74) argued, the innovating firm’s profit rate might rise because its higher productivity enables it to reap superprofits while its competitors’ profit rates and the general profit rate fall. The Okishio theorem seemed to refute this argument, but only because it seemed to show that a new technique that caused the innovator’s profit rate to rise could not lower the general rate of profit. By refuting the theorem, this chapter has likewise vindicated Marx’s argument.

As an illustration of this process, consider a one sector capitalist economy consisting of an innovating firm, I, and its competitors, C. As in the example above, the data for the total social capital are $a = 0.4$, $n = 0.2$, $\varepsilon = 1$, $p_0 = \frac{1}{3}$, $w = 0.5$, $f = 2$, $b = 1.06$, and $c = 1.02$. The initial market shares of I and C are 10 per cent and 90 per cent, respectively. Beginning from a static equilibrium with I and C having the same technology (and thus the same a , n , and f , above), C does not innovate, but grows at 4 per cent per period ($b^C = c^C = 1.04$). I’s output and inputs change at the rate needed to ensure $b = 1.06$ and $c = 1.02$ for the total social capital.¹⁶ The general rate of profit is again computed from (5), (6), (11), and (12). Individual profit rates are computed analogously, except that all purchases and sales are made at the *social* price, expressing the average, socially necessary labour time needed to produce the commodity, given by (5) and (6).

t	r_t^I (%)	r_t^C (%)	r_t (%)
0	20.00	20.00	20.00
1	20.65	19.09	19.27
2	21.10	18.41	18.76
3	21.37	17.83	18.34
4	21.50	17.31	17.98
5	21.54	16.83	17.65

Table 10.3

Table 10.3 gives the individual and general profit rates through period 5. Consistent with Marx’s argument, I’s profit rate rises, while C’s and the general rate fall. Since the data for the total social capital are the same as in Table 10.2, moreover, the general rate of profit in each period is exactly the same, although Table 10.2 and the discussion until now abstracted from competition. This illustrates the meaning of Marx’s contention that competition manifests and enforces the law of the falling tendency of the rate of profit, a law which,

however, 'is conceivable *prior to* competition and regardless of competition' (Marx 1973:752).

Finally, it is crucial to recognize that mechanization can be put into effect, not only because of intercapitalist competition, but because of a type of 'competition' inherent in the capital/labour relation itself: the antagonism between worker and machine. The Okishio theorem, and bourgeois economics generally, treats wages as being paid, not per unit of labour power hired, but per unit of actual labour activity. It is thus known *ex ante* how much output will result, not only from given physical inputs and labour activity, but also from given money outlays. It is as if the purchase of labour power in the market guarantees that the gears of industry will turn smoothly.

In capitalism, however, the payment of wages bears no monotonic relation to the amount of labour sweated out of working people. To turn labour power into actual sweated labour, the capitalist reduces workers to appendages of machines, exercises the raw power of management, and so on. But the power of workers 'trained, united and organised by the very mechanism of the capitalist process of production' (Marx 1976a:929) always threatens to raise the wage rate per unit of *labour actually performed*, or per unit of *output actually produced*, to uncontrollable and unacceptable levels, through strikes, slowdowns, increased supervisory costs, and so forth; and the workers' potential to take control of production is ever present. In such an environment of 'uncertainty', techniques of production cannot be costed up in the manner assumed by the Okishio theorem; only after production is completed can the wage rate per unit of labour extracted be known with certainty. Moreover, very good microeconomic reasons suggest to the capitalist that profitability depends on reducing this uncertainty. Mechanization is the key way in which s/he tries to gain control of the factory, to further the implementation of his/her 'purely despotic' plan (Marx 1976a:450), and thus to raise expected profitability. This is the 'microfoundation' of the falling rate of profit that pertains to any and all forms of capitalism. It is a 'rising organic composition' theory; it is a 'class struggle' theory. The two are the same.

But machinery does not just act as a superior competitor to the worker, always on the point of making him superfluous. It is a power inimical to him, and capital proclaims this fact loudly and deliberately, as well as making use of it. It is the most powerful weapon for suppressing strikes, those periodic revolts of the working class against the autocracy of capital. According to Gaskell, the steam-engine was from the very first an antagonist of 'human power'. (Marx 1976a:562)

In absolute opposition to capital's drive to subdue human power by replacing it with machine power, which gives rise to the falling tendency of its profit rate and its crises, Volume III of *Capital* holds forth the vision of a 'true realm of freedom, the development of human powers as an end in itself' (Marx 1981:959).

10.6 APPENDIX

I. The Okishio theorem

Roemer (1981, Chapter 5) generalized Okishio's theorem to include nondepreciating fixed capital. A single-capital/one-output version of that generalization follows. Premechanization magnitudes are denoted with, and postmechanization magnitudes without, a zero superscript (for example, F^0).

The theorem is an argument in three steps:

(a) Assume an initial static equilibrium, with a static equilibrium (timeless) price prevailing:

$$p^0 Q^0 = r^0 p^0 F^0 + (1 + r^0) p^0 (A^0 + wN^0)$$

which implies that

$$r^0 = (Q^0 - A^0 - wN^0)/(A^0 + wN^0 + F^0) \quad (I.1)$$

(b) The capitalist will adopt a new technique if and only if it is expected to result in a higher profit rate, according to calculations made on the basis of the *current* static equilibrium price, profit rate, and real wage rate. Adoption of the new technique thus requires

$$p^0 Q > r^0 p^0 F + (1 + r^0) p^0 (A + wN)$$

from which it follows that

$$r^0 < (Q - A - wN)/(A + wN + F) \quad (I.2)$$

(c) Finally, adjustment to a new static equilibrium is assumed (not proved), with p and r as the new equilibrium price and profit rate:

$$pQ = rpF + (1 + r)p(A + wN)$$

implying that

$$r = (Q - A - wN)/(A + wN + F) \quad (I.3)$$

Since the expressions on the right hand sides of (I.2) and (I.3) are identical, $r > r^0$.

II. Mathematical fine points

Note that:

- (i) p_t approaches zero from above over time (as shown in text);
- (ii) $ab = 1$ would imply $A_{t+1} = Q_t$, but some Q_t must be used for wages, and so on, so $ab < 1$; and
- (iii) equation (11) can be rewritten, using (2) and (6), as

$$K_t = F_0 [p_0 + (p_0 - \pi)(1 - \frac{1}{b}) \sum_1^t (ab)^\tau + \pi(1 - \frac{1}{b}) \sum_1^t c^\tau]$$

- A. The profit rate approaches zero over time if $c < 1$. Proof: Refer to (12'). ($c < 1$ and (i)) implies that N , and the numerator of (12'), approach zero over time. Since the increment to K in any period is the positive unit price times the positive change in fixed capital, K continually increases, so the denominator remains positive. Q.E.D.

- B. The profit rate approaches zero over time if $c = 1$. Proof: Refer to (12'). ($c = 1$ and (i)) implies that N_t and the numerator of (12'), reach a finite limit over time. Refer to (iii). The first term in square brackets is constant. Given (ii), the second term approaches a finite limit over time. $c = 1$ implies that the third term, and thus K_t , and thus the denominator of (12'), increase without limit. Q.E.D.
- C. Refer to (14). $a, c/b < 1$. ($c > 1$ and (ii)) implies that $ab/c < 1$. Thus $a^t, (c/b)^t$, and $(ab/c)^t$ approach zero over time. Refer to (iii). The first term in square brackets is constant and, given (ii), the second reaches a finite limit over time. Hence, when $c > 1$, each approaches zero over time when divided by c^t . In the third term, Σc^τ divided by c^t is $c\Sigma(1/c)^\tau$, also summed from 1 to t , which rises to the limit $c/(c - 1)$. Hence K_t/Q_0c^t rises to the limit $\pi f(c/b)[(b - 1)/(c - 1)]$.

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NOTES

- ¹ For the sake of clarity, it must be noted that my research has not sought to reconceptualize value in order to replace a flawed tool of economic analysis with a superior one. I regard Marx's concept of value as a category of his dialectical presentation of the real movement of capitalistic society, not as a tool of investigation. Moreover, my research is not intended to develop an alternative political economy, but to reclaim and contribute to the *critique* of political economy on the foundations laid by Marx. For an elaboration of this distinction, see the chapter by McGlone and Kliman in the present volume.
- ² '[C]ompetition is an essential feature of capitalism; capital can only exist in the form of many capitals' (Elson 1979b:168).
- ³ See also Marx (1976a:433): 'The general and necessary tendencies of capital must be distinguished from their forms of appearance ... a scientific analysis of competition is possible only if we can grasp the inner nature of capital, just as the apparent motions of the heavenly bodies are intelligible only to someone who is acquainted with their real motions, which are not perceptible to the senses'.
- ⁴ Nakatani actually reverses the causation to a greater extent, rooting cutthroat competition in a prior lack of aggregate demand, whereas Marx roots the shortfall in demand in the antecedent fall in the rate of profit. Shaikh does not explain the source of the cutthroat environment but, given that competition induces mechanization in his approach, the source could not be falling profitability stemming from mechanization itself.
- ⁵ In 1899, just five years after the publication of *Capital*, Volume III, Tugan Baranowsky and the Italian philosopher Benedetto Croce independently critiqued Marx's law along these lines. Bortkiewicz (in 1907), Moszkowska (in 1929), and Shibata (in 1933) also anticipated Okishio. See Howard and King (1989:188-90, 198; 1992, Chapter 7) for references and discussion.
- ⁶ Imagine, for simplicity, two sectors without fixed capital and the following input-output relations (with wages included among inputs): (I) 12s, 8c yield 24s; (II) 2s, 4c yield 12c (s is steel, c is corn).

Assuming uniform profitability and stationary prices, the ‘corn price’ of steel is 2: 1 unit steel = 2 units corn. The profit rate is

$$\frac{24s + 12c}{14s + 12c} - 1 = \frac{48c + 12c}{28c + 12c} - 1 = \frac{60c}{40c} - 1 = 0.5$$

indicating a 50 per cent expansion of corn-equivalent.

- ⁷ The phrase ‘the expression ... production’ was emphasized in the original; other emphases are added.
- ⁸ Okishio’s original theorem ignores fixed capital, but Roemer’s (1981, Chapter 5) later generalization includes it.
- ⁹ ‘Part of the commodities on the market can complete their process of circulation and reproduction only by an immense reduction in their prices, i.e. by a devaluation in the capital they represent’ (Marx 1981:363).
- ¹⁰ See Perelman’s (1993) excellent discussion of crises as discontinuous, nonperiodic manifestations of technical change and asset devaluation. See also Moseley’s (1993c) argument that, due to the restoration of profitability during slumps, Marx’s law does not imply a long-run decline in the observed profit rate.
- ¹¹ The parameters are implicitly restricted to ensure that output in each period is greater than or equal to the next period’s production requirements. Given that $c \leq b$, if this restriction is met in the initial period, it will be met thereafter.
- ¹² I therefore reject Ernst’s (1982) contention that money and price cannot exist in a one-output model. In his model, capitalists are unable to recognize the fall in the value rate of profit because value relations find no monetary expression. This leads him to the absurd conclusion that the falling rate of profit neither leads to crisis nor influences capitalists’ behaviour. Instead, the system breaks down due to *material* overaccumulation.
- ¹³ This result can be confirmed by comparing the limit of the value/price rate of profit (14’) with the limit of its static equilibrium counterpart (10’), below. When $c = b > 1$, the two profit rates converge to the same limit.
- ¹⁴ For example if the ratio of output to fixed capital is 1, then (total revenue)/(value of fixed capital), initially 1, falls to 0.21 by period 40.
- ¹⁵ It can also be shown that, when real wages are zero or the rate of surplus-value is held constant, the value/price profit rate must decline continuously to its limit—even though the ratio of constant capital to output is fixed. In contrast, the material profit rate remains constant through time in both cases.
- ¹⁶ For example, if $Q_0 = 1250$, then $Q_0^C = 1125$, and $Q_0^I = 125$; and $N_0 = 250$, $N_0^C = 225$, $N_0^I = 25$. Given the growth rates, $Q_1 = 1325$, $Q_1^C = 1170$, so $Q_1^I = 155$; and $N_1 = 255$, $N_1^C = 234$, so $N_1^I = 21$.

11 Price, value and profit – a continuous, general, treatment

Alan Freeman

Laß dir von keinem Fachmann imponieren, der dir erzählt: „Lieber Freund, das mache ich schon seit zwanzig Jahren so!“ – Man kann eine Sache auch zwanzig Jahre lang falsch machen.
Kurt Tucholsky

11.1 INTRODUCTION

This chapter replaces the simultaneous equations approach of General Equilibrium theory with an economically superior and more general formalism based on Marx's analysis, removing the arbitrary and restrictive assumptions needed to obtain a simultaneous solution. Its values, prices and rate of profit are in general different from those predicted by simultaneous models. Former debates, which assume a common framework, are therefore superseded. There are now two frameworks; one confirms Marx's thought and one falsifies it; one expresses the inherent phenomena of a capitalist economy, the other assumes they do not exist.

The features of the formalism which distinguish it from equilibrium are:

- ☐ Reproduction is treated as a chronological, not a simultaneous process.
- ☐ Goods are sold at market prices instead of fictional equilibrium prices.
- ☐ Goods exchange for money, not for each other.
- ☐ Profit rates are not assumed actually to equalise.
- ☐ Technology is not assumed either constant or uniform.
- ☐ Supply and demand do not balance and unused goods accumulate as stocks.
- ☐ Variations in the price and value of existing stocks are rigorously accounted for in the calculation of prices, values, and profits.
- ☐ In a uniform treatment of fixed and circulating capital, the period of reproduction has no definite length. In the continuous case it is arbitrarily small.

A formalism is not a model. It does not yield predictions or „solutions“ from particular restrictive assumptions. It is an axiomatic system, a methodical framework for presenting concepts and their relations, in which a variety of different assumptions can be represented and in which it is possible to deduce the general laws that apply to all such special assumptions. Anyone who wants to build a model – that is, asserts that capitalism obeys more precise laws under

more specific circumstances or assumptions – can frame this mathematically in this system, and anyone who wants to study certain phenomena in abstraction from disequilibrium can do so by introducing special restrictions. Equilibrium systems are hence a special case of this more general formulation.

It is hence an alternative paradigm to the simultaneous equation method which, under the guise of simplifying, imposes a particular assumption – market clearing – and claims it as a general model. We apply the classical procedure of moving from the general to the particular.¹

The word „general“ does not mean that every aspect of a real economy is represented, but that the construction has introduced no obstacles to representing them, at a more concrete stage of analysis. There is no scope to cover commercial capital, finance capital, landed rent, credit, unproductive labour, noncapitalist production, or skilled and complex labour. Geographical factors are not assessed. The state is not treated apart from its role in monetary regulation, nor relations between states and hence imperialism or the world economy. This shows how far we have to travel. But to travel at all we must leave the territory we are confined in: it is impossible to study finance capital rigorously in a simultaneous framework, since the assumptions of simultaneity spirit away the money relation. My aim is to remove those limits to a proper study of these questions inherent in existing treatments, above all the ideological assumptions of General Equilibrium, frozen in place by the simultaneous equation model and the elimination of time.

The use and limits of mathematics

Parts of this chapter are mathematical. The non-mathematical reader can skip them, but I hope she or he will glance at them, because the mathematics is new but not inherently difficult and one function of this chapter is to develop a complete alternative way of going about things so as to break the stranglehold of equilibrium thinking.

Mathematics suffers the same limitations as formal logic, which has to separate things conceptually that are not isolated actually. For this reason alone it is dangerous to credit it with powers greater than those invested in it. In the last analysis mathematics is a technology of mental processes, and should be taken neither for real things nor real thinking.

However, it often is. Its very power lends it the aspect of a supernatural force, capable of revealing any truth. It unites the two most powerful human mental faculties, the power to symbolize and the power to depict: magic and religion abound with mathematical lore.² Walras and Bortkiewicz were early worshippers at this shrine and economics has yielded itself almost entirely to the mystical power of pictures and symbols, a cosy substitute for the complexity of the real world. For this reason some Marxist writers despair of using mathematics.

The problem, however, is not mathematics as such but its worship as an independent source of truth.³ Political economy is subject to the laws of

arithmetic, which are not abolished by refusing to express numbers in symbols. It is true that the real world imposes itself, if not through conscience then through the facts, but it is not enough just to assert „the figures add up“; it has to be proved. This calls for a mathematical framework whose generality admits the facts, and whose simplicity displays the concepts.

As shown in Chapter 1, Walrasian mathematics imposes concepts that deny access to the facts. However these concepts exist independent of the mathematics, which merely exhibit them in pure form. Even the most seasoned casuist cannot make five from two and two: his best hope is to stop two and two coming together in the presence of four. Mathematics does not help him in this respect; the problem is not its use but its abuse, which this chapter seeks to end.

11.2 A BRIEF READER'S GUIDE

This chapter has two audiences: non-mathematical readers, and those with a background in linear production models.⁴ Mathematical detail is given separately at the end of each section and can be skipped, except for the final part and the section on notation which introduces symbols used throughout.

Sequential value calculation, time, and the labour process

First, I introduce the sequential calculation of value, correcting the basic weakness of simultaneous models which assume that input values are equal to the corresponding output values at the end of production. In fact they equal the output values of the *preceding* phase of production. The notation is introduced.

Exchange, circulation, values and market prices

This introduces circulation in a money economy.⁵ In contrast to the standard treatment commodities exchange against money, not each other; money functions as a hoard, not a flow; and I show that Marx's „first equality“ holds for arbitrary market prices, not just prices of production. Being derived from pure circulation, the analysis applies to any exchange of the products of labour regardless of the conditions of production.

Value transfers and the origin of profit

Any set of market prices effects a transfer of values given by a special vector, the value transfer vector. It summarises the impact of the market on the values emerging from production. Profit is shown to be the sum of surplus value and this transfer vector – Marx's „second equality“.

Capital as such: stocks, flows and accumulation

Stocks are the form which capital – dead labour – takes in production. This central section rigorously examines their formation from commodity flows.

Equilibrium theory is deficient in two vital respects. First, it assumes that supply equals demand when in fact fluctuations in stocks, the pulse of capitalism, both express and regulate the differences between them. Second, it ignores the way old stocks enter the formation of new prices, which is why the profit rate falls.

Value, price and profit in the presence of fixed capital

I extend Marx’s derivation of market values to fixed capital, based on his concept of moral depreciation. I show how to calculate profit and surplus value in the presence of fixed capital and that Marx’s two equalities remain true.

This makes it possible to correct the traditional distinction between fixed and circulating capital which assumes a fixed period of reproduction, an arbitrary accounting construct. This restriction is removed so that results are independent of it. This is the basis of the passage from difference, or discrete dynamics, to continuous dynamics.

I deduce the general law of accumulation and a general account of sale at market prices. On this basis the Okishio theorem is refuted and it is shown that the value and price of society’s capital rises – and its profit rate falls – unless the capitalists disinvest. Finally, the theory is restated with a variable value of money, and its role in the mechanism of the business cycle is established.

11.3 SEQUENTIAL VALUES: AN ILLUSTRATION

To fix ideas and explain the contrast with the simultaneous method, consider a simple example involving two producers P_I and P_{II} , producing homogeneous commodities C_I and C_{II} respectively. Suppose over some period of time they and their labourers consume, produce or reproduce the following quantities of C_I and C_{II} and labour power V , measured in their natural units.

FLows		C_I	C_{II}	V		C_I	C_{II}	Labour Power
Producer P_I	used	35		300	and produced	50		
Producer P_{II}	used	10		200	and produced		100	
Labourers	consumed		50		and reproduced			500

Table 11.1 Quantities consumed and produced in period 1

Let λ_1 , λ_2 and λ_L be the value per unit of C_I , C_{II} and V . The simultaneous approach proceeds thus: the unit values of inputs must equal the unit values of outputs. Then the following must hold:

$$50\lambda_1 = 35\lambda_1 + 300$$

(1)

$$100\lambda_2 = 10\lambda_1 + 200$$

(2)

The unique solution – the only one compatible with equilibrium⁶ – is

$$\lambda_1 = 20, \lambda_2 = 4$$

(3)

However, we have no real right to assume that input values are equal to output values. Suppose during the previous period productivity was different for

whatever reason, and the quantities consumed and produced were given by Table 11.2:

FLOWS		C _I	C _{II}	L		C _I	C _{II}	Labour Power
Producer P _I	used	40		400	and produced	50		
Producer P _{II}	used	10		300	and produced		100	
Labourers	consumed		70		and reproduced			700

Table 11.2 Quantities consumed and produced in period 0

The corresponding simultaneous equation values are given by

$$50\lambda_1 = 40\lambda_1 + 400 \quad (4)$$

$$100\lambda_2 = 10\lambda_1 + 300 \quad (5)$$

and are $\lambda_1 = 40, \lambda_2 = 7 \quad (6)$

The simultaneous calculation faces an insuperable difficulty. If C_I was worth 40 per unit at the end of period 0, then it must also be 40 at the beginning of period 1, since these are one and the same time. But according to equation (1) this cannot be: λ_1 must be 20. The two simultaneous solutions are incompatible.⁷

This reverses the charge made by Marx's critics. The input values of period 1 are not equal to output values of period 1 but of period 0; the same applies to prices *mutatis mutandem*. A perfectly rational alternative is thus available. Suppose, for example, the values given by equation (6) are valid at the beginning of period 1. A perfectly determinate calculation gives new, and different values at a later time – the end of period 1. To distinguish them, we use a time suffix: λ^t represents value at the beginning of period t , that is the end of period $t-1$.

Hence

$$\lambda_1^0 = \text{unit value of } C_I \text{ at the start of period 0}$$

and $\lambda_1^1 = \text{unit value of } C_I \text{ at the start of period 1}$

and so on. The problem then becomes to write down an equation giving the relation between λ^1 and λ^0 for each commodity; This is technically a small step, but conceptually a giant one; it removes us once for all from a mathematical framework which logically imposes constant prices and values.

The equations follow naturally enough from Marx's account of the labour process. For each commodity the value of outputs is the sum of two quantities; the value transferred from consumed constant capital, and the labour product. That is, in this instance, the value of consumed inputs, plus the hours worked.

Hence

$$50\lambda_1^1 = 35\lambda_1^0 + 300 \quad (7)$$

$$100\lambda_2^1 = 10\lambda_1^0 + 200 \quad (8)$$

that is

$$50\lambda_1^1 = 35 \times 40 + 300 \quad (9)$$

$$100\lambda_2^1 = 10 \times 40 + 200 \quad (10)$$

Giving

$$\lambda_1^1 = 34, \lambda_2^1 = 6$$

These are lower than the values of the previous period, because labour productivity has risen, but not as high as the hypothetical simultaneous values of the current period, whose inputs were produced less efficiently than its outputs because of the inherited more costly inputs. Now that λ^1 are known, the same method can be used with the data of the next period (which in general will be different) to define λ^2 , λ^3 , and so on. There is no single unique value but a time sequence of different values, none of them in general equal to the simultaneous solution. Provided the data about consumption and production are available for each period, this is a determinate definition of values in every period. A few relevant points should now be noted:

- ❑ No technological assumptions (such as constant returns to scale) were made; we calculated values from the observed consumption and production of each good, on the scale at which the economy actually performed.
- ❑ Hence a linear production model is not assumed. The only linear assumption is that the value of a composite is equal to the sum of its parts. This is intrinsic to the nature of value and involves no assumptions about production.
- ❑ The straitjacket of a fixed technology has vanished. No matter how technology changes from period to period, the value calculation remains valid.
- ❑ The calculation depends on initial values as for all dynamic analysis. We shall show that starting data are given by the economy itself – observed input prices. The only truly unknown initial quantity is the value of money, dealt with later.

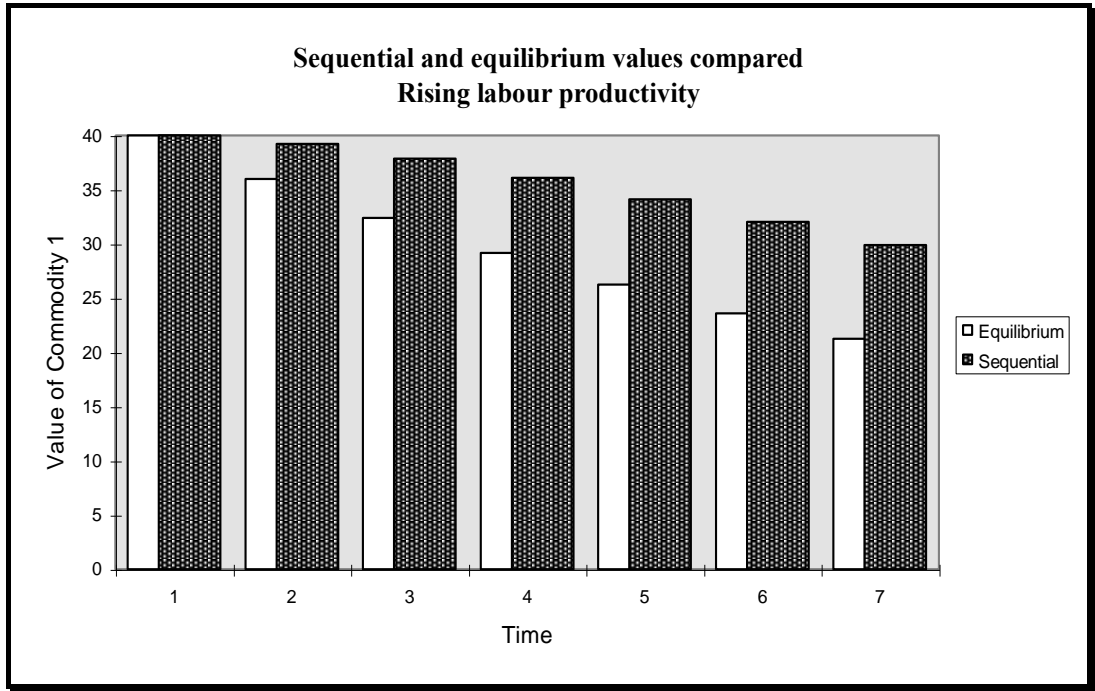


Figure 11.1 Sequential and equilibrium values compared

It cannot be stressed enough that sequential and equilibrium values are *different*. This is so even when technology is fixed but becomes even clearer when it is changing. If consumption and production levels do not change, the sequence converges to equilibrium for any economy producing a surplus, whatever the starting point, which appears to justify treating the fluctuations as an ignorable disturbance. But production and consumption levels will in fact change on a time scale similar to the period of convergence: equilibrium never happens.

Suppose labour productivity steadily improves and 10 per cent less labour is required in each period. Then as Figure 11.1 shows, even though the sequential and simultaneous calculations start with the same values, from then on the two diverge. The reason is that inputs in each cycle come from a *previous* period and embody past labour time. The sequential calculation recognizes these historically-inherited production conditions, the equilibrium calculation cancels them.

In this respect it should be remembered that for the whole of *Capital* except the section of Volume II which deals with simple reproduction, Marx assumes *relative surplus value*.

11.4 A MATHEMATICAL REPRESENTATION

This section may be skipped by the non-mathematical reader although it may be useful to read the first three paragraphs of the section on „notation“ which introduce simple standards used throughout this piece.

Difference equations and the sequential method

The sequential approach can be understood without vectors or matrices. Consider a single commodity serving as its own input such as corn. Suppose 10 person-weeks of labour transform 5 tons of seed corn into 10 tons of new corn. At time $t = 0$ suppose the seed corn's unit value is λ^0 weeks per ton. New corn is produced at $t = 1$ with a new value, λ^1 . Basic value theory tells us that

$$10\lambda^1 = 5\lambda^0 + 10 \quad (11)$$

Suppose now that at $t = 0$ the value λ^0 of the seed corn is known to be 1. Then

$$10\lambda^1 = 5 + 10 = 15$$

hence

$$\lambda^1 = 1.5$$

If corn and labour continue to be produced and consumed at the same rate, we can define a relation between values at any successive times in the same way:

$$10\lambda^{t+1} = 5\lambda^t + 10 \quad (12)$$

By successively substituting we can get $\lambda^2 = 1.75$ from λ^1 , $\lambda^3 = 1.825$ from λ^2 , and so on. These values are defined at all subsequent times, that is, they can be calculated from observed data. Equation (12) is a difference equation which given the initial values can be solved for these values. More generally it reads

$$\lambda^{t+1}X = \lambda^t C + L \quad (13)$$

where

C represents consumed inputs

X represents outputs.

L represents the value-product of labour

More generally, if technical relations are changing (as they are), the equation has to reflect this by adding a time parameter to all magnitudes:

$$\lambda^{t+1}X^{t+1} = \lambda^t C^t + L^t$$

In this general case, sequential and simultaneous values have no necessary relation to each other: If we suppose for example that labour inputs shrink by 10% per year we get the equation that produced Figure 11.1:

$$10\lambda^{t+1} = 5\lambda^t + 10 \times (0.9^t) \quad (14)$$

A sequence of magnitudes for all data of the economy, at all times, is a *trajectory*. A „model“ of this sector of production is an attempted prediction of its trajectory from past data. (The Sraffa model, for example, assumes that X, C, and L are constants.) This is in general impossible.⁸ However certain general laws hold for *all* models – for example, the rate of profit falls unless the capitalists disaccumulate in value terms. The function of mathematical analysis is to establish such general laws and the conditions in which they hold.

Notation

Mathematical notation is not neutral. The unorthodox notation used here is chosen to reflect and encourage the conceptual structure needed to analyse a commodity economy. It is designed to make the logic clearer and the argument easier to follow. The principle is that the same symbol always stands for the same commodity in the same capital, while value is distinguished from use value, and stocks from flows, by varying the type or additional symbols. This emphasises the unity of the commodity form. It also makes it easier to use the same letters as Marx, who tends to use C for everything and V for everything else.

Every commodity has two aspects: use value and value. The value of a commodity will be represented with a £ sign in front unless the context is unambiguous. Thus equation (13) can be written

$$£X^{t+1} = £C^t + £L$$

or

$$\lambda^{t+1}X^{t+1} = \lambda^t C^t + £L$$

This leads to a pedantic but important distinction: One pound's worth of value will be represented as £1 but one pound coin or note itself will be represented 1£.

Every commodity exists both as a flow, or turnover and as a stock. The notation to distinguish these will be introduced in section 10 on accumulation.

The basic symbols are matrices C, W, X and B, and vectors V, L, λ and p :

- C_j^i constant capital employed: quantity of commodity i in capital j
- V_j variable capital (labour power) employed by capital j , in hours
- $£L_j$ value-creating capacity of V_j , (value-product) in pounds⁹

X_j^i	produced output of commodity i in capital j
W_j^i	quantity of commodity i in the wage-fund of workers in capital j
B_j^i	quantity of commodity i owned by capitalists in sector j
λ_j	value of a unit of commodity j measured in pounds
p_j	price of a unit of commodity j measured in pounds

Columns represents capitals and rows represent commodities. This is slightly confusing since Marx's tables show capitals or producers as rows and commodities in columns. Modern usage is too well rooted to change it.¹⁰

There may be more than one producer of the same commodity so C_j^i may not be square. In this chapter we use a *reduced form* (Freeman 1991) of C in which each column aggregates all capitals in a sector and activities corresponding to joint production are allocated to distinct commodities, so each sector makes one distinct good. X is therefore a diagonal matrix. Workers' consumption is represented by a matrix (W) rather than a vector, so wages may differ from sector to sector though of course they may be the same.

To distinguish rows from columns we use the convention that superscripts vary over columns and subscripts over rows.¹¹ Hence:

$\pounds C^m$ is a row vector in which $\pounds C_j^m$ represents the value of money held in sector j ,
 $\pounds C_{\text{farmers}}$ gives the farmers' constant capital, and so on

Column and row totals and correspondence with Marx's notation

We often refer to column or row sums of C , V , X and their derived matrices, for example $\sum^i \pounds C^i$, the constant capital employed in each sector (note that this is the same as λC). Thus

$\sum^i \pounds C^i$ is the total value of constant capital employed in each sector.
 $\sum_j \pounds C_j$ is the total value of each commodity employed in production

This lets us use most symbols as Marx does: $\pounds C$ is what he terms constant capital and $\pounds V$ is variable capital.

Sign convention and the problem of the stock-flow relation

The important matrix K gives the distribution of the total stocks of all commodities in the economy except labour power. A problem of signs then arises as follows. It is conventional, and any other usage would be obscurantist, to represent the *consumption* of C , W and B as a positive quantity. Consumption actually diminishes a stock and, strictly speaking, should be represented as a negative number. It seems a rather strong illustration of the scant attention economics has paid to the stock-flow relation that this is not often recognized.¹² We find that the stock of a commodity is *minus* the sum (or integral) of consumption flows. Therefore the stock of C is represented by $-C$, not by C , just as assets on a balance sheet appear as a debit, something owing to the owner. In

writing down the relation between K and the other stocks in society this problem cannot be avoided and we have to recognize that

$$K = X - C - W - B$$

Thus $\sum_j K_j^i$ gives the amount of commodity i in the economy. The diagonal matrix formed from this is called \hat{K} , so that $\hat{K}_j^i = 0$ when $i \neq j$ and \hat{K}_i^i is the quantity of commodity i in existence. \hat{C} , \hat{W} and so on are similarly defined. Note that $\hat{X} = X$.

The n -sector value equation

The simple difference equation for one good carries over to the n -sector case provided we assume (which Marx did not) that all goods are turned over exactly once, in which case $X = K$.¹³ Then

$$\lambda^{t+1} X = \lambda^t C + \text{£} L \quad (15)$$

or more simply

$$\text{£} X^{t+1} = \text{£} C^t + \text{£} L \quad (16)$$

This can be read off as it appears: value at time $t+1$ is equal to consumed constant capital plus the value product. It provides a solution for λ at all times:

$$\lambda^{t+1} = \lambda^t C X^{-1} + \text{£} L X^{-1} \quad (17)$$

which is positive and determinate provided consumption of inputs and hours worked are positive. It is difficult to conceive how this could be violated.

This concludes the first mathematical section.

11.5 CIRCULATION AND MARKET PRICES

Whether or not goods sell in proportion to their values, prices appear with circulation. Commodities do not exchange for each other but a third commodity, money. This, like all others, is neither consumed nor produced by exchange. It functions as a hoard which grows when people sell, and shrinks when they buy.

By the very fact that prices differ from values, the intrinsic value of the commodity serving as money does not fix the ratios in which it exchanges. If I buy clothes produced in nine hours with metal produced in ten, then just as if I barter meat or drink for them instead of money, the value of money measured in clothes has fallen. In this respect it is like any other commodity.¹⁴

Ricardo's famous unanswerable question – whether the high price of clothes is „due to“ a rise in their value or a fall in the value of the metal – arises only because he never really accepted that nothing exchanges in proportion to its value, not even money. The issue has to be posed differently: how does money regulate the transfer of values in circulation between all goods, including itself?

As universal equivalent, only money functions both as measure of value and standard of price. If clothes previously worth ten pounds now sell for nine then society does not say money has fallen by one sock, but clothes have risen by one

pound. If Ricardo adopted any other practice in his daily life he would at best be recorded as mildly eccentric. If, in exchange, ten pounds come to represent less value than *all* money prices rise, whereas a fall in sock prices does not change every ticket in the shop. Both changes transfer value between capitals; but the change is expressed differently. This is the essence of the price-value relation.

Circulation as such

Circulation is a distinct phase of reproduction. Everyone enters with stocks of commodities and money derived from previous times, whose values also derive from previous times. In general, they exchange at prices different from values. Like Marx, we distinguish two moments of this process; sale and then purchase.

The analytical reason for this separation is not that all commodities are sold at once, but that the sale of any one commodity does not depend on the purchase of another.¹⁵ All commodities are exchanged with money, none with each other. The gains and losses of each capitalist are therefore the net result of two magnitudes, their sales and their purchases. The determinants of each are quite distinct.

Virtually all equilibrium models translate a particular theory of demand into a universal theory of economics. Usually they *derive* sales from purchases which are already past, as if capitalists were under a compulsion to replace their inputs in kind and quantity. Actually this never happens.¹⁶ Demand and supply are concretely and separately determined differently for every society at every stage. A general framework has to translate *any* given pattern of demand into symbols and relations and deduce what is necessarily common to all of them.

We assume only that at the „end“ of circulation, everyone possesses different stocks from the beginning, and that the changes were effected by money exchange at a definite set of prices. Our aim is to express the underlying transfer of value resulting from an arbitrary exchange of commodities in a market economy.

STOCKS	Commodity 1	Commodity 2	Money	Total wealth
Capital I	£200[25]		£300[300£]	£500
Capital II		£80[20]	£300[300£]	£380

Table 11.3a Two-party exchange, starting position with prices equal to values $\lambda_1=\text{£}8$, $\lambda_2=\text{£}4$

Suppose two capitals constitute a society and exchange with the endowments of Table 11.3a. Assume £1 represents one hour of socially necessary labour time or as Marx puts it, one hour of labour time is expressed in £1. Assume all stocks possess initial values given by $\lambda_1=\text{£}8$, $\lambda_2=\text{£}4$, so that, for example, the value of 30 units of C_{II} is £5, representing 5 hours. Suppose proprietors exchange at prices equal to values ($p=\lambda$) as shown in Table 11.3b. The following propositions then hold:

- I. The sum of values in society is the same before as after
- II. The sum of values in society is equal to the sum of prices in society
- III. Each capital has the same value before as after exchange

STOCKS	Commodity 1	Commodity 2	Money	Total wealth
Capital I		£80[20]	£300[300£]	£500
Capital II	£200[25]		£300[300£]	£380

Table 11.3b Two-party exchange after all goods are sold at prices equal to values ($p_1 = £8, p_2 = £4$)

This representation cannot be assimilated to barter. There is no necessary correspondence between the C_I sold and C_{II} purchased. Capital I, if it wanted, could have bought the C_{II} without selling anything leading to Table 11.3c.

STOCKS	Commodity 1	Commodity 2	Money	Total wealth
Capital I	£200[25]	£80[20]	£220[300£]	£500
Capital II			£380[300£]	£380

Table 11.3c Two-party exchange after C_{II} is sold at prices equal to values ($p_1 = £8, p_2 = £4$)

Walras, who writes as if C_I exchanges directly against C_{II} , thinks the demand for C_I is matched by the demand for C_{II} in a ratio given by their relative prices.¹⁷

Thus these propositions apply regardless of how much is actually traded. A change of ownership transfers use values, including money, from one place to another; therefore if the two capitals do actually trade as shown, there must be a net transfer of money. But *value* can only change hands as a result of price variations, and as we shall see this is independent of the volume of trade.

Exchange at market prices

Consider the results of the same exchange at prices different from values. Suppose the unit price of C_I falls to £4 and that of C_{II} rises to £9. This represents no qualitative change: commodities are assessed in the same units. But the commodities have now lost or gained value. The 30 units of C_I whose value is £5.00, for example, are now priced at £4.50, so that £0.50 of their value has been transferred elsewhere. The result is shown in Table 11.3d.

Value has been transferred between capitals as well as commodities, so proposition III no longer holds, but the first two propositions remain true. Social wealth is the same but its distribution has changed. Capital I, which owned the commodity whose price has fallen, has lost £0.50 (representing ½ hour) and capital II, whose goods rose in price, has gained the same amount.

STOCKS	Commodity 1	Commodity 2	Money	Total wealth
Capital I		£180[20]	£220[220£]	£400
Capital II	£100[25]		£380[380£]	£480

Table 11.3d Two-party exchange, all goods sold at prices $p_1 = £4, p_2 = £9$.

In no sense have commodity values been „wiped out“ and replaced with prices. Table 11.3b did not purport to give values before exchange, but after exchange at prices equal to values. Now we have same table with a new assumption: exchange at prices different from values.

Figure 11.2 shows how value is redistributed between capitals, and between the different stocks of commodities in society. This shows that the effect of pricing the commodities at any given market price is a transfer of value, both between the stocks of these commodities and the capitals which are composed of

them. To foreshadow a later discussion, it adds a *transfer vector* to society's commodity stocks and another vector, induced by the first, to capitals.

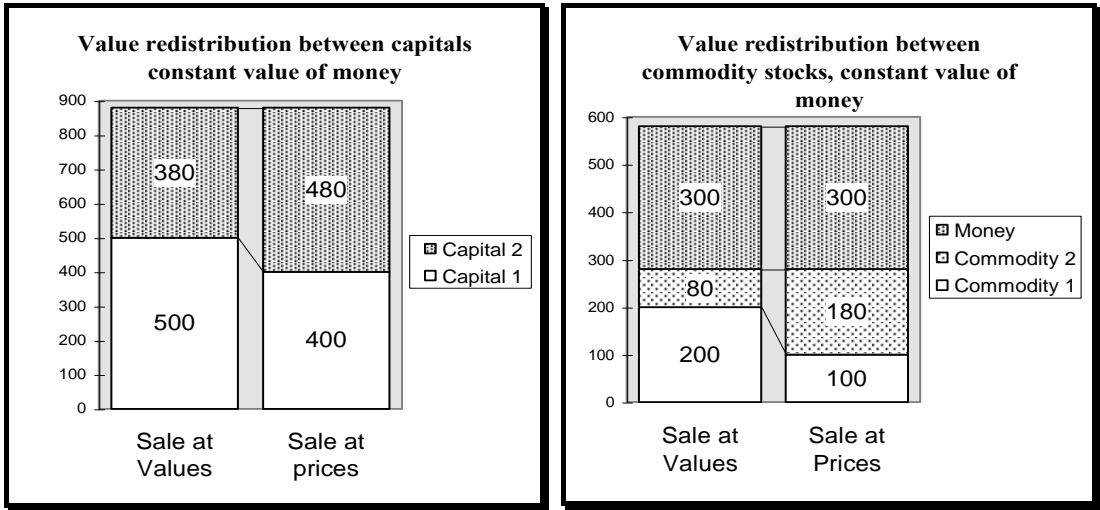


Figure 11.2 Value redistribution with a constant value of money

Two points are not immediately obvious. First, these losses and gains are not concealed. There are no secret transactions in hours hidden by public ones in pounds. If I sell books for £50 that cost me £100 my loss is tangible and concrete. It is not fetishized, dialectically complex, abstract, contradictory, metaphysical or even subtle. I am £50 down, period. The disguise effected by capitalism does not lie in deceit as to the role of exchange or arbitrage. It consists in disguising the source of *profit*, in making the prices of things appear as their real social cost. It disguises only the effects of selling the commodity labour power.

Second, as previously stated the value transfers are effected not by trade but by the change in prices. They remain independent of the volume of trade. In Marx's words, the commodities „are assessed in gold before it circulates them“ (1969b:200). Value is transferred between all goods in circulation, that is, all commodities in society. It is not confined to what is sold. If I speculate in palm oil and £50mn is wiped off its value, then I lose £50mn. I cannot fob off creditors by saying I haven't sold it yet. I may be able to conceal it, but it has happened. The price system hurls accumulated labour across the globe like the mediæval wheel of fortune tumbling crowns and enthroning pretenders with sublime indifference.

This led Proudhon to say exploitation lay in exchange other than at values. Marx said it lay in the nature of the commodity labour power, a result not of purchase at prices other than values, but the purchase of this commodity *at* its value. To demonstrate this he had to abstract, in Volume I, from price-value differences. Twentieth century „Marxism“ has erroneously taken this to mean that exploitation involves hours and exchange concerns money. In fact exploitation can be expressed directly in money terms, as Marx did throughout his work.

Simple exchange with a variable value of money

We now turn to prices different from those discussed by Marx in the first ten chapters of Volume III dealing with prices of production. Marx states throughout that he assumes the value of money to be constant.¹⁸ This is hardly discussed in the literature but has produced indescribable confusion.

The rate at which any good exchanges for money results from the general interaction of supply and demand. The basic difference between Marx’s theory of money and Ricardo’s is that Ricardo, like Hume before him and many after him, assumed the price level was determined by the relation between the „supply and demand“ for money.¹⁹ Marx held that it was determined, in effect, by the supply and demand for everything else. The quotation given in chapter 1 is instructive:

The most common and conspicuous phenomenon accompanying commercial crises is a sudden fall in the general level of commodity-prices occurring after a prolonged general rise in prices. A general fall of commodity-prices may be expressed as a rise in the value of money relative to all other commodities, and, on the other hand, a general rise in prices may be defined as a fall in the relative value of money. (Marx 1970:183)

During a boom when goods are in short supply, all prices rise relative to money, and in a slump they all fall. While an inflationary paper issue of course raises prices, these fluctuations happen regardless of the money supply. This is inverted in Ricardian and monetarist formulations so that a slump is presented as a shortage of money and a boom as a surplus.

Fluctuations in the value of money over the boom-slump cycle are in fact an integral component of the process of that cycle itself, though not its primary or sole causal factor. They reflect the very conditions of general shortage or general glut which Say’s law forbids. Exchange rate relations between different monies are also a central mechanism of the world operation of the law of value.

Suppose as a result of a general fluctuation in global demand, all money prices rise. For simplicity suppose C_I and C_{II} exchange „at values“ – that is in the proportion $\lambda_1:\lambda_2$ – but at twice the money price. Prices are now $p_1 = \pounds 16$, $p_2 = \pounds 8$. What final disposition of money and value corresponds to any given disposition of products? No special knowledge of value theory is needed, just solid bookkeeping. We price the commodities at the new rates, charge capitalists with their purchases and credit them with their sales.

STOCKS	Commodity 1	Commodity 2	Money	Total wealth
Capital I		£160[20]	[300£–160£+400£=540£]	£700
Capital II	£400[25]		[300£–400£+160£=60£]	£460

Table 11.4 Two-party exchange, all goods sold at $p_1 = \pounds 16$, $p_2 = \pounds 8$

Now a pound no longer purchases an hour of socially necessary labour time. To express this, Table 11.4 shows the value of each commodity estimated in money at the rate used to effect the exchanges, that is, at the given prices; and then as before, the use value of the commodity estimated in its natural units.

At first sight this table appears to violate the carefully-specified conditions which hold with a constant value of money. Although price *ratios* have not altered, their money measure has. Everything has inflated in the proportion $^{880}/_{1160} = ^{11}/_{14}$. Note, incidentally, that no change in the quantity of money was needed for this price revolution.

Something, however, is clearly amiss with the picture as both a neoclassical and a surplus approach advocate would surely recognize. The same pattern of commodity exchanges has taken place as before. No new commodities have made their appearance. How can wealth have been created out of nothing? Our „society“ has clearly not created an extra £260; it has moved the goalposts, changed the scale of the reckoning so that it appears so.

Why do ‘total prices equal total values’?

This illustrates the most misunderstood issue in the literature on transformation. Total prices equal total values because of exchange, not production. We have isolated this so the matter can be studied in its pure form; moreover we used an example where goods exchange, as any true Ricardian would prefer, in proportion to values. Yet the problem persists. It would be a rash economist indeed who would claim that doubling prices creates a profit of £260 with no new products.

How can we represent this? The perceptive reader may notice something missing from the third column. In Tables 11.3a and b, money stocks were given as for all other commodities in both exchange value and use value terms. Capital I was given 300 units of value expressed in 300 pounds of use value, written £300[300£]. But things are no longer so simple. Although the relative prices of C_I and C_{II} have not changed, money no longer possesses the same purchasing power. We thus have two money measures of value: the money in which commodities were estimated before exchange began, and that in which they are estimated now.

The question is: how much real value does the new £ represent? To put it another way, how much old money is the new money worth? To put it correctly, what is the ratio between the labour hours – the „immanent measure of value“ – expressed in one money and the labour hours expressed in the other? This is the true origin of Marx’s famous „first equality“. The problem is not abolished by renouncing labour values, nor is it resolved or even affected by assumptions about the structure of production, save that commodities are the products of labour. It exists for any economist who jibs at saying „wealth appears from nowhere“. Labour values are not the problem: they are the solution.

A first and wrong answer would be to say: money has halved in value. Since all prices doubled, surely money has halved its purchasing power. This Ricardian answer neglects a vital fact: money itself was involved in the exchanges.²⁰ We can clarify the difficulty by denoting the old money and the new money

differently, as £old and £new, just as if there had been a currency reform, which indeed there has, though not by the intervention of any money authority.

The Ricardian theory is that £old 1 = £new 2. Let us reconstruct the table giving values in the estimated £old, to see what goes wrong.

STOCKS	Commodity 1	Commodity 2	Money	Total wealth
Capital I		£80[20]	£270[540£]	£350
Capital II	£200[25]		£30[60£]	£230

Table 11.5 Two-party exchange, all goods sold at $p_1 = \text{£}16, p_2 = \text{£}8$ with wrong estimates in £old

If our reconstruction had gone right, we should see an unchanged total wealth in £old. But the estimate of total social wealth comes to £old 580. This reconstruction does not work, because it suggests that exchange has destroyed £old 300.

A second answer is offered by the „New Approach“ school (see Saad-Filho in this volume). We could estimate the value of money from the value of the „net product“ it purchases. But what is the net product? We don’t know where these products came from or where they are going. Which of them is net and which gross? We are analysing circulation in abstraction from all production relations, like Marx in Part 1 of Volume 1, before production has been introduced.

Value redistribution with a variable value of money

Once the problem is posed in this way there is only one answer. The fact that no wealth was created can be recognized only by converting £old to £new at a rate that ensures total social wealth, when measured in £old, does not change unless use value is destroyed or created. Any other concept of real wealth is absurd.

STOCKS	Commodity 1	Commodity 2	Money	Total wealth
Capital I		£old 121.38=£160[20]	£old 409.65[540£]	£old 531.03
Capital II	£old 303.45=£400[25]		£old 45.52[60£]	£old 348.97

Table 11.6 Two-party exchange, all goods sold at $p_1 = \text{£}16, p_2 = \text{£}8$, with correct value estimates in £old

Thus the correct ratio for conversion from £old to £new is one for which the total social wealth, £1160 in £new, is expressed as £880 in £old. This is given in Table 11.6 to the nearest penny. The following points should be noted:

- ❑ £old is a monetary measure of value. Column 3 restores the original notation in which the first number represents value, and the number in brackets represents use value. This respects the qualitative distinction between £old 409.65, the value of the money held by Capital I, and 540£ which is its use-value.
- ❑ We could use £new as a monetary measure of value. In this case we would have to retrospectively re-estimate the values before exchange in £new. We would find that in aggregate they amounted to £1160. Therefore, it is not enough to state that money is „the measure of value“. It is, as Marx says, a

dynamic or variable measure which means we must also specify *at what time and what point in the circuit of capital* it applies.

- Labour time, on the other hand, remains a stable measure because one hour of past labour is equivalent to one our of current labour. £old 1 represents one hour of labour time, so the value magnitudes in Table 11.6 could equally well have been hours. £new 1, however, represents represents 11/14 hour of labour and if we use this conversion coefficient we arrive at the same result. Labour time, the immanent measure of value, is what the money actually measures.²¹ It represents the „real value“ of goods measured in a variable denomination. It shows the real social cost of making them available for use.
- The sum of values in society, the same before as after, is equal to the sum of prices *provided* the two are measured in the same units.

The rise in prices *has* now redistributed value even though the two commodities exchanged in proportion to their values. Capital I was worth £400 and is now worth £531.03. It has gained £131.03, or 131.03 hours of socially necessary labour time. Capital II was worth £480 and is now worth £348.97. It has lost £131.03. Why this redistribution? Because capitals contain the money commodity too. The productive commodities originally owned by capital I have risen in value, from £200 to £303.45 Likewise those of capital II have increased from £80 to £121.38. But the *money* held by each of these capitals has lost value to the productive commodities. The value of the society's money stock has fallen from £600 to £455.17 and the balance of £144.83, transferred to its stock of productive commodities which have risen by the same amount, all in £old. As before, the extent of the redistribution does not depend on the volume of trade.

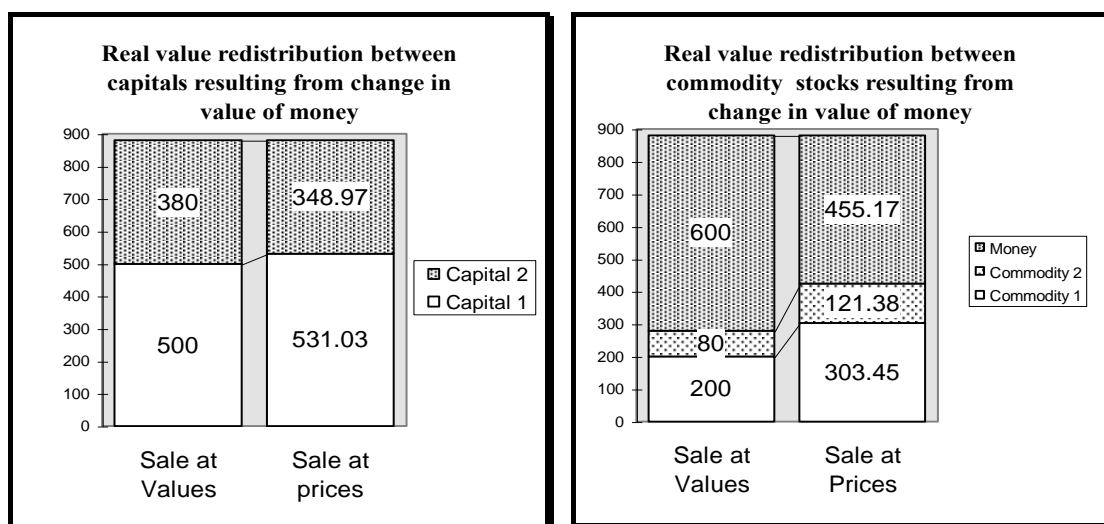


Figure 11.3 Real value redistribution brought about by a change in the value of money

The material origin of liquidity preference

Clearly, if the price of all commodities had fallen, value would have been transferred to the money commodity reflecting its increased purchasing power.

This, not some psychological disposition, lies behind liquidity preference. Capitalist competition itself drives wealth owners to hold any asset which acts as a store of value in a climate of falling prices. If money, the general equivalent, is increasing in value those who possess it can secure a rising share of social wealth.

It follows that a capitalist who merely holds money can make profit in real terms, that is, appropriate surplus value created elsewhere, as long as the value of money is rising over time, that is, has a positive derivative with respect to time as in the slump period of the business cycle. The process of competition itself operates to produce liquidity preference but only if treated dynamically. There is no static representation of this phenomenon. We will see that the price rate of profit is modified by a factor μ'/μ where μ represents the value of money.

11.6 THE ORIGIN OF PROFIT

The preceding section made no assumptions about production or the labour process at all. In and of itself, Marx's „first equality“ is not an assertion about the structure of production but the nature of exchange, and attempts to interpret it otherwise introduce serious confusion. Having said this, what then is its relation to the labour process, production, profit and surplus value?

The debate on value since Marx, and to a great extent before, is in essence about the origin of profit. Mathematically, it arises as follows: the price of any composite – and hence any capital – is a linear function of its elements, the sum of its parts. Add bread priced 20p to ham priced 20p and you have a sandwich worth 40p. And since the price of anything is a multiple of its use value, the price of any composite is a linear function of the use values in it.

The mystery of capitalist production is that from raw materials worth 40p and 20p in wages, I can get goods worth 70p. Output prices are not a linear function of input prices or quantities. „Something for nothing“ appears: value is added. This is not at all obvious or „natural“; it is a real change in the function of money which appears when labour power is a commodity. Why does the sandwich not sink to 60p, its real cost including wages? After all, if people regard 70p as extortionate they can buy the raw materials, hire servants, and get a sandwich for 60p. Why doesn't competition level the price of all goods down to this money cost?

Proudhon, expressing the natural outrage of a dispossessed artisan class, said this discrepancy was theft caused by capitalist property. Under fair competition, if all produce sold at its „natural“ price – in proportion to the quantity of each input including labour – it would vanish. Marx simply showed that even if the price of all produce was proportionate to the quantity of consumed use values, there would *still* be a difference between the price of a commodity and the sum of the price of its inputs. This holds, incidentally, whatever the measure or source of value.

Once accepted, however, that labour like any other commodity adds value in proportion to its use value, we must ask what this use value actually is. Capitalists do not hire workers to make sandwiches for themselves but to make money from the sandwiches. The use value of the workers *is* to create value; if their sandwiches did not sell they would not be hired.

This is of course true of other commodities also; but other commodities do not walk around the market disposing of their income on an equal basis with their owners. The cost of labour power is determined *independently* of its capacity to make money for its purchaser. This, and no other reason, is why profit exists. If labourers were hired directly as slaves, robots, beasts of burden or servants, then whether or not labour time were the measure of value, surplus labour would not be extracted in the form of money profits but directly, like domestic labour.

Both Marx and Ricardo therefore said no more than this: that all inputs add value in proportion to the quantity consumed. Since one particular commodity is directly involved in the production of every other commodity, the value added by all other commodities can be reduced to the value added by this particular commodity, namely labour power.

The origin and nature of price-value deviations

Ricardo stopped at this point. The difficulty, however, is that the actual money price of any commodity still differs from a linear sum of inputs: from value. His school foundered because it could not explain how goods whose value, based on a sum of the prices contributed by their inputs, is 70p, can sell for 80p or 65p.²²

Like Smith he treated such deviations as accidental, so that an average over time yields a „natural price“ equal to value. But in at least two cases prices diverge *systematically* from values: rent, and capitalist competition, when the supply of any product adjusts only until capital cannot obtain a higher return by migrating. In this case even the average price is only exceptionally equal to value.

Vulgar economics approaches this problem as things appear to the capitalist; it treats capital as an extra commodity. The natural price of a product becomes its raw material cost, plus wage costs, plus the cost of „capital“. The main objection is that this cost is already accounted for. Capital comprises commodities whose costs enter the product directly. If I already charge 60p for eating the sandwich, how can I charge an extra 10p for having it? Still more awkward, the solution implies wealth can be created without use value. If money creates value, why bother putting it in a factory? Why not just leave it in the fridge and watch it make free lunches?

But in any case the idea does not solve the problem posed. What if the market price deviates from the new „natural price“? The dichotomy of Ricardian value theory has not been abolished; equilibrium or long-run price has simply supplanted value. Deviations of real, market prices, from this ideal are no better explained and worse still, they render the price of „capital“ non-uniform.

Equilibrium theories, as Carchedi discusses in this volume, escape by acting as if market prices did not exist. The equalisation of profit rates is taken as achieved fact. Even so, what determines the rate? Why 5 or 10 per cent, not 100 per cent? The two main answers to this reflect the two faces of the commodity. Neoclassical theory derives profit from exchange value, as the „price“ of capital; the surplus approach school derives it from use values – a putative „physical surplus“. The result is a man fighting his shadow. The moves are impressive²³ but no-one can win.

Over this debate looms the suspicion that because of the errors in Marx's own price theory there is no rigorous alternative in his framework. There is.

Price as the outcome of value transfers

Marx pointed out that deviations of market prices from values could not be considered in isolation from each other. Consider first a single use value X . If $\text{£}P$ is its price then we can work out the value transferred between X and the rest of society as the difference between its value and its price. Call this $\text{£}E$: then

$$\text{£}E = \text{£}P - \text{£}X$$

Clearly, for every unit of X , a certain amount of value is transferred to or from owners of X . If the value of iron was $\text{£}10$ per ton and its price rises to $\text{£}15$, then for every ton of iron I own, I will gain $\text{£}5$. Value transferred is thus $+\text{£}5$ per ton, just as the price was $\text{£}15$ per ton. Call this e and note that $e = \text{£}E/X$. The unit price p is then the value plus this modification:

$$p = \lambda + e$$

This is altogether different from the relation proposed by Bortkiewicz, for whom price is a multiple of value.²⁴ Moreover, if we know e for every commodity, we can compute the value lost or gained by any given capital. If ham is undervalued by $5p$ per slice and bread is overvalued by $2p$ per slice, sandwich-owners will lose a penny for every sandwich for which they hold the title deeds.

We can calculate the value lost or gained by every capital in society as a consequence of any change in prices at any time. In matrix terms, though this is not needed to follow the argument, the value transferred between capitals is

$$\text{£}E = eX$$

The sum of these, $\sum_j \text{£}E_j$, is the difference between the price of all the goods in circulation and their value, including (as always) money. This sum is the value gained or lost by society as a whole arising from any change in prices. The „equality of total prices and values“ means this is zero. There is no net gain or loss of value when commodities exchange without a change of form, that is, without destruction or creation of use values. If we give a different answer, then we say that a rise in money prices is the same thing as an increase in wealth when no extra consumption or enjoyment results. By *reductio ad absurdum*, hyperinflation is the wealthiest state a nation can attain.

Thus the outcome of any given set of market prices is summarized by the *transfer* vector e . Just as value added $\text{£}L^t$ summarizes the value-creating effects of production, so e^t summarize the redistribution of this value effected by circulation. It contains all the information there is about the effect of price changes on capital; for every set of prices there is a unique e and vice versa.

But there is more: e defines the relation between profit and surplus value.

Profit as surplus value plus value transfers.

The relations above were all derived without reference to production, as a prelude to explaining the origin of profit. Now suppose use values X are produced with inputs C and a value-product L of workers working for $V(=L)$ hours. The value contribution of C is given, as explained throughout this book, by their current price pC or just C . The workers therefore create the following value:

$$\text{£}X = \Sigma \text{£}C + \text{£}L \quad (18)$$

The cost to the capitalist, however, is

$$\text{£}C + \text{£}V$$

the sum of constant and variable capital. The difference between the two is thus

$$\text{£}S = \text{£}X - (\text{£}C + \text{£}V) = \text{£}L - \text{£}V$$

the surplus value added by the workers. Now consider what happens if the product sells for $\text{£}P$, different from $\text{£}X$. This is given by

$$\text{£}P = \text{£}X + \text{£}E \quad (19)$$

The capitalist makes a profit, the difference between sales and costs:

$$\text{£}\Pi = \text{£}P - \text{£}C - \text{£}V$$

At first sight, this bears no relation to $\text{£}S$, because it contains no term directly related to $\text{£}L$, the value-product. But equations (18) and (19) show that

$$\begin{aligned} \text{£}\Pi &= \text{£}X + \text{£}E - \text{£}C - \text{£}V && \text{from (19)} \\ &= \text{£}C + \text{£}L + \text{£}E - \text{£}C - \text{£}V && \text{from (18)} \\ &= \text{£}L - \text{£}V + \text{£}E \end{aligned}$$

that is

$$\text{£}\Pi = \text{£}S + \text{£}E$$

that is, profit equals surplus value plus the transfer vector $\text{£}E$. Summing now gives

$$\Sigma \text{£}\Pi = \Sigma \text{£}S + \Sigma \text{£}E = \Sigma \text{£}S$$

the famous „second equality“; the sum of profits equals the sum of surplus values.

We thus have a mathematically exact demonstration of why the capitalists, no matter how little little love is lost among them in their mutual competition, are nevertheless united by a veritable veritable freemasonry vis-à-vis the whole working class as a whole. (1981:198)

Why has this simple relation eluded Marxologists since Bortkiewicz? Because Bortkiewicz's model, by eliminating time, conflates and identifies two transfers of value which take place at different points in time, forcing them to be identical.

We noted above that the value contribution $\pounds C$ is equal to pC , the current price of consumed constant capital. This of course differs from the value with which $\pounds C$ emerges from production, and the difference between pC and λC is in turn a transfer vector eC . *But this vector arises at a different point in time.* It expresses transfers from the last cycle. It is not equal to $\pounds E^t$ except under Bortkiewicz's restrictive assumption that inputs are purchased at the *same* price as outputs. Of course, everything just said applies also to this special case; but the conceptual framework imposed by it utterly obscures these simple basic identities.

11.7 THE MATHEMATICS OF PRICES AND VALUES

In the next more mathematical section we derive the above results generally and rigorously and match them to Marx's writings on the subject.

Circulation has two distinct and independent results. First, it transfers use values from one owner to another. After circulation C , V , X and all other stock magnitudes have changed because outputs have been transferred from X to their purchasers. These movements are governed by social and historical laws specific to any given economy. Second, however, these movements are effected at definite prices by exchange with money. Price changes transfer value from one capital to another *independent of the movement of use values*. Value-price analysis has to define the laws governing these transfers.

Recall that $\pounds K = \lambda \hat{K}$ gives the total value of each commodity in the economy. Note that this is different from λK , the value of each capital in the economy.

Now let

$$\pounds E = p\hat{K} - \lambda\hat{K}$$

defining

$$e = \pounds E \hat{K}^{-1}$$

gives

$$p = \lambda + e$$

Therefore to any set of prices p corresponds a unique transfer vector e .

The transfer vector and constant capital

Consider the simple case where all capital is turned over uniformly in a single period, which means we can continue to blur the distinction between turnover and stock. In section 5 we showed that at a given time t unit values are given by λ^t

$$\lambda^{t+1}X = \lambda^t C + \pounds L. \quad (15)$$

Tradition has it that Marx forgot to transform inputs. But this transformation is already implicit, and in several places explicit, in his analysis of exchange. It consists in assessing the contribution to value of consumed constant capital

$$\pounds C^t = \lambda^t C$$

when C are purchased at prices different from values. As explained by Marx and at many points in this book, the cost price of X includes value transferred to C in the previous phase of exchange. The value of consumed constant capital is

$$\lambda^t C + e^t C$$

Thus in place of $\lambda^t C$ in equation (15) we write $\lambda^t C + e^t C$ to get

$$\lambda^{t+1} X = \lambda^t C + e^t C + \pounds L^t \quad (20)$$

or

$$\lambda^{t+1} X = p^t C + \pounds L^t$$

As Marx (1972:167) puts it in a previously-cited quotation:

the cost price of constant capital [$p^t C$] – or of the commodities which enter into the value of the newly-produced commodity as raw materials and machinery [or] labour conditions – may likewise be either above or below its value. Thus the commodity comprises a portion of the price [$e^t C$] which differs from value [$\lambda^t C$], and this portion is independent of the quantity of labour newly added. [$\pounds L^t$]

This correction makes no reference to the price at which the output is sold. It is independent, therefore, of p^{t+1} , and hence $\pounds E^{t+1}$, in fact of any magnitudes from time $t + 1$, since $t + 1$ had not happened when the inputs were purchased. It is also clear that „this portion [$e^t C$] is independent of the quantity of labour newly added“ since the value contribution of labour power is, as before, $\pounds L^t$.

The transfer vector and variable capital

We can divide both the consumption and the stocks of society into two categories: goods acquired by workers, and everything else.²⁵ The latter includes V , the commodity labour power, which has a value and a price. As with any other commodity a certain quantity of value $e_L^t V$ is transferred to or from the commodity labour power when its price differs from its value. Thus

$$p_L^t V = \lambda_L^t V + e_L^t V$$

But equally, since the wage W is a set of commodities with a value and a price,

$$p^t W = \lambda^t W + e^t W$$

Since here we assume the money wage is completely spent in a period (ignoring consumer durables); the value of V is the same as the value of W and the price of V is the price of W .²⁶ It follows that

$$e^t W = e_L^t V$$

that is, the value lost or gained by workers is equal to the difference between the price and the value of the commodity labour power:

The workers must work for a greater or lesser amount of time [$e^t W$] in order to buy back these commodities (to replace them) and must therefore perform more or less necessary

labour [e_L^tV] than would be needed [λ^tW] if the prices of production [*in general market prices, p^tW*] of their necessary means of subsistence did coincide with their values. (Marx 1981:309)

Value, price and the value product

The output of period [$t, t + 1$], contained in X , is sold at time $t+1$ at prices in general different from values. The (vector of) output values, given by (20), is $\pounds X$. Their price $\pounds P^{t+1}$ differs from $\pounds X^{t+1}$ by the transfer vector $\pounds E^{t+1}$ for the *current* period, that is

$$\pounds P^{t+1} = \pounds X^{t+1} + \pounds E^{t+1}$$

Substituting for $\pounds X^t$ from equation (20) gives

$$\pounds P^{t+1} = \lambda^tC + e^tC + \pounds L^t + \pounds E^{t+1} \tag{21}$$

Value of elements of constant capital	λ^tC
Value transferred in last period of circulation	e^tC
Value product	$\pounds L^t$
Value transferred in this period of circulation	$\pounds E^{t+1}$
Market Price	$\pounds P^{t+1} = \lambda^tC + e^tC + \pounds L^t + \pounds E^{t+1} = \pounds X^{t+1} + \pounds E^{t+1}$

This exhibits the „two ways“ in which the conversion of $\pounds X$ into $\pounds P$ takes place. Values λ^tC emerge from production between $t-1$ and t . At time t , prices $\pounds P^t$ effect transfers of value e^tC . A new cycle of production adds new value $\pounds L$, *and then* prices $\pounds P^{t+1}$ effect further transfers $\pounds E^{t+1}$ at time $t+1$. There is no redundancy, no circularity, and no error. The price is a linear sum of value contributions from dead labour, live labour and value transfers effected by the price system. The value of the output is perfectly distinct from its price, the difference being $\pounds E$; moreover it is independent of variable capital or the wage.

Variable capital, whatever difference between value and cost-price it may contain, is replaced by a certain quantity of labour [$\pounds L^t$] which forms a constituent part of the value of the new commodity, irrespective of whether its price [$\pounds P^{t+1}$] expresses its value [$\pounds X^{t+1}$] correctly or stands above or below the value. (Marx 1972:167)

The next three sections illustrate the main magnitudes of Marx’s value theory using the formulae derived. We omit the time subscript when it is equal to t (start of the current period), giving it only when it is $t + 1$ (end of the current period)

Surplus value

Variable capital is in general less than $\pounds L$, the value product. The difference is a vector we denote by $\pounds S$, surplus value.

Value product	$\pounds L$
Variable capital	$\pounds V = p_LV$
Surplus value	$\pounds S = \pounds L - \pounds V = \pounds L - p_LV$

This can be broken down to separate out value transfers from the previous period:

$$\pounds S = \pounds L - p_L V = \pounds L - (\lambda_L V + e_L V)$$

The term $e_L V$ represents transfers of value in the *previous* period of circulation; it is the difference between the price and the value of labour power.

Cost price

The cost price of the period is the sum of the constant and variable capital turned over in this period, namely

Constant capital	$\Sigma^i \pounds C = pC$
Variable capital	$\pounds V = p_L V$
Cost price	$\Sigma^i \pounds C + \pounds V = pC + p_L V$

Profit, surplus value, and Marx's second equality

Output is in general sold at a price different from its value. The difference between market price and cost price is capitalist profit, a row vector we call Π .

Market price	$\pounds P^{t+1} = \pounds C + \pounds L + \pounds E^{t+1}$
Cost price	$\pounds C + \pounds V = p(C + V)$
Profit	$\pounds \Pi^{t+1} = \pounds P^{t+1} - \pounds C - \pounds V = \pounds L - \pounds V + \pounds E^{t+1} = \pounds S + \pounds E^{t+1} \quad (22)$

Equal profit rates are not assumed, though these results are equally valid for the special case where they do equalise. No necessary law governs the actual profits realised in different sectors. Most important of all, when we look beneath sectoral averages we find *individual* profit rates realised by different producers of the same commodity. Whatever the sectoral averages, these differ vastly and are the motor of the investment mechanism. As Marx repeatedly argued, the pursuit of an above average profit rate, brought on by an exceptionally productive new technique, is the real motive for capital movements.

In actual fact, the particular interest that one capitalist, or capital in a particular sphere of production has in exploiting the workers he directly employs is confined to the possibility of taking an extra cut, making an excess profit over and above the average [E^{t+1}] (Marx 1981:299)

Whatever the time average of Π , each actual sale will deviate from it.²⁷ Nevertheless, just as a general law regulating exchange (the first equality) applies to all market prices, a second general law regulates profits. Summing (22) gives

$$\Sigma \pounds \Pi = \Sigma \pounds L - \Sigma \pounds V + \Sigma \pounds E^{t+1}$$

But $\Sigma \pounds E^{t+1}$ is 0; therefore

$$\Sigma \pounds \Pi = \Sigma \pounds L - \Sigma \pounds V = \Sigma \pounds S.$$

Marx's „second equality“. Being established for the general case where profits are not equal, it is certainly true for the special case where they do, that is where market prices equal prices of production.

11.8 CAPITAL

We now turn to the study of capital as such. To this end we must correct the most basic flaw of General Equilibrium and the hidden basis of the simultaneous equation construction: the assumption that the market clears. This brings us to a threshold. Everything said until now can be stated in a more limited way in an equilibrium framework; the results that follow cannot. They have no parallel in equilibrium and directly contradict it. There are therefore two distinct approaches to the study of a market economy, which can and should be tested by the normal method of science: which best explains the observed facts.

What is capital?

Marx succinctly defined capitalism as „generalized commodity production“, a society in which the production, circulation and distribution of the material means of existence takes the form of use values produced for sale. Generalized does not mean „everything“ – domestic labour is still not paid. Capitalism means:

- ❑ The *means of production* are commodities, and
- ❑ specifically *labour* enters production as a commodity, labour power.

Every element of production except labour-power is itself a product of value. Value requires nothing for its own production except labour and itself. Though labour remains the source of value, capital – past labour – dominates living labour and organizes society around its own reproduction, securing all the conditions of its existence. Dead labour becomes a self-reproducing, self-expanding and self-evolving social relation; in modern jargon, artificial life.²⁸

If we pin down the specific forms of appearance assumed in turn by self-valorising value in the course of its life, we reach the following elucidation: capital is money, capital is commodities. In truth, however, value is here the subject of a process in which, while constantly assuming the form in turn of money and commodities, it changes its own magnitude, throws off surplus-value from itself considered as original value, and thus valorises itself independently. (Marx 1976a:255)

Neoclassical theory duly accords capital the power of procreation. But its forms of existence, the commodity and money, each unite in themselves two aspects, use and exchange value. The theory divides: one personality assigns creation to machines and the other to exchange. Macroeconomics demands things from money, and microeconomics supplies money from things. For Marx, in contrast, production is a unity:

Like the commodity, which is an immediate unit of use-value and exchange-value, the process of production, which is the process of production of commodities, is the immediate unity of the processes of labour and valorisation. (Marx 1976a: 978-9)

This does not just mean the output is a commodity. The elements of production – machines, work in progress, labourers and money – not only produce but *exist* as commodities, unities of use and exchange value. They transmit value to their products not because they once had value but because they still do. Their ability to mobilize living labour is not derived from their individual characteristics or history but their relation to all other commodities of the same type.

If these lose or gain value for any reason, this is transmitted not only to the products of capital but to capital itself. Its creative power cannot therefore be reduced to a purely technical nor a purely monetary function. If matter could make value, money would grow on trees. But if value could make matter, then trees should grow on money. The task is to unite in a single dynamic relation the independent determination and mutual interaction of all aspects of capital.

Capital as a stock of commodities and the dynamics of the stock-flow relation

Capital accumulates as stocks and acts as such for the capitalist. My wealth is measured not by what I handle but what I have, or bank clerks would be rich beyond the dreams of avarice. This is an enormous problem for equilibrium theories of all types, whose approaches fall into three categories:

- ❑ that of Walras, who separates all commodities into two species: fixed capital which lasts for ever, and circulating capital which is consumed instantly.²⁹
- ❑ that of Bortkiewicz, who treats all capital as completely turned over in one „period“ so that stocks are always equal to flows.³⁰
- ❑ that of von Neumann, Sraffa and the surplus approach school, who treat fixed capital as a series of flows from machines of different ages or vintages.³¹

Nothing indicates the effect of equilibrium theory on mental health more than the contortions induced by a meeting with simple facts. *All* commodities act on the same basis as components of capital. If I buy a sausage machine, that is an investment. If I stock up meat, that is an investment. If I pay a week's wages, that too is an investment, and if I buy an old sausage machine I may pay less and make worse sausages, but it is an investment just like the others. If I stockpile sausages even *they* are an investment until they putrify. My capital consists of everything I need to sell sausages, its size is their current monetary worth, and my profit is the rate it grows. That is how my banker sees it and that, under capitalism, is how it is.

Everything which exists as a flow, a quantity in motion, forms itself into a stock, a quantity at rest. A river does not merely pass through the land but takes up space within it. If water flows into a space at one point and out at the other, the space holds a variable but definite quantity of liquid. The rate at which this rises

or falls is the net flow, the difference between inflows and outflows. The problem is not to make a scholastic distinction between one type of flow and another but to understand how *all* flows of value are dragooned into service as capital.

This does not require a metaphor of substance; it applies wherever one cause augments a thing and another diminishes it. Production and circulation are *par excellence* activities of this type. At each stage of the circuit commodity stocks are increased because of what went before and decreased because of what comes after. This is not metaphysics but bookkeeping.

Why supply does not match demand, and where the difference goes

It is precisely such bookkeeping which simultaneous equations exclude. If the economy reproduced perfectly and identically, stocks could not differ from flows because they would neither rise nor fall. In reality reproduction is incessantly interrupted or capitalism would not exist. The gap between supply and demand appears as changes in stock levels, providing the signals that drive price changes and tell producers what is socially necessary. This is the pulse of capitalism.

Simultaneous equations impose an immediate identity of supply and demand; if these do not match there is nowhere for the excess to go or the shortage to come from. Mismatches are relegated to an impenetrable subjective domain which by definition has no visible expression, which is why neoclassical theory is constantly driven to seek psychological explanations of material phenomena. There is no means of forming prices, no movement of capital, no technical change, and no capitalism. Equilibrium posits a living corpse, blood with no heart.

To illustrate this, consider the stocks which would result from the flow activities described by Tables 11.1 and 11.2. The technology of period 1 did not actually use up the output of period 0. We have an unsold surplus: five units of unsold C_{II}, fifty of C_I and two hundred unemployed people as shown in Table 11.7. One table no longer represents the economy. We need an independent record of these stocks.

STOCKS		C _I	C _{II}	L		C _I	C _{II}	Labour Power
Producer P _I	owns	35		300	and	5		
Producer P _{II}	owns	10		200	and		50	
Labourers	own		50		and			200

Table 11.7 Stocks after one period of production with supply-demand mismatches

Stocks, value transfers and accumulation

Stocks exist whether or not flows proceed smoothly. Productive capital collects as machinery or work-in-progress; output as inventory, money as hoards, new purchases as goods in transit and even private consumption as weekly shopping or consumer durables. Capital, the money value of these stocks, is what the capitalist advances and expects a return on. This cannot be reduced to the annual

turnover of capital except on Bortkiewicz's preposterous assumption that workers are paid annually, machines replaced annually, and raw materials purchased annually, an assumption that has become the bedrock of Walrasian Marxism.³² We illustrate this with a simple extension: suppose fixed capital turns over once every two periods.

STOCKS		C _I	C _{II}	L		C _I	C _{II}	Labour Power
Producer P _I	owns	70		300	sales stocks	0		
Producer P _{II}	owns	20		200	sales stocks		0	
Labourers	owns		50		sales stocks			0

Table 11.8 Simple reproduction with fixed capital, stocks at the beginning of period 1

Suppose production begins with the stocks given in Table 11.8 and proceeds with the turnover given in Table 11.1 for one period. At the end of this period, stocks are as in Table 11.9. Half of C_I, all of C_{II} and all labour power has been used up, but they have been reproduced as sales stock.

STOCKS		C _I	C _{II}	L		C _I	C _{II}	Labour Power
Producer P _I	owns	35		0	sales stocks	50		
Producer P _{II}	owns	10		0	sales stocks		100	
Labourers	owns		0		sales stocks			250

Table 11.9 Simple reproduction with fixed capital, stocks at the end of period 1

The value advanced to run this cannot be reduced to the capitalists' annual purchases. They must buy everything in Table 11.8 before they can even start. But far more important, while this goes on *all prices and values change*. The remaining 35 units of C_I are no longer worth $35 \times \lambda^0$ but $35 \times \lambda^1$. They have appreciated or depreciated, and the differences confront the capitalists as gains or losses.

The problem which Bortkiewicz wishes away is now clear. Everyone holds stocks inherited from previous times, not by accident but because these are necessary to the act of consumption. We buy meat by the pound, not by the hour. Existing as commodities, these stocks are a component of supply and take part in price formation as long as they are available for circulation. Capital, made up of commodities, is therefore constantly re-estimated by the pricing system. It follows that, in addition to the value transferred between current goods – flows – value is incessantly moved between accumulated goods – stocks.

If I bought a computer for £3000 last year, then even if functioning perfectly it will lose value, not because it has decayed but because cheaper and better machines have driven down its price and drained it of value. If they did not appear, it would not lose value.³³ But this has a converse. I advanced the original, not the new value of the computer. My debts have *not* fallen. £3000 is what I must find from my sales, and is the basis on which my rate of profit is calculated. The fundamental error in the equilibrium vision is that it loses sight of this fact. It idealizes the process whereby capital settles accounts with its own past, above all its brutality and blindness. This is why the rate of profit really does fall, whatever Marx's inquisitors have to say; this is why the constructive power of technical

progress unleashes the destructive power of bankruptcy, mass unemployment, social devastation, periodic crisis, and all its attendant ills.

This is not secondary. It is *the* decisive phenomenon of accumulation because capital depends for its existence on endless revolution in production. With the stage that Marx terms the „real subsumption of labour by capital“, the production of relative surplus value, it harnesses every resource of labour and nature to accumulation, which enslaves it. Prometheus begets Faust. No matter what damnation awaits or what devastation trails, it exists to expand and expands to exist. It consumes its past to create its future. Even as its latest creations start to live out their days, newer and cheaper rivals have numbered them.

If capitalism could continuously revolutionize the productivity of all human labour, so that every capital on the globe individually realized the benefits of each technical advance and no human labour were devalued by it, we would live in a world something like the idealization of equilibrium analysis. This would be the world of the Okishio theorem, the factor-price theorem, „balanced growth“ and all other idealizations of capitalist progress. This world might be unacceptable for other reasons – it would still contain rich capitalists and poor workers – but it would not be ravaged by war, disease, famine and death. The opening to the world market would not have projected Eastern Europe into the third world and much of the third world into hell. „Modernization“ would not be a synonym for doom, children would not be born to feed Chronos, and the four horsemen would not ride out on steel-clad steeds with hearts of crystal.

It would not be the world we live in. Capitalist progress is simultaneous destruction and construction irrevocably intertwined. In raising the *average* productivity of human labour it directly lowers the productivity of *most* human labour because it concentrates the value of each commodity in the hands of a minority, those who deploy the most advanced technology. Otherwise there would be no incentive to deploy the new technology. The more technology becomes a universal component of all means of production, the more pronounced this phenomenon and the less protection the benefits of nature afford to those denied the fruits of technology. This, one of the absolute limits on the capitalist mode of production, has been surgically excised by the mainstream theories, both non-Marxist and supposedly Marxist, which seek to understand it.

Age doesn't matter: money does

Insofar as equilibrium theories of all kinds have grappled with the impact of price movements on existing capital, they have turned from the changing *money costs* of capital and dealt with the passage of time by distinguishing between the *physical properties* of commodities of different ages. This misses the point. The restless movement of value and price applies to all goods of all ages. When house prices rise, they all rise including old houses, because they take part in a common market with a common use value. The age of a stock is of secondary importance.

There *is* no general way to distinguish between new and old goods from their intrinsic properties. What is old copper? Copper is a pinkish conductive substance. Its date of production is not stamped on its atoms. As for machines, the market cares only how and whether they work. Old machines differ from new ones only if they undergo bodily change or if the new machines perform differently. Physical difference, not age, alters use value. What constitutes used software – do its bits fall off?³⁴ The vast and resourceful literature on scrapping, vintages, and joint production is beside the point; when prices change *for whatever reason*, goods and capitals alike lose or gain value. It makes no difference to profits if some accounting date passes and a machine has a birthday. Theories of aging belong in the theory of production; attempts to explain price by age originate with the misguided belief that value is a component of physical being.

It is equally mistaken to think changes of use are the motor force of price movements. In a certain sense every factory is a distinct use value, a unique combination of parts which belong together.³⁵ These may decay, survive, or change their function. *It doesn't matter*. What counts is that either in parts or together it can be bought and therefore has a price.³⁶ Internal changes of use modify its technical composition; if a machine is reduced to scrap we have one less machine and one more ton of metal. But the value transferred between me and society remains the difference, after adjusting for changes in the value of money, between what I paid for the factory and what I will get if I sell it, in whatever form.³⁷

Indeed, price movements determine use. If the price of scrap rises sixfold, dead machines wake to money's kiss.³⁸ If the price of steel collapses, the finest furnace in the world may be sold for scrap. And if a segment of production is isolated from the world market, either being forcibly removed – as in Russia, China and Eastern Europe, or in less extreme forms by protection and import substitution – or because it is in a backwater of innovation, it can survive and indeed advance for decades and in some cases millenia.³⁹

11.9 VALUE IN THE PRESENCE OF STOCKS

The calculation of all value magnitudes has to be modified to take into account, in a rigorous manner, the modification of previously-existing values by both price and value changes after they have been produced. This is a natural extension of Marx's method for calculating social or market values from individual values:

The individual commodity does not only appear materially as a part of the total produce of capital, but as an aliquot part of the total produced by it. We are now no longer concerned with the individual autonomous commodity, the single product. The result of the process is not individual goods, but a *mass of commodities* in which the value of the capital invested together with the surplus-value – i.e. the surplus-labour appropriated – has

reproduced itself, and each one of which is the incarnation of both the value of the *capital* and the surplus-value it has produced. The labour expended on each commodity can no longer be calculated – except as an average, i.e. an ideal estimate ... This labour, then, is reckoned *ideally* as an aliquot part of the total labour expended on it. When *determining the price* of an individual article it appears as a merely ideal fraction of the total product in which the capital reproduces itself. (Marx 1976a :954)

Once a unified market is established, value and price emerge as an average over all the output of society. Marx concentrated his attention on the relation between individual producers and this market value. But everything he wrote logically applies to the entire stock of society; it would not make sense to exclude any portion of this on the basis of an arbitrary accounting separation which adjudges it an output of the „last period“and therefore ineligible to take part in the formation of a uniform market price.

The value calculation

Production begins with a definite quantity of each commodity possessing a definite value. During production some of it metamorphoses and transfers part of this value to whatever it becomes. It loses both the use value and the exchange value of this consumed part. But it also gains new use values from production, and with them individual value transferred from inputs and added by labour power.

But these two contributions are independent. Total use value is the initial stock less what was consumed plus what was produced; while its exchange value is the initial stock less what was consumed, plus value transferred in production, plus the value product. Dividing the second by the first gives the new market value of the commodity, arising from the two sources of existing stocks and new product.

To illustrate this, we again present Tables 11.8 and 11.9 but in value terms, on the assumption that as before initial unit values are $\lambda_1= 40$, $\lambda_2= 7$, and hence $\lambda_L=7/10$.

STOCKS		C _I	C _{II}	V		C _I	C _{II}	Total
Producer P _I	owns	2800[70]		210[300]	sales stocks	0		3010
Producer P _{II}	owns	800[20]		140[200]	sales stocks		0	940
Total Value		3600	0	350		0	0	3950

Table 11.8a Simple reproduction with fixed capital, values at the beginning of period 1

The new assumption that constant capital turns over at half the speed of living labour means, of course, that the proportions of living and dead labour in the product are not the same as before. We calculate the individual value of outputs as before, by adding together the consumed dead labour and the added living labour:

STOCKS		C _I	C _{II}	V		C _I	C _{II}	Total
Producer P _I	owns	1400[35]		0	sales stocks	1700[50]		3100
Producer P _{II}	owns	400[10]		0	sales stocks		600[100]	1000
Total Value		1800	0	0		1700	600	4100

Table 11.9a Simple reproduction with fixed capital, individual values at the end of period 2

As before, there is a contradiction between the output and input values of C_I . The 50 units of output have an individual value given, as usual, by the sum of metamorphosed inputs (1400) and value product (300). Their unit individual value is therefore $1700 \div 50 = 34$. If it were not for the 35 units of preserved stocks of C_I , this would be the market value. But these preserved stocks also contain the value with which they started, namely 1400, corresponding to the old unit value of 40.

There is only one coherent way to resolve this contradiction, which is to estimate the new market (social) value of C_I as the average of the whole value contained in the whole stock of C_I :

if an increase in the price of raw materials takes place with a significant amount of finished goods already present on the market, at whatever stage of completion, then the value of these commodities rises and there is a corresponding increase in the value of the capital involved. The same applies to stocks of raw materials, etc., in the hands of the producers. This revaluation can compensate the individual capitalist, or a whole particular sphere of capitalist production – even more than compensate, perhaps – for the fall in the rate of profit that follows from the raw material's rise in price. Without going into the detailed effects of competition here, we may remark for the sake of completeness that (1) if there are substantial stocks of raw material in the warehouse, they counteract the price increases arising from the conditions of their production; (2) if the semi-finished or finished goods on the market press heavily on the supply, they may prevent the price of these goods from rising in proportion to the price of their raw material ... The smaller the amount of stock to be found in the production sphere and on the market at the end of the business year, at the time when raw materials are supplied afresh on a massive scale (or, in the case of agricultural production, after the harvest), the more visible the effect of a change in raw material prices. (Marx 1981:207-208)

The market will insist on this whether we like it or not, because it will assign a uniform price, and thereby a uniform value, to this stock. Table 11.10 illustrates the result. There are 95 units of C_I in existence, consisting of 45 units which were preserved intact and 50 units just produced. The exchange value contained in them is likewise the value of the new stock, 1700, plus the preserved value, 1800, totalling 3500. Dividing by the total use value gives the new unit market value, namely $700/19$. This is less than the old 40, but greater than the new individual value of 34 emerging from production. As for C_{II} , its value is the same as in simple reproduction because there are no preserved stocks. The „standard“ calculation is thus a special case of the general technique.⁴⁰

As an equation, the calculation looks like this:

$$(45+50)\lambda_1^1 = 35\lambda_1^0 + 300 + 45\lambda_1^0 \quad (23)$$

$$100\lambda_2^1 = 10\lambda_1^0 + 200 \quad (24)$$

This alters our previous conclusions in only one way: through the transfer of value brought about by the revaluation of stocks. Total new value is still equal to the value product 500, which replaces the value of variable capital, 350, to increase the total value in society from 3950 to 4100. Values arise from production and will now circulate at prices different from these values in

accordance with Marx’s first equality. Stocks therefore have an impact on value *prior* to the formation of market prices, a point to which we shall return.

Values do not immediately sink to the level of the cheapest available technology. This occurs only when the product has been manufactured in sufficient quantities to replace all existing stocks and become the actual, and not just the potential new technique used by society. This has profound implications.

Commodity C _i , period 1	Use Value	Exchange Value	Average
Conserved in unconsumed stocks	45	1800	40
Metamorphosed/Transferred in production	50	1400	—
Added by Labour power	—	300	—
Subtotal; new stock	50	1700	1700 ÷ 50 = 34
Total	95	3500	3500 ÷ 95 = ⁷⁰ / ₁₉

Table 11.10 Value calculation with fixed capital stocks

First, it contradicts the prime assumption of the Okishio theorem and all comparative statics – that new technology can be immediately, universally and costlessly deployed. The introduction of new technology is a process over time – usually years and often decades – and during this time values change continuously.

Second, it contradicts the view that „socially necessary labour time“ is the time which *would* be needed if the latest technology were universal. The latest technology is *never* universal: as fast as it is introduced, it is superseded.⁴¹

Finally, it means that the calculation of profit and surplus value themselves have to be modified to take account of the transfers of value effected by revaluation.

Surplus value and profit

The impact of price changes on commodities is relayed through capital, which the market reduces to a money sum. If the elements of production lose or gain value through the operation of the price system, this communicates itself to my profits. If any part of my capital depreciates through technical change, this is registered as a loss of profits. The concept of profit does not therefore make sense unless variations in the price of stock are taken into account.

Suppose I own 1000 tons of iron worth £2000, of which 500 (worth £1000) are consumed in production to make steel that sells for £3000. Suppose the wage was £1000. If the price of iron has not changed meanwhile, my profit is the difference between costs and revenues, £1000. But suppose in the meantime the price of iron halves. My remaining stock of 500 tons is now worth only £500. I have lost £500 through price changes. *This is a deduction from profits.* It will be balanced by rises in prices elsewhere so that others make windfall profits. Over the whole of society, total profit is unaltered. But this cannot help the individual capitalist whose books show, according to normal accounting practice, a *cost* of £500 in stock depreciation to be found from revenues. Profit is therefore not £1000 but £500.

Gross worth at start of production		Gross worth at end of production	
Iron: 1000 tons	£2000	Iron: 500 tons	£500
Labour contracts (variable capital)	£1000	Labour contracts	None
Steel	None	Steel worth its sale price, that is	£3000
Gross worth	£3000	Gross worth	£3500

Table 11.11 Profit taking into account depreciation

This amounts to the following; profit is no longer simply the difference between revenues and costs. It is the change in gross worth of the business, just as the capitalists calculate it. My advances are given on the left hand side of Table 11.11. My results are given on the right hand side.

Profit is the difference between the two: $£3500 - £3000 = £500$. This is not an accounting foible: it is enforced by the market. If I claimed profits of £1000 I would soon be forced to recognize the error. Other capitalists would purchase iron at its new market price. If they managed to sell steel for £3000 they would secure an excess profit of £500. If not, I would be forced to take a further loss. Whether or not the price of steel reflects this general devaluation, we confront each other as capitals using the *same* production process, in the technical sense, but with *different* productivities in value terms and hence different individual profits.

Without depreciation, this method yields the normal result: the 500 tons of unused steel would have the same price. Depreciation registers exactly as if the loss in value had transferred to the product. The accounts will read:

Sales:		£3000
Costs:	Materials £1000	
	Depreciation £500	
	Labour £1000	Total £2500
Profits:		£500

We can thus separate out depreciation into two components: actual usage (£1000) and moral depreciation (£500).⁴² We could treat the £500 as a transfer of *surplus* value from the previous cycle of production. Marx, however, considered it a component of the *value* of the product.⁴³ In this case labour in steel production becomes less productive, as if it had been deskilled, since it now creates only £1500 in the same time it previously created £2000. Elsewhere, constant capital *appreciates* and consequently transfers less to its product; labour in these branches becomes more productive and adds more value. Both approaches are consistent but the first follows capitalist practice.

In either case the surplus value created in any given period remains equal to the value product, less the value of consumed capital; and total profits equal total surplus value in accordance with Marx's second equality.

Note once again that the profitability of a production process cannot be derived from technical conditions alone. Producers of the same product with the same inputs and the same methods will secure different profits depending on when they buy their steel.⁴⁴ Note finally that the resultant profit rate is *different* from that predicted by equilibrium theory. Productivity-enhancing technical

change produces a falling rate of profit in conditions where equilibrium theory predicts a rising rate, as Andrew Kliman's chapter in this volume shows.

Figure 11.4 illustrates this point, giving the rate of profit and the value of total capital stock for the case we have been discussing under the following unexceptionable conditions: C_I and C_{II} turn over once every ten periods and the technique of producer P_{II} remains fixed; however P_I is able to invest its physical surplus, 2.5 times its output, so that its invested constant capital rises continually without expanding the labour force; that is, labour productivity in both sectors steadily improves due to the cheapening of C_I . The real wage remains fixed at half the output of P_{II} . The equilibrium calculation shows a rising profit rate and a falling capital stock; the correct calculation shows a rising capital stock and a falling profit rate.

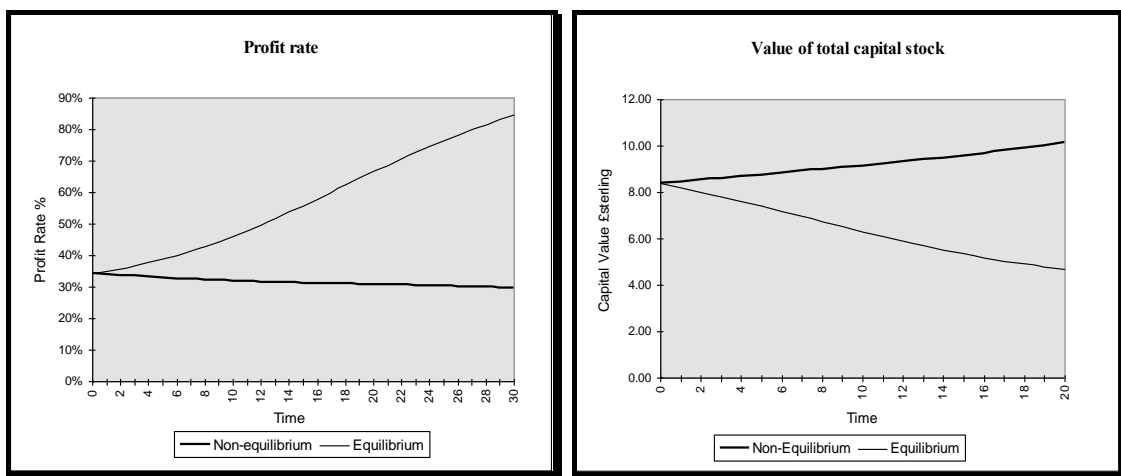


Figure 11.4 Equilibrium and non-equilibrium profit rates and capital stock

What is fixed capital? the period of reproduction and continuous time

Equilibrium theories, as we have seen, are forced to locate the value-creating potential of capital in either its exchange-value or its use-value aspect, neglecting the unity of the two.

In the absence of technical change, there would be no difference between the two. If use value and exchange value formed an indissoluble unity in the commodity, there would be no need to consider them separately. They would behave like the weight and the volume of a liquid or a powder, which behave as interchangeable measures. There are conversion scales from fluid ounces to pints, or ounces to tablespoons, which cooks use happily every day of their lives, so that recipes work equally well in either.

If prices never changed, values and quantities would be linked in the same way. Price and quantity would be invertible expressions of the same thing, and could be used interchangeably, just as the French Revolution *defined* its unit of weight, the gramme, to be the weight of a volume of water – one cubic centimetre. The £ sterling could be used as a universal measure of quantity and cake could be made with £2 of flour and £1 of butter, just as the neoclassical

production function says. The only debate in economics would be which numéraire from the infinite number available was the most aesthetically or politically pleasing, be it gold, paper, labour, standard commodities, socks or fish.

It is a different matter when two quantities vary independently. If one is used as the standard of the other, a change of form appears as a change of magnitude. If France had defined weight as a volume of gas, its balloonists would have made matter out of hot air and Marie Antoinette would have kept her head. And if there were no incompressible substances, the Académie could without doubt have sustained a long and heated debate on whether weight or size mattered most.⁴⁵

The neoclassical macroeconomic production function therefore makes it appear as though money creates money, because it uses a changing standard of price as a measure of its capacity to mobilize or create value.

Those variants of equilibrium theory which eschew this choice attempt to do so by identifying a special, value-creating type of capital – fixed capital. In fact, however, this elevates an arbitrary accounting unit to the level of an economic constant. This unit is the period of reproduction.

Many neoclassical models secretly depend on this constant. For example, the formula giving the rate of interest on currencies that are expected to devalue is usually given as $i + h$ where i is the normal rate of interest on the currency under threat, and h is a hedge factor or risk premium given by the expected rate of fall in value of the currency under the impact of a devaluation. Unfortunately h has time in its denominator. Therefore the expected rate of fall should be adjusted for the *time* at which it is expected to happen. As the hour of doom approaches, h becomes infinite. This happened on Black Wednesday when at one point the Bank of Sweden raised the interest rate on the Krone to 500 per cent, in vain.

Why does C_I appear as fixed, and C_{II} as circulating capital, in Tables 11.5 and 11.6? Because we took as our period of reproduction a unit of time in which C_{II} is completely used up. But there is no basis for this choice. If we had taken the period of reproduction to be a week instead of a month, or a day instead of a week, C_{II} and indeed variable capital would have turned over only partially in this time.

Successive approximations to time-varying values

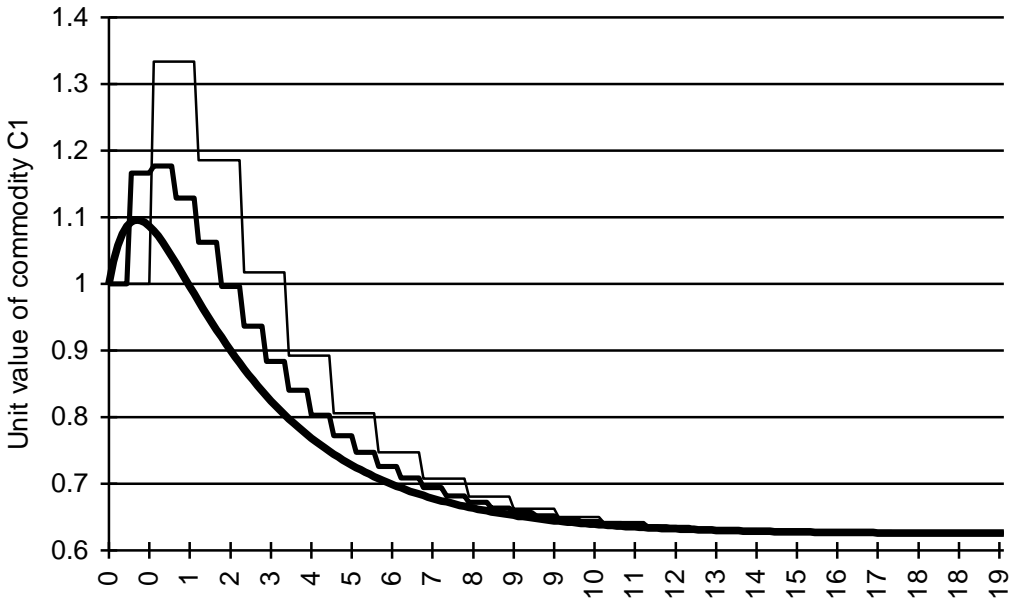


Figure11.5 Uniform convergence of sequentially calculated values with fixed capital

As we have seen, in reality all components of capital exist as stocks and money-capital must be advanced for their use. Marx’s extensive discussion of turnover time is not destined, as all subsequent authors have taken it, to establish the *difference* between fixed and circulating capital but to establish their inherent *identity* insofar as they function as capital.

Our final correction, therefore, is to remove the arbitrary assumption of a fixed period of reproduction and treat all elements of capital equally. This finally deals with an abstraction we have so far made: in effect, that circulation ceases until production is complete. In fact they proceed in parallel. The assumption that a period of circulation alternates with a period of production therefore introduces a distortion.⁴⁶ How do we know that this distortion is not fatal?

The isolation is *analytically* correct, because there are distinct acts in the life of each commodity, which are separated in time for each individual commodity: the production of the commodity, and its sale. But while it is true that a definite period of time elapses while each commodity is produced, this period is not the same for each commodity, so that we cannot act as if all commodities were sold at once.

General Equilibrium theory deals with this problem by eliminating the passage of time altogether, assuming an immediate identity between production and consumption, a fact that Marx made the centre of his criticism of Ricardo. Producers are made to pay for their inputs at prices which do not yet exist, on the assumption that „in the long run“this assumption will justify itself, which it does by the extreme measure of removing every source of change in prices. This

solves the paradox of Achilles and the Tortoise by killing the tortoise before the race.

The method we propose, classical in the natural sciences and in mathematics in general, is to make the period of reproduction progressively shorter and shorter. This gives a more and more accurate view, until in the limit – the continuous case – the distortion is eliminated. When the period used for accounting is reduced successively, the magnitudes calculated by the formalism reduce to a well-defined trajectory; in mathematical parlance, the sequence of values and prices should converge uniformly. What they converge uniformly to is the continuous case, in which the period of reproduction is treated as infinitely small.

The condition for this is the absence of singularities or „sudden steps“ in the stock or price vectors.⁴⁷ This is clearly true for changes in stock and in the value product, although at moments of financial crisis, vast volumes of commodities can now change hands in a very short space of time, approaching a singularity. It will definitely be violated for the transfer vector £E at moments of crisis and of sudden shifts in such quantities as exchange rates, when all commodities exchanging for a given money are instantly revalued in terms of another money. It is precisely at such points that the value-price distinction asserts itself most emphatically. Outside of such moments, the distinction is blurred by the smooth operation of the market and it becomes impossible to distinguish changes effected by the price system from changes resulting in underlying real value movements. What remains true, however, are three fundamental laws:

- ❑ The new value entering the economy – the value product – is proportional to the time worked by employed labourers;
- ❑ Surplus value and profit in total add up the difference between this value product and the wage;
- ❑ As will be demonstrated, the total value of stock (equal to its total price) increases for as long as the capitalists invest any portion of this surplus value, and falls only when – as in a crisis – a forcible disinvestment takes place.

Figure 11.5 shows how the successive reduction of the period of reproduction yields sequences of values which converge on a single trajectory.

11.10 THE MATHEMATICS OF ACCUMULATION

Reproduction is an alternation of production and circulation, the unity of these two moments. Any mathematical formalism will stand or fall by the manner in which it represents this unity. If it obliterates distinctions which actually exist in the real world, it will remain nothing more than idealization.

The errors in the simultaneist approach to reproduction and accumulation exactly parallel the errors in its approach to exchange. In exchange it assumes constant prices, in reproduction constant proportions. In exchange this gives rise to a separation into the two spheres of „value“ and „price“. The image of this in its

treatment of reproduction is a separation into the two spheres of „use value“ and „value“. The founding catechism of the Surplus Approach school is the idea that a *single technology* corresponds to a *single price system*. In simultaneous equations this is true, but in the real world and in Marx it is false.

Our first task, therefore, is to re-integrate production and circulation in such a way that the distinct effects of each process on both use value and value are properly represented; and our second task is to re-unite these two separate aspects of reproduction in such a way that their concrete unity does not destroy their abstract difference.

Relative surplus value

Virtually the whole of the simultaneist interpretation of Marx assumes simple reproduction. Marx, on the contrary, conducted his analysis in the framework of relative surplus value. The two are incompatible. For Marx there is no *necessary* reproduction of the material elements of production; as we explain in chapter 1 this is an ideological construction which has paralysed economic thinking from 1897 onwards. To take but one example: what is the meaning of a „physical surplus“? For the whole linear production school of which the Surplus Approach school is but a part, it means this; first we subtract from the physical product all those commodities necessary to restart production with *exactly* the same inputs in *exactly* the same proportions.⁴⁸

This never happens, and Marx makes this abstraction at only one point, during the construction of his simple reproduction schemes in Volume II. This assumption is immediately dropped and does not apply in Volume III (or Volume I), all of which are in the framework of relative surplus value. In practice society reproduces a mixture of old with new and different commodities which permit the capitalists to reproduce their *capital*, that is, their money or more generally, its capacity for growth. They therefore resume production of different goods, using different techniques, in different proportions, in every way a modification of what went before. A physical surplus in the pure sense does not even exist, because many use values are consumed and never even produced again, having been superseded technically. Space does not allow us to develop this in full but we draw the reader's attention to Volume 34 of his collected works, which contains the final part of the „second draft of capital“, and which he wrote immediately after the *Theories of Surplus Value*, itself a break in his study of relative surplus value. This volume also contains the first worked-out version of his reproduction schemas.

We draw attention to just three points which run completely counter to the simple reproduction formalism. First, for Marx reproduction is the *conversion of surplus value into capital*. But in simple reproduction, surplus value cannot be converted into capital or it would not be simple. Moreover surplus value is for Marx always converted into *more efficient* means of production, because it seeks

a higher individual rate of profit. The cheapening of the means of production was not for him an afterthought but the starting point. Thus we find, for example:

it is the tendency and the result of the capitalist mode of production continuously to raise the productivity of labour, hence continuously to increase the amount of the means of production converted into products with the same additional labour, continuously to distribute the newly added labour over a greater quantity of products, so to speak, and therefore to reduce the *price* of the individual commodity, or to *cheapen* commodity prices in general. (Marx 1994:369)

Secondly, if the framework of the transformation is that of simple reproduction, what is it doing sitting just before the chapter on the falling rate of profit? How can the rate of profit fall in simple reproduction when it is due to the *accumulation* of commodities, that is, the conversion of surplus value into capital?

Thirdly, we actually find that Marx has a completely different concept of physical surplus:

One should not imagine for that reason that *surplus produce* arises merely because in reproduction the amount of products increases as compared with the original amount. All *surplus value* is expressed in *surplus produce*, and it is only this that we call *surplus product* (the surplus of use value in which the surplus value is expressed). On the other hand, not all of the *surplus product* represents surplus value; this is a confusion found in Torrens and others. Assume, for example, that the year's harvest is twice as large this year as the previous year, although the *same* amount of objectified and living labour was employed to produce it. The *value* of the harvest (disregarding here all deviations of price from value brought about by supply and demand) is the same. If the same acre produces 8 qrs of wheat instead of 4 qrs, 1 qr of wheat will now have half as much value as before, and the 8 qrs will have no more value than the 4 had. In order to exclude all outside influences, assume that the seed was cultivated on specific fields, which yielded the same product as the previous year. Thus a qr of seed would have to be paid for with 2 qrs of wheat, and all the elements of capital as also surplus value would remain the same (similarly the ratio of the surplus value to the total capital). If the situation is different in this example, this is only because a part of the constant capital is replaced *in natura* from the product; hence a smaller part of the product is needed to replace the seed; hence a part of the constant capital is set free and *appears* as surplus produce. (Marx 1994: 220)

The legacy of Sraffa is the idea that with a given technology, prices are given solely by the division of the product between capital and labour: that „technology determines prices“. From this point of view the statement that „a qr of seed would have to be paid for with 2 qrs of wheat“ is inconceivable. The seed *is* wheat and in material terms the wheat replaces itself directly. How, then, can one qr of wheat exchange on a basis of equality with 2 qrs of wheat? Does this mean that the price of wheat is twice itself?

Moreover it is widely assumed that one may divide the gross product independently of prices into three portions representing replacement means of production, wage goods and luxury goods, and that the value distribution in society is simply equal to the value of these three portions of the product. But this is simply not so. If constant capital has cheapened and indeed changed its material nature during a period of production, and the value of portion of the

gross product which pays for its replacement is smaller than the value of the constant capital of the last period, then as Marx puts it in many places in all three volumes, constant and variable capital is „freed up“; accumulation is fuelled *not* just by surplus value but by this additional surplus. Marx’s definition of surplus produce is therefore this: it is the portion of the gross product left over after the *value* of consumed capital has been replaced, *not* after its use value has been replaced.

However, it is necessary to analyse the total movement of use values distinctly from the movement of values. The most important thing, therefore, is to make no prior assumptions, such as simple reproduction, which impose an a priori constraint on the reproduction of values. This in turn is impossible unless we recognize, as Marx did in his treatment of expanded reproduction, that accumulation does not consist of the immediate redeployment of produced goods in production, but in a *prior accumulation of unused use values* and a *prior accumulation of idle money*. That is, we have to account systematically for the conversion of flows into stocks.

The representation of stocks and flows

We must thus represent properly the relation between turnover and stock. The first hurdle, at which the simultaneous method falls, is to recognize that turnover alters stock, to realize there is any dynamic relation at all between the two. But this is not enough. There are two causes of the rise or diminution of any stock, and Marx’s analytical construction is constructed through and through to distinguish between them. On the one hand, production decreases C, W, and B and raises X; and on the other, circulation diminishes X and increases C, W and B. We must distinguish systematically between these sources of variation; the inability to do so is one of the most important conceptual failings of neoclassical economics.

In the deepest sense, a stock *is* an aspect of a flow, just as any existing thing is an empty abstraction if divorced from what it was and what it will be. The movement is the primary entity.⁴⁹ The notation of the differential calculus is clumsy in this regard since it takes the entity itself, X, as given, and the variation of X, ΔX , as the variation of it. But we are not in a position to escape this here.

When we need to make the distinction clear we use the symbol Δ_C , the variation in circulation, to represent the change in any magnitude due to circulation, and the symbol Δ_P , the variation due to production, to represent the change of the same magnitude due to production. The symbol Δ is thus the sum of the two, the total variation in a quantity, giving an operator identity

$$\Delta = \Delta_C + \Delta_P$$

Our analysis moves from the discrete to the continuous case, which means we need to be able to represent the *rate of flow* of a given magnitude. By analogy we shall write

C_C for the rate at which C is changed in circulation;

C_P for the rate at which C is changed in production.

C' for the total rate at which C is changed in reproduction, so that $C' = C_P + C_C$

Note that C' has its normal significance in calculus as the rate of change of C . This also permits us to move away from the confusing use of a different symbol for price and for value, which are actually the same thing at different points on the circuit of capital. As reproduction progresses, the price of any commodity changes for two reasons; because of changes in the productivity of labour and because of the redistribution of surplus value in the sphere of circulation. From one period to the next, p changes, as it were, twice; once because the outputs of production contain a different amount of socially necessary abstract labour time

$$p^t \rightarrow p^t + \Delta_P p^t$$

a quantity we have hitherto called λ , and again because circulation redistributes surplus value

$$\lambda^t \rightarrow \lambda^t + \Delta_C p^t = p^{t+1}$$

where $\Delta_C p$ is simply what we have so far called e . The overall movement is

$$p^t \rightarrow p^t + \Delta_C p^t + \Delta_P p^t = p^{t+1}$$

Analogously we have

p_C for the rate at which p changes in circulation;

p_P for the rate at which p changes in production.

p' for the total rate at which p changes in reproduction, so that $p' = p_P + p_C$

The important and difficult thing in a truly general dynamic analysis, as we have said, is to separate and analyse these two sources of variation, production and circulation, in relation to the two moments of the commodity, use value and value, and then unite them in such a manner that their concrete unity is expressed without obliterating their abstract differences. We proceed to do this by separately analysing, first the general laws governing the reproduction (production and circulation) of use values; and then those governing the reproduction (production and circulation) of value. This is conducted for the discrete case. We then bring the two together and reduce the period of reproduction to zero to produce a general, continuous differential equation governing reproduction as a whole.

The reproduction of use values

Production, in which we include reproduction and hence personal consumption, destroys and create use values. We cannot predict how much. Workers may consume all, part, or none of W and the capitalists of B . Investments may, or may not, be used, and output may or may not be sold. But we can quantify the outcome: each stock is either augmented or diminished by its turnover.

Circulation on the other hand alters the distribution of stocks, so strictly speaking C^t , for example, actually stands for two different magnitudes: before circulation and afterwards.⁵⁰

In circulation commodities are redistributed in four main ways:

- ❑ One part is purchased by labourers and either consumed by them or laid up as a consumption fund. This is thus added to the wage fund W .
- ❑ A second part is purchased by the capitalists and employed – or lies idle – in production in the next period. This is thus added to constant capital C .
- ❑ A third part is purchased or set aside by capitalists for private use in B .
- ❑ A fourth part remains as unsold inventory X in the hands of the capitalists.

Again there is no automatic way to predict the proportions of these exchanges. Thus the only relation we can rely on is the definition:

$$K = X - C - W - B \quad (25)$$

Equation 25 is the most general statement we can make. If any of the magnitudes in it are specified in more detail – for example by a production function or a theory of consumer demand – then we have a particular model of the economy, not a general theory. We can say, however, that the same law applies to any changes of stock levels, so that

$$\Delta K = \Delta(X - C - W - B) \quad (26)$$

However, the same is true for any isolated source of change, so that

$$\Delta_c K = \Delta_c(X - C - W - B) \quad (27)$$

But this means we can say something specific about circulation since it can neither create nor destroy use values. The quantity $\Delta_c K$ may change in circulation through a redistribution of commodities but the total commodities in it cannot. It follows that the row sum of $\Delta_c K$ is zero.

Therefore summing (27) across rows – capitals – produces a fundamental statement, a sort of Kirchoff's Law of circulation, which any commodity economy must obey:

$$\Delta_c \Sigma_j (X - C - W - B) = 0 \quad (28)$$

In consequence the quantity ΔK , changes in K over the whole of reproduction, can *only* be due to production (in which, recall, we include private consumption).

Therefore

$$\Delta K = \Delta_p \Sigma_j (X - C - W - B) \quad (29)$$

We term these last two equations the *fundamental stock accounting identities*. They are the most general statements which can be made about the reproduction of use values in a market economy and therefore, firstly, must be true in any particular case and secondly, impose no hidden a priori assumptions.

The calculation of value in the presence of fixed capital

At the beginning of a period of production at time t , following circulation, the total goods in circulation K , that is all goods in society available for sale, comprise the following use values:

- C productive stocks;
- W consumption goods owned by labourers;
- B consumption goods owned by capitalists;
- X sales inventory owned by capitalists;
- K total stocks excepting labour-power, the sum of the above;
- V the total labour power in the economy.

Assume for simplicity that workers consume all wage goods in the current period. Consumed variable capital V is therefore always equal in price and hence value to the price of consumed wage goods pW consumed during the same period.⁵¹

After production each stock has diminished except X, which has grown because production has created new use values $\Delta_p X$. A portion of K^t survives intact to subsequent periods and preserves the value it has inherited. This portion, plus $\Delta_p X$, makes up K^{t+1} , the total goods now in circulation. It follows that this intact portion has magnitude

$$K^{t+1} - \Delta_p X^t$$

or

$$K^t + \Delta_p K^t - \Delta_p X^t$$

(Another way of deriving the same result is to say that this intact portion is equal to K^t less consumption of C, V, W and B.) This preserves the value it possessed when production began, and contributes this to the total supply of value in society as if it had just been produced. This component of new value is equal to

$$p^t(\hat{K}^t + \Delta_p \hat{K}^t - \Delta_p X^t)$$

Production creates new goods whose value comprises two components, namely the value transmitted by the consumed constant capital $\Delta_p C^t$ and the value added by labour power $\Delta_p \mathcal{L}^t$. The total value in the economy following production is therefore the sum of preserved and new values,

$$p^t(\hat{K}^t + \Delta_p \hat{K}^t - \Delta_p X^t) + p^t \Delta_p C^t + \Delta_p \mathcal{L}^t$$

On this basis, new unit values are formed. These are a social average, equal to the total value of each commodity divided by the total use value of the same commodity. Representing new unit values as $p + \Delta_p p$, the total value of all stocks in circulation is also given by

$$(p + \Delta_p p) \hat{K}^{t+1}$$

that is

$$(p + \Delta_p p)(\hat{K} + \Delta_p \hat{K})$$

where we drop the time subscript since only subscripts at time t are now involved.

hence $(p + \Delta_p p)(\hat{K} + \Delta_p \hat{K}) = p(\hat{K} + \Delta_p \hat{K} - \Delta_p X) + p \Delta_p C + \Delta_p \mathcal{L}$

Expanding and simplifying yields

$$\Delta_p p \hat{K} + \Delta_p p \Delta_p \hat{K} = -p \Delta_p X + p \Delta_p C + \Delta_p \mathcal{L}$$

that is

$$\Delta_p p \hat{K} + p \Delta_p X = p \Delta_p C + \Delta_p \pounds L + o(2)$$

We now divide through by Δt and pass to the limit as $\Delta t \rightarrow 0$. This gives the *value accounting identity*

$$p_p \hat{K} + p X_p = p C_p + \pounds L_p \quad (30)$$

or, in slightly more familiar form

$$p(X_p - C_p) = \pounds L_p - p_p \hat{K} \quad (31)$$

This should be compared with the value equation when all stocks are considered to turn over during the period of production:

$$p(X_p - C_p) = \pounds L_p$$

The difference is $p_p \hat{K}^t$, the *revaluation term*. This expresses the redistribution of value brought about by depreciation of commodities due to technical change.

Suppose now that in circulation goods sell, not at prices equal to values $p + \Delta_p p$ but at new prices $p + \Delta p$ where in general $\Delta p = \Delta_p p + \Delta_c p$, the value change brought about by production plus the value change brought about by circulation. The same reasoning yields the *price accounting identity*

$$p' \hat{K} + p X = p C + \pounds L + p_c K \quad (32)$$

or

$$p' \hat{K} + p X = p C + \pounds L + \pounds E \quad (33)$$

Equations (32) and (30) are the basic dynamic relations of price and value taking into account fixed capital. Given only the observed data of the economy they are determinate and distinct vectors of values and prices.

They can be rearranged to show how new value is created and redistributed in the economy thus:

$$p' \hat{K} + p(X - C) = \pounds L \quad (34)$$

that is, *new value enters the economy at the rate* $\pounds L$, and

$$p' \hat{K} + p(X - C) = \pounds L + \pounds E \quad (35)$$

showing how this new value is redistributed through by transfer vector $\pounds E$.

Surplus value and profit with fixed capital

The capitalists begin production with stocks $K - W$, that is, everything except wage goods, and variable capital V whose value is pW . Their gross value is therefore

$$p(K - W) + pW = pK$$

At the end of production they have used up $\Delta_p C$, $\Delta_p V$ and $\Delta_p B$ and created new use values $\Delta_p X$. They therefore own stocks equal to

$$\Delta_p(K + X - C - B)$$

and have also used up $\Delta_p V$ of their variable capital. Their new worth is equal to the new price of their stocks

$$(p + \Delta_p p)(K + \Delta_p X - \Delta_p C - \Delta_p B) - \Delta_p \pounds V$$

and assuming that the value of variable capital is equal to the current price of wage goods, this is equal to

$$(p + \Delta_p p)(K + \Delta_p X - \Delta_p C - \Delta_p B - \Delta_p W)$$

However, luxury consumption B is a deduction from their wealth; it is part of what they appropriated. Gross wealth including current consumption is therefore

$$(p + \Delta_p p)(K + \Delta_p X - \Delta_p C - \Delta_p W)$$

Subtracting current gross wealth from initial gross wealth gives net surplus value:

$$(p + \Delta_p p)(K + \Delta_p X - \Delta_p C - \Delta_p W) - pK \\ \Delta_p p K + p \Delta_p X - p \Delta_p (C - W) + o(2)$$

But the value equation (30) established that

$$\Delta_p p \hat{K} + p \Delta_p X = p \Delta_p C + \Delta_p \pounds L + o(2)$$

from which

$$p \Delta_p X = p \Delta_p C + \Delta_p \pounds L - \Delta_p p \hat{K} + o(2)$$

Substituting for pX yields the rate at which surplus value is produced or the *rate of surplus value generation*

$$\Delta_p \pounds S = \Delta_p p(K - \hat{K}) + p \Delta_p C + \Delta_p \pounds L - p \Delta_p (C + W) + o(2)$$

The two terms in $p \Delta_p C$ drop out leaving

$$\Delta_p \pounds S = \Delta_p p(K - \hat{K}) + \Delta_p \pounds L - p \Delta_p W + o(2)$$

But we have assumed the value of consumed variable capital $\Delta_p \pounds V$ is equal to the price of consumed wage goods, disregarding consumer durables, giving

$$\Delta_p \pounds S = \Delta_p p(K - \hat{K}) + \Delta_p (\pounds L - \pounds V) + o(2)$$

Dividing by Δt and passing to the limit yields

$$\pounds S_p = \pounds L_p - V_p + p_p(K - \hat{K}) \quad (36)$$

This is the value-product of labour power $\pounds L$, less variable capital $\pounds V$, plus a *redistribution* term $p_p(K - \hat{K})$. This reflects the result of the competitive struggle between capitals through depreciation. All capitals whose value has risen have appropriated surplus value from all capitals whose value has fallen through depreciation. The rate of *profit generation* is given similarly by

$$\Pi' = \pounds L - \pounds V_p + p(K - \hat{K}) + \pounds E \quad (37)$$

that is, the rate of surplus value generation plus the transfer vector $\pounds E$. Marx's second equality follows from two facts: the sum of the components of $\pounds E$ is zero, and

$$\Sigma K = \Sigma \hat{K}$$

Lastly the equations of price and profit yield a simple relation connecting price and profit on a sectoral basis

$$\Pi' = p'K + p(X_p - C_p) - V' \quad (38)$$

Capitalist accumulation

The wealth of society falls into two main portions: the wage fund W , which is owned by workers, and everything else, which is owned by capitalists. This latter is capital; it consists of those commodities which, broadly speaking, enter into the equalisation of profit rates. In this we include the wealth of collectors, speculators, hoarders and rentiers; in short every form of wealth which acts as a receptacle for surplus value and which, as a component in a portfolio of wealth, may be exchanged for other commodities in pursuit of a higher rate of growth of real value, that is, profit. Neglecting variable capital this is given by $K - W$.

However capital also seeks a return on variable capital along with all other advances of money. The value of the capital seeking a share of surplus value is therefore simply the scalar quantity

$$\Sigma_j pK$$

The total rate of accumulation of society is the rate at which this magnitude grows. (For the rest of this section we are concerned only with total social magnitudes and we will therefore drop the summation sign.) Differences between p and λ which cancel out over all of society. This total rate of accumulation whether goods sell at prices or values, is therefore

$$\pounds K' = p'K + pK'$$

the sum of two quantities, one the result of the accumulation and capitalist consumption of use-values and the other the result of price and value changes. But the second of these terms is given by the equation of value production:

$$p'\hat{K} + pX_p = pC_p + \pounds L + \pounds E$$

When we sum over the whole of society \hat{K} and K are the same and $\pounds E$ vanishes:

$$\pounds K' = \pounds L + p(K_p - X_p + C_p)$$

However, the stock accounting identity tells us

$$K_p = X_p - C_p - B_p - W_p$$

Thus the rate of growth of capital, summed over society, is therefore

$$\begin{aligned}\pounds K' &= \pounds L - \pounds B_p - \pounds W_p \\ \pounds K' &= \pounds S_p - \pounds B_p\end{aligned}\tag{39}$$

The only way this can be negative is if the bourgeoisie disinvest in value terms.

The general law governing the rate of profit

We are now in a position to state the general law governing the variation of the rate of profit. Since we have made no special assumptions concerning wage rates, supply and demand, capitalist behaviour or the structure of production, this law is absolutely general and must therefore apply in all special cases.

The general or average rate of profit is given by the ratio between $\pounds S_p$, the rate at which profit is generated, and K , the volume in value terms of capital seeking a

return on investment. Between one period and the next, this changes by an amount

$$r' = \frac{d}{dt} \left(\frac{\pounds S_p}{\pounds K} \right) = \left(\frac{\pounds K \pounds S - \pounds S_p \pounds K'}{\pounds K^2} \right) = \left(\frac{\pounds S_p - r \pounds K'}{\pounds K} \right)$$

But we can substitute from the numerator using equation (39), to give

$$r' = \left(\frac{\pounds S_p - r(\pounds S_p - \pounds B_p)}{\pounds K} \right) = \left(\frac{\pounds L - \pounds V - r \pounds I}{\pounds K} \right)$$

where $\pounds I$ is the rate of investment, that is, surplus value less capitalist consumption. We can now formulate precisely the conditions for this to be a positive magnitude (rising profit rate) or a negative magnitude (falling profit rate). First, if $\pounds L$ and $\pounds V$ are zero (constant rate of value creation and constant wage in value terms), then *the rate of profit must fall unless the capitalists disinvest in value terms*, that is, unless I , the rate of investment, is negative. Thus (the law as such) investment produces a continuously falling profit rate.

Second, this can be offset (countervailing tendencies) by raising $\pounds L$ – making the workers work harder or employing more of them – or by decreasing $\pounds V$, the share of national product which they consume in value terms. However there are *absolute limits to either*. $\pounds L$ here is the social average. Over all of society, differences between less or more skilled labour average out, and therefore it is in a fixed ratio to hours worked. And $\pounds V$ cannot be decreased below zero or the workers die.

We thus find – an astonishing and salutary result – that after a hundred years of nit-picking at Marx's original statement of the general law of the falling rate of profit, that this law is not merely valid, but scientifically and rigorously exact.

11.11 CHANGES IN THE VALUE OF MONEY

Under general price inflation, anyone who holds commodities other than money will make profits in money terms, whether or not these profits correspond to a real increase in their command over either people or things. This is not a special feature of Marxist analysis but applies in any conceivable economic framework.

Suppose I purchase 100 tons of steel for £100 on 1 January and do nothing with them; and all prices rise by 10 per cent during the year. My steel is worth £110 on 31 December and my profit is therefore £10, in money terms.

No-one, no matter how ideologically blinded or prejudiced against value theory, could possibly claim that this represents an increase in real wealth. There is thus a real problem in economics which has to be dealt with in any analytical framework, although most microeconomics evades or ignores it: how can we distinguish between profits which are the result of purely monetary phenomena, and profits which in some sense represent an increase in real wealth?

In an equilibrium framework this is incomprehensible. Monetary inflation can be simulated in comparative statics by changing the numéraire from one period to the next. But this does not exhibit the false profits induced by inflation. The

numéraire appears in both the numerator and the denominator of the profit expression, which appears therefore as if it were unaffected by the value of money. The real basis on which monetary variations affect profits – the variation of asset prices from one time to the next – simply cannot be represented in such systems.

This is a deeply practical question. Accountants, who understand many of these issues better than economists, have devised inflation-accounting systems for eliminating false profits of this type. Working economists distinguish between real and nominal value. Macroeconomic theory attempts to separate out the effects of changes in the price level from movements in the „real economy“.

Working economists lead strangely schizophrenic existences. From 9 until 5, for however many days a week they are paid to produce useful, or at least marketable results for governments, accountants, market researchers or perhaps investment banks, they sit in offices and carefully adjust figures with scrupulous professional attention using price indexes calculated with minute care to disentangle the real values of the assets under discussion from their monetarily-inflated prices. Then, during the hours left for reading, writing, or attending learned conferences, they sit and read, or perhaps write, theoretical tracts which have been crafted with equal care for a hundred years around the single proposition that all prices are relative, the value-price distinction is meaningless, and that accounting for social effort in labour hours is a theoretically-discredited and fruitless activity.

This schizophrenia is self-induced and uncalled for. In the framework we propose, money – which was present from the start – enters in a natural and obvious manner into the calculation. As shown in section 5 the commodity serving as money at all times has a known and calculable value, as does every other commodity. This may be considered in one of two ways which are formally equivalent. First, we may take the value of money at some given initial starting point as the standard of value (and hence price). Thus, if in 1980 the total assets of the economy were priced at £1000 billion and in 1981 the same goods would have been priced at £1250 billion, then a 1981 pound is worth 1.5 times a 1980 pound; the value of £1 has thus fallen to $\frac{4}{5}$ measured in 1980 pounds.

Alternatively, we may wish to express these magnitudes directly in hours. As Carchedi and de Haan show in this volume, this calculation is perfectly practical in principle. The only difficulty is that the accuracy of measurement is affected by the time period chosen. By calculating the price of the new goods created over some definite time, correcting as we will show for the (known) change in the value of money and dividing by the total hours worked in society that created these new goods, we can calculate the value product £L of an average hour of socially necessary labour time in 1980 pounds. Since we are converting to a constant value measure (1980 pounds), the wealth of society in 1980 may now be estimated in hours, as may all magnitudes previously calculated in pounds.

Either calculation yields a coefficient μ^t , the quantity of value expressed in one unit of current money. How does this affect the calculation of profit? Begin in the current period; gross money wealth is

$$\mu pK$$

After production and circulation gross wealth including current consumption is

$$(\mu + \Delta\mu)\{(p + \Delta p)(K + \Delta X - \Delta C - \Delta W) + \Delta \text{£}E\}$$

Subtracting current gross wealth from initial gross wealth gives net profits in money terms:

$$(\mu + \Delta\mu)(p + \Delta p)(K + X - C - W) - \mu pK$$

Clearly, the part of this equation that is multiplied by μ will yield the same expression for the rate of profit generation as before but multiplied by μ , namely

$$\mu \{p'(K - \hat{K}) + \text{£}L - \text{£}V + \text{£}E\}$$

All elements of the second part, multiplied by $\Delta\mu$, will vanish in the limit except

$$\Delta\mu pK$$

and this must be added to the expression above to yield the *money rate of profit generation*

$$\Pi_m = \mu \{p'(K - \hat{K}) + \text{£}L - \text{£}V + \text{£}E\} + \mu' pK \quad (40)$$

where the extra term $\mu' pK$ shows that profit must be adjusted for the *rate of change of the value of money*, multiplied by the price of capital stock.

This can be summed to yield the rate of profit generation in the whole economy, the general rate of profit generation – remembering that when summing over society many of the terms drop out or can be simplified:

$$\Sigma_j \Pi_m = \mu \Sigma_j \text{£}S + \mu' \Sigma_j K \quad (41)$$

Finally, dividing through by the money price of the total capital stock μK yields the *money rate of profit*

$$\begin{aligned} r_m &= \frac{\mu \Sigma_j S + \mu' \Sigma_j K}{\mu K} \\ &= r + \frac{\mu'}{\mu} \end{aligned}$$

the normal rate of profit plus a term representing variations in the value of money

$$\frac{\mu'}{\mu} \text{ or } \frac{d(\log \mu)}{dt}$$

The importance of this is as follows:⁵² during a period, such as the boom phase, when all prices are generally rising, the money rate of profit is raised artificially by this general rise. The effect, however, is limited to periods in which prices are *rising*, not when they are simply high; it is a dynamic effect with no static equivalent. High money profits act as an attractor for investment so that investment-led growth creates and re-enforces the demand for all goods, feeding the rise in prices. Money itself becomes a source of losses, since its purchasing

power is falling. Value is thus transferred out of society's stock of money and into its stock of productively active goods.

However, the resultant accumulation begins to raise the value of invested capital stock, reducing the actual underlying profit rate. Initially this is not perceived because it is offset by general price inflation, but eventually comes to dominate. At a certain point, the reduction in demand provoked by this fall in the profit rate, or perhaps some external or specific endogenous event – it is irrelevant what the immediate cause is – will bring to an end the period of generally rising prices. Now, however, the term μ'/μ becomes *negative* and instead of offsetting the fall in the underlying rate of profit, it re-enforces it. The feedback mechanism goes into reverse; now investment cuts off, existing productive stock becomes idle or bankrupt, and demand falls, re-enforcing the fall in the value of money. Money becomes a source of gain, since its purchasing power is rising and additional stores of value are sought such as precious metals, jewellery and collectors items. Value thus flows out of the stock of productively active goods and into society's stock of money and other stores of value.

A point is reached where the value of the capital in society – including money and the like – has actually devalued because society has physically drained them of value. This can happen in a number of ways. Value may be transferred into spheres which do not participate in the equalisation of the profit rate, such as armaments or other state expenditures. If society continues producing goods with new technology, even at a reduced rate, then the physical stock of goods gradually declines in value towards its theoretical equilibrium rate (old assets are written off, depreciated or liquidated) so that the mass of value entering the equalisation of the profit rate falls generally towards its theoretical equilibrium magnitude. The underlying profit rate begins to recover; the stage is set for a new cycle of accumulation on an expanded scale – until the next time.

NOTES

¹ The word „simplification“ is abused in the literature. The axiomatic method abstracts from particular factors which may be re-introduced at a later stage. The power of Euclidean geometry, the most beautiful classical example of this method, lies in the formulation of axioms concerning lines and points which state *only* the relations between them. The thickness of a Euclidean line or size of a Euclidian point is not zero: it is undefined. I can build a projective geometry out of Meccano or out of my head, as I choose. The „simplification“ that profit rates are equal, or that supply matches demand, is of a different order. It simplifies by constraining, not by removing constraints.

² Magic numbers are the raw material of sorcery and religion alike: think of the pentangle, the trinity, the seven-branched candelabrum, the number of the beast. Cabbalism, of which neo-Ricardianism at times seems a reincarnation, was dedicated to discovering the secret forms of God in the numbers and symbols He bequeathed. The famous Tower of Babel, built in Babylon, was a magical monument with seven rising stages, each dedicated to a planet. Its angles symbolized the four corners of the world. „The old tradition of a fourfold world was reconciled with the seven heavens of later times.“ says Seligman (1975:38) „For the first time in history numbers expressed the world order“. Not for the last.

- ³ The notion, originating with Plato, that the geometry expresses divine relations, was the conscious basis of a political system. So long did it take to break free that Kepler, who established the modern laws of planetary motion, experimented for years with circular orbits believing the Creator could not possibly have taken the ellipse as His model for the universe. See Farrington (1939), Lerner (1992)
- ⁴ Nearly everything said here applies also to the systems of linear inequalities pioneered by von Neumann (1937) and further developed by Morishima (1973) and other writers.
- ⁵ This order of presentation is logically incorrect for pedagogical reasons as exchange should have been introduced before production. Otherwise the order of presentation follows the development found in *Capital*.
- ⁶ Note that these were calculated independent of workers' consumption, which affects only the value of labour power; 6 hours of labour power are worth $24 \times v_2 = 4$ hours so $v_L = 4/5$
- ⁷ Moreover the output of period 0 will not all be used in period 1, that is, the market will not clear. This is dealt with in section 8
- ⁸ Suppose I build an infernal device, the Laplace Integral Engine, deploying the latest Sraffa-Heisenberg Inference Technology to digest all information about the planet including the state of Schrödinger's cat and predict infallibly all prices on 1st April 1999. Suppose I sell the results for £1 a prediction. The information being cheap and worth having, I sell a few billion and retire. The customers, however, did not buy the information for pure interest but to make a few bob; they behave differently. But this falsifies the predictions, whose premises have been changed by the information deduced from them. The machine contradicts its own existence. The economic future can be predicted only if it is consciously controlled; that is, if humans reach prior agreement as to courses of action they wish to pursue in knowledge of the consequences, and stick to them because knowing these consequences does not divert them from it. But such a situation has nothing to do with a market economy.
- ⁹ The expression of L in hours would be hrsL, slightly clumsily. But this is simply equal to V. However £V, the value of labour power, is not equal to £L: labour power adds value in proportion to its magnitude (number of hours worked), not in proportion to its price. This proportion is assumed the same for all labour but a general treatment of skilled and complex labour would make it a vector of coefficients. See for example Giussani (1987). See also Carchedi and de Haan in this volume.
- ¹⁰ The reader should not think in terms of the linear production convention that columns represent quantities and rows prices or values. Our variables represent *commodities*, unities of use and exchange value. Columns represent capitals and rows represent commodities, in *each* space representing values/use values, stocks/flows. Each table has $3n^2$ degrees of freedom where n is the number of sectors.
- ¹¹ This is borrowed from tensor analysis. There is no implication that values are contravariant and capitals covariant vectors, although it is an interesting idea.
- ¹² I am in debt to Bruce Roberts for drawing my attention to this problem in a very patient reading of a first draft of a section of this paper.
- ¹³ An „augmented form“ can be constructed; labour is a distinct row of X and C and v is partitioned into its labour and non-labour components: $v^+ = [v_{\text{non-labour}}, 1]$. Then $v^{t+1} = v^{+t}c$ where $c = CX^{-1}$
- ¹⁴ Every money, even paper, has a cost of production and therefore an intrinsic value. It requires a certain number of socially necessary labour time to bring it into existence. But the cost of production (value) of every money including gold diverges from its rate of exchange for other commodities, which Marx sometimes terms the exchange value of money, and sometimes simply the value of money. The term „value of money“ covers, we think, what Rodríguez calls „exchange value of money“. When we wish to distinguish the intrinsic value of money we call it „the value of the commodity which serves as money“. This issue is dealt with exhaustively in the section on continuous dynamics.
- ¹⁵ The apparent „technical“ requirement to replace inputs arises only because money tied up in machines is lost unless it panders to their appetite. But raw material purchases rise and fall, and stop if the machine becomes unprofitable. And when the machine itself is due for replacement only an insane capitalist buys the *same* machine instead of the latest.
- ¹⁷ See Walras' (1965:89) theorem: „The effective demand for or offer of one commodity in exchange for another is equal respectively to the effective offer of or demand for the second commodity multiplied by its price in terms of the first.“
- ¹⁸ „But a further series of factors have also to be taken into account in our analysis, factors which affect the sizes of C, V and S in a decisive way, which must therefore be briefly mentioned. Firstly, the *value*

of money. This we can take as constant throughout" (Marx 1981:142, emphasis in original). This is rather important. If the value of money affects the magnitude of C , V and S in a „decisive way“, how does this square with the universally-accepted view that constant capital transfers to the product only the value with which it emerges from production, instead of the value it realizes in exchange?

- 19 I place the „supply and demand“ for money in quotes because it is in my view of a different order from the supply and demand for commodities in the normal sense. These express the rate of consumption or production, not the absolute amount in existence. Hume's concept is that metal money, which possesses a substantial intrinsic value that may exceed its extrinsic value, appears to be affected by laws of supply and demand when coin is melted down – though the reverse (conversion of bullion into coin) is rare because of the laws against forgery. But regardless of the empirical validity of this „law“, a different conception is involved from supply in the sense of the *rate at which it is produced*. The so-called „supply of money“ is the supply of a stock, not a flow. To confuse the two is to confuse a quantity with its differential. Equilibrium theory can make this elision because in it, there are no differentials.
- 20 „It [surplus value] is the sum total of the realized unpaid labour, and this grand total is represented, just like the paid labour dead and living, in the total mass of commodities *and money* that accrues to the capitalists“. (Marx 1981:274, my emphasis); „The *sum of values* remains the same, even if the expression of that total *sum of values* were to grow in money, hence the sum of „exchange-values“ rises, according to Herr Wagner. This is the case, if we assume that the *fall in price* in the sum of the other commodities does not cover the *over-valued price* (excess price) of the corn. But in that case the exchange-value of money has, *pro tanto*, fallen below its value; the sum of values of all commodities not only remains *the same*, it even remains the same in *monetary expression*, if money is reckoned among the commodities“. (Marx 1975:188, emphasis in original)
- 21 „It is not money which renders the commodities commensurable. Quite the contrary. Because all commodities, as values, are objectified human labour, and therefore in themselves commensurable, their values can be communally measured in one and the same specific commodity, and this commodity can be converted into the common measure of their values, that is into money. Money as a measure of value is the necessary form of appearance of the measure of value which is immanent in these commodities, namely labour-time“(Marx 1976a:188)
- 22 Ricardo and Marx both accept that the value added by labour power is a variable function of the time worked. Some workers add more value than others because they are more skilled or work harder. It is reasonable to assume that the same type of worker in the same conditions creates the same amount of value in the same time. Multiplying by a coefficient for each type of labour under average conditions gives the value it creates in one hour. From now on, with Marx, we assume this reduction as given. This necessary correction does not remove the problem: When price deviates from value, it is still not the sum of value created and transferred.
- 23 See for example Harcourt (1972), Eichner (1979)
- 24 Seton (1957) does pose the price-value relation as an additive rather than multiplicative difference, although he also introduces price-value multipliers.
- 25 Space does not permit a full treatment of expenditures left out of this account, which can be assigned to one or other of variable capital or profit. Thus the unproductive costs of circulation come from profits; the services of the state to labourers are part of variable capital while taxes on labourers are a deduction from it; the services of the state to capital are part of profits while taxes on the capitalist class, either privately or as capitalists, are a deduction from profits. See Moseley (1990), Freeman (1992c).
- 26 V is neither W nor the money wage. It is the labour-power contracted to the capitalists, for which they pay the money wage V , which is then spent separately on W at a time of the workers' choosing. Recall that for clarity V is not included in K ; its price and value are the scalars p_L , λ_L .
- 27 „Market-value (and everything that was said about this applies with the necessary limitations also to the price of production) involves a surplus profit for those producing under the best conditions in any particular sphere of production ... this holds good for all market-prices, no matter how much they might diverge from market values or market prices of production. The concept of market price signifies that the same price is paid for all commodities of the same kind, even if these are produced under very different individual conditions and may therefore have considerably different cost prices“ (Marx 1981:300-301).

- ²⁸ Moreover when the stage of „specifically capitalist production“ or the „real subsumption of labour“ is reached, capital organizes not merely its reproduction but the continuous revolutions in technology that drive it forward. „This entire development of the productive forces of *socialized labour* (in contrast to the more or less isolated labour of individuals) and together with it the *use of science* (the *general product of social development*), in the *immediate process of production*, takes the form of the *productive power of capital*. It does not appear as the productive power of labour, or even of that part of it that is identical with capital ... The mystification implicit in the relations of capital as a whole is greatly intensified here, far beyond the point it had reached or could have reached in the merely formal subsumption of labour under capital“ (Marx 1976a:1024).
- ²⁹ „I define *fixed capital*, i.e. *capital* in general, just as my father did in his *Théorie de la richesse sociale* (1849) as all durable goods, all forms of social wealth which are not used up at all or are used up only after a lapse of time, i.e. every utility limited in quantity which outlasts its first use, or which, in a word, can be used more than once, like a house or furniture. And I mean by *circulating capital* or *income* all non-durable goods, all forms of social wealth which are used up immediately, i.e. every scarce thing which does not outlast its first use, or which, in short, can be used only once, like bread or meat“ (Walras 1984:212).
- ³⁰ „[I]t will be convenient, in order not to complicate the presentation, to introduce the same limiting assumptions which Tugan-Baranowsky made use of, namely, that the entire advanced capital (including the constant capital) turns over once a year and reappears again in the value or the price of the annual product“ (Bortkiewicz 1984:199-200).
- ³¹ „The j^{th} column of B [the output matrix–AF] represents the quantities of commodities produced by production method j , where that list of commodities is taken to include all partially used items of fixed capital. (Thus machines, etc., of different ages are treated as *distinct* commodities and are represented as such in the columns of both A and B.)“ (Steedman 1977:164).
- ³² Marx makes no such assumption. Nearly two-thirds of Volume II, which deals with reproduction, is dedicated to the turnover time of capital. Marx’s „correctors“ all base their account on his statement in Volume III that *solely* in order to study the formation of profit he will abstract from differences in turnover time. It is illegitimate and absurd to apply this to reproduction and in the event Marx does not even use it in Volume III; in all his tables capital advanced differs from capital consumed.
- ³³ „If, as a result of a new invention, machinery of a particular kind can be produced with a lessened expenditure of labour, the old machinery undergoes a certain amount of depreciation, and therefore transfers proportionately less value to the product. But here too the change in value originates outside the process in which the machine is acting as a means of production“ (Marx 1976a:318).
- ³⁴ Worn-out economic theories still fetch the same as two hundred years ago, even allowing for inflation. This is because nothing new has hit the market.
- ³⁵ Accountants normally allow for depreciation on a „going concern“ basis; that is, they assume the investment is functioning as part of a totality that is selling its product.
- ³⁶ „Thus if an increase in the price of raw material takes place with a significant amount of finished goods already present on the market, at whatever stage of completion, then the value of these commodities rises and there is a corresponding increase in the value of the capital involved. The same applies to stocks of raw material, etc. in the hands of the producers. This revaluation can compensate the individual capitalist, or even a whole particular sphere of capitalist production – even more than compensate, perhaps – for the fall in the rate of profit that follows from the raw material’s rise in price“ (Marx 1981:207-208). Note once again that a change in *price* modifies the *value* of the existing capital, as Marx then explicitly notes: „Our whole investigation has proceeded from the assumption that any rise or fall in prices is an expression of real fluctuations in value. But since we are dealing here with the effect that these price fluctuations have on the profit rate, it is actually a matter of indifference what their basis might be. The present argument is just as valid if prices rise or fall not as a result of fluctuations in value, but rather as a result of the intervention of the credit system, competition, etc.“
- ³⁷ „The *destruction of capital* through crises means the depreciation of *values* which prevents them from later renewing their reproduction process as capital on the same scale. This is the ruinous effect of the fall in the prices of commodities. It does not cause the destruction of any use values. What one loses, the other gains. Values used as capital are prevented from acting again as *capital* in the hands of the same person. The old capitalists go bankrupt. If the value of the commodities from whose sale the capitalist reproduces his capital = £12,000, of which say £2,000 were profit, and their price falls to

£6,000, then the capitalist can neither meet his contracted obligations, nor, even if he had none, could he, with the £6,000, restart his business on the former scale, for the commodity prices have risen once more to the level of their cost prices. In this way, £6,000 has been destroyed, although the buyer of these commodities, because he has acquired them at half their cost price, can go ahead very well once business livens up and may even have made a profit" (Marx 1969b:496).

In the early 90s in London because of a shortage of London Stock bricks the labour time of stealing the contents of a house sank lower than stealing its fabric. A new crime developed; instead of breaking into houses, entrepreneurs broke the houses themselves and sold the bricks.

The Roman builders of a number of still-functioning Italian aqueducts would be gratified but astonished to find they had started a self-sustaining joint production process which was to last two thousand years.

For simplicity we have omitted the commodity stocks of labour power, and those held by labour power. Because the value of C_1 does not change in this example, this does not affect the calculation.

There is not scope to go into the authoritative and profound Japanese debate on market value discussed in Professor Itoh's (1980) book. However, we believe that the insight provided by the fact that previously-existing stocks enter the formation of market values does substantially change the terms of the debate; it means, for example, that society does not immediately determine what is socially-necessary and what is not, but only after a lapse of time; and that the movement of stocks is one of the main indicators that allow producers to judge whether their selling price corresponds to what is socially necessary labour.

In the extreme case of software, which is in principle indestructible, *all* depreciation is moral. How can a vintage theory possibly explain its contribution to value?

„If the short working life of the machines (their short life-expectancy *vis-à-vis* prospective improvements) were not counter-balanced [by extension of the working hours] they would transfer too great a portion of their value to the product in the way of moral depreciation" (Marx 1981:209).

At one stroke, incidentally, this eliminates the neoclassical production function: there *is* no fixed relation between the value of outputs and the value of inputs derived from the production condition of a single process. The marginal product of either capital or labour simply ceases to exist in the normal sense of General Equilibrium theory.

The sizeists would have won.

We are indebted to Paolo Giussani for pointing this out.

Stock matrices X and the like are functions of both production and circulation. Turnovers $\Delta X/\Delta t$ are the first partial derivatives of *stock* matrices, maintaining circulation zero. We could have completed the analysis more rigorously by introducing a turnover due to circulation, the first derivative maintaining production zero. The continuity condition states that both these partial derivatives should be bounded.

The concession of a change in scale is permitted in the concept of a von Neumann ray, or balanced growth, in which all production expands proportionately. This does not alter the argument that follows, since balanced growth requires that *at least* the previous inputs to production should be reproduced.

The recognition of this fact is, I think rightly, considered by Hegel as almost the first act of philosophy. „Becoming is the first concrete thought, and therefore the first notion; whereas Being and Nought are empty abstractions ... As the first concrete thought-term, Becoming is the first adequate vehicle of truth. In the history of philosophy, this stage of the logical Idea finds its analogue in the system of Heraclitus. When Heraclitus says "All is flowing", he enunciates Becoming as the fundamental feature of all existence" (Hegel 1975:1323).

We could have made this distinction formally, but this would have overloaded the notation. The context always makes clear whether stock variables are being considered before or after circulation.

This can be corrected to allow for *secondary exploitation*, transfers of value to and from consumer durables, but we shall omit this correction here.

I am grateful to Professor Itoh for an extremely useful discussion on the mechanism of crisis, though I am responsible for the interpretation which follows and particularly any errors it contains.

12 Bibliography

Bibliographical Note

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