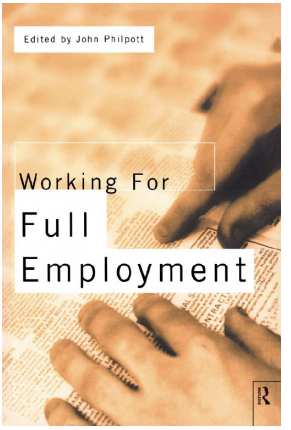
CAN ECONOMICS SOLVE THE PROBLEM OF UNEMPLOYMENT?

Paul Ormerod



in J. Phillpott (ed.)
Working for Full Employment, 1997

INTRODUCTION

Unemployment has re-emerged as a major policy issue in the Western world. Yet as I point out in my book, *The Death of Economics* (1994), conventional economics has little to offer in terms of understanding and solving the problem.

The free market, competitive model of microeconomic theory faces formidable theoretical and empirical problems. Yet proposals which call for deregulation and flexibility in labour markets are based on a belief in this model as a good approximation to reality. A familiar mode of discourse in economic debate is for a set of policies to be 'tested' by examining their impact in one of the various large-scale macroeconomic models which exist, such as the publicly available version of the Treasury model in the UK. But, whatever the economic nuance of any particular model, whether monetarist or Keynesian, such models are deeply flawed. They are unable to generate the most salient features of developed economies, namely that they grow over time. Their forecasting record, even in the very short-term, is abysmal, and the various models are still unable to agree on the effects even of simple policy changes.

A great deal of the debate on economic policy takes place around ideas and policy packages whose purpose is essentially counter-cyclical in nature. In other words, their aim is to move the economy from the recessionary to the expansionary phase of the cycle. However, as I discuss in this chapter, such policies are conceptually quite distinct from those which might generate and sustain full employment. The correlation which exists in all developed countries between growth and employment/unemployment over the course of the cycle misleads people into believing that it persists over the course of several cycles. But it does not. Unemployment in the medium and longer term essentially depends upon the social values, institutions and history of a country, and not upon technical aspects of economic policy.

THE FAILURE OF CONVENTIONAL MACROECONOMIC MODELLING

The performance of contemporary macro models in understanding the behaviour of developed economies is similar to that of the seventeenth century 'science' of numerology in ascertaining whether or not Anti-Christ had arrived on earth. Totally frustrated by decades of learned effort which had made no scientific progress whatsoever, in 1690, John Owen, Chancellor of Oxford University, went so far as to state: 'Take heed of computation! How woefully and wretchedly we have been misled by it!'. This could serve as the epitaph for the discipline of economics in its current state, and an epitaph in particular for contemporary macroeconomic modelling and forecasting.

But, despite the problems, there is a large number of macroeconomic models in regular use around the world, in treasuries, central banks and in large commercial companies, almost all of which are based upon the general, shared theoretical framework of macroeconomic behaviour. The models differ in the strengths of their various linkages, which are still the source of endless discussion among applied econometricians, but the underlying approach is common to all.

A substantial amount of resources has been devoted in the past twenty years to developing and refining these models. In Europe, this has been mainly at the expense of the taxpayer, although in the USA commercial funding of the models has become the norm. But despite this effort and attention, the performance of the models is sadly lacking.

The conventional reply to this criticism is that the models are only meant to serve a short-run purpose, whether in understanding the effects of policies or in forecasting. But even on their own short-run terms, there are two major problems with conventional models. First, despite the enormous amount of resources devoted to them over the years, the different models are still unable to agree on the effects of even the simplest policy changes. Second, their short-run forecasting record is abysmal.

As an example of their use to assess the impact of policy changes, Value Added Tax (VAT) is levied on most items of consumer spending in the countries of the European Community. Macro models can be used to supply answers to the question: what would happen if the rate of VAT were changed? This very question was actually asked of the six leading macro models in Britain in an exercise to compare their structures carried out in the summer of 1993 (Church *et al.* 1993). For the purposes of the exercise, VAT was assumed to be reduced by one percentage point.

In the first instance, it seems logical that a reduction in the rate of tax on spending would lead to some reduction in the average price at which goods and services across the economy are sold. Indeed, all six models agreed that initially this would happen, but in varying degrees. A couple of models thought that average prices would fall at once by 0.6 per cent, while at the other

extreme another model gave the answer that prices would hardly fall at all, by just 0.1 per cent. So the six models differed in their account of what would happen to prices as soon as the rate of VAT was changed. But at least they all agreed that prices would fall. An even bigger disagreement arises when the models trace through the consequences of a change in VAT over a period of three or four years. After four years, two of the models continue to give the answer that prices would fall, and by amounts greater than the initial impact. But one model said that by then prices would not have altered at all, while the other three answered that a reduction in VAT now would actually lead to higher prices in four years' time.

In other words, a finance minister trying to decide whether or not actually to change VAT, or a managing director trying to understand the consequences for his or her business of such a change, would be given quite different answers depending on which particular model were selected to tackle the question. In the immortal words of the salesman: 'You pays your money, and you takes your choice.'

Such disagreements among models about the empirical consequences of practical policy changes are widespread and other examples could be readily supplied, both from models of the British and of other economies. The differences in the answers provided arise from the cumulative effect of what are often small and apparently insignificant differences in the various linkages within the models. Providing a full account of the reasons for such differences can be a challenging job for the model operators in the same way that, for example, tracing connections on a complicated electrical switchboard requires skill.

In terms of forecasting accuracy, the models have a very bad track record. For example, during 1992 and 1993 alone big errors were made in forecasts. The Japanese recession, by far the deepest since the war, was not predicted. The strength of the recovery in America in 1993 was not really anticipated. In Europe, neither the turmoil in the Exchange Rate Mechanism (ERM), nor the depth of the recession in Germany were foreseen by the models.

A survey published by the Paris-based international body the Organization for Economic Co-operation and Development (OECD) in June 1993 illustrates the problem quite clearly. The forecasting records of the two major publicly funded international bodies, the OECD and the IMF, and of the national governments were compared. For the seven major world economies, the forecasts for the next year for output growth and inflation were examined. The benchmark for comparison was the naive projection that the next year's growth of output or inflation would simply be equal to this year's. In other words, this benchmark requires no knowledge of economics to produce and a forecast could be made with it by anyone who understands the elementary arithmetic of percentage changes.

Over the period 1987–92, this extremely simple rule performed at least as well as the professional forecasters in projecting the next years economic growth rate.

In terms of inflation, the rule performed as well as the OECD and IMF and slightly better than the national governments. In other words, the combined might of the macroeconomic models and the intellectual power of their operators, whether based in national governments or installed in tax-free splendour at public expense in Paris or in the IMF in Washington, could not perform any better than the simplest possible rule which could be used to make a forecast.

The record of forecasting is poor whatever the theoretical nuance of the model concerned, whether it leans towards monetarist or Keynesian properties. A survey of the accuracy of British economic forecasts, for example, carried out by the London Business School in 1993 concluded that differences over time between the predictions from the various schools of thought are very small. The striking fact to emerge from the study is that errors in forecasts are much greater than the differences between the apparently contending schools of thought. This is by no means a new discovery, but it represents valuable confirmation of previous studies over the years which have come to the same conclusion.

The best recipe for forecasting success, conclude the London Business School researchers, displaying a welcome degree of irony rare amongst economists, is to 'forecast often and forecast late'. In other words, the more forecasts which one makes during the course of the year, the greater the chance that, purely at random, one of them will prove to be reasonably accurate. By forecasting as close as possible in time to the actual period being forecast, much more information becomes available about what is likely to happen. Of course, this information is not confined by some secret code to economic forecasters. It is information in the public domain, available to anyone wishing to make an informed guess about the prospects in the immediate future.

All the problems of macroeconomic models, for example, the contradictory short-run answers different models give to the same question, the poor short-run forecasting record, the inability to trust a model on its own, exist despite the effort devoted to their maintenance and construction. And they exist despite the fact that model builders and operators, particularly in Europe where a greater proportion of their work is funded by grants from the taxpayer than in the USA, pride themselves on incorporating the latest nuances of macro-economic theory into the specification of their models.

A PERSPECTIVE ON UNEMPLOYMENT IN BRITAIN AND THE EU

Unemployment in developed economies, when examined over long periods of time, shows a number of distinct characteristics. It shows regular fluctuations, but the size of the fluctuations and the average level of unemployment around which such movements take place vary in different periods. Established patterns of behaviour can, when shocked, shift rapidly and following the shock behaviour remain irregular for some years.

These key characteristics of unemployment are seen in many data series from disciplines other than that of economics. In epidemiology, for example, epidemics such as measles and rubella often show similar features. In physiology, the initial symptoms of many acute diseases show themselves in marked changes and irregularities in previously regular rhythms of breathing. Patterns of river flows, which are crucial for agriculture in many developing economies, exhibit similar characteristics. In climatology, careful reconstructions of the earth's climate are showing a history which has the pattern of periods of stable behaviour, with fluctuations of reasonable regularity, punctuated by irregularities before a new, stable pattern emerges.

The understanding of the behaviour of such data in these scientific disciplines has been increased substantially in the past ten to fifteen years by the application of a particular analytical technique—namely, the use of very small systems of non-linear equations to comprehend the essential properties of the data being examined. (An interesting collection of such papers is available, for example, in *The Nature of Chaos*, Mullin 1993.) The realization that the underlying structure of apparently complex systems can be better understood through the application of non-linear mathematical techniques is perhaps the single most important scientific advance of the latter decades of the twentieth century. A simple graphical technique is often used in non-linear systems analysis, before any mathematics is used at all. This technique gives insights into the current problem of unemployment which faces most Western economies.

The usual way of presenting graphically the movement of a series such as unemployment over time is in a simple plot of the data (see Figure 9.1). An alternative way is to use a connected scatter plot. Figures 9.2, 9.3 and 9.4 construct a scatter plot of unemployment in any particular year against unemployment in the previous year. The resulting points are then connected together in sequence. For example, the points which link unemployment in 1992 and 1991, and 1991 and 1990 are marked on the chart, and then connected together. Such charts can provide three technical pieces of information:

- Whether the data tend to exhibit cycles over time—if so, the data in a connected scatter plot will appear in the shape of an ellipse.
- The average value around which the series fluctuates. This is the point in the centre of any ellipse which, applying technical jargon, we can call the 'attractor point' of the data. The data in the series is attracted around this point.
- The magnitude of the cycles around the attractor point—an ellipse which was very tightly drawn, for example, would imply that the data showed only small fluctuations over time.

The detection of attractor points in a rigorous way can be a difficult task involving some advanced mathematics, and it is a task which is further complicated in economics both by the relatively small number of observations

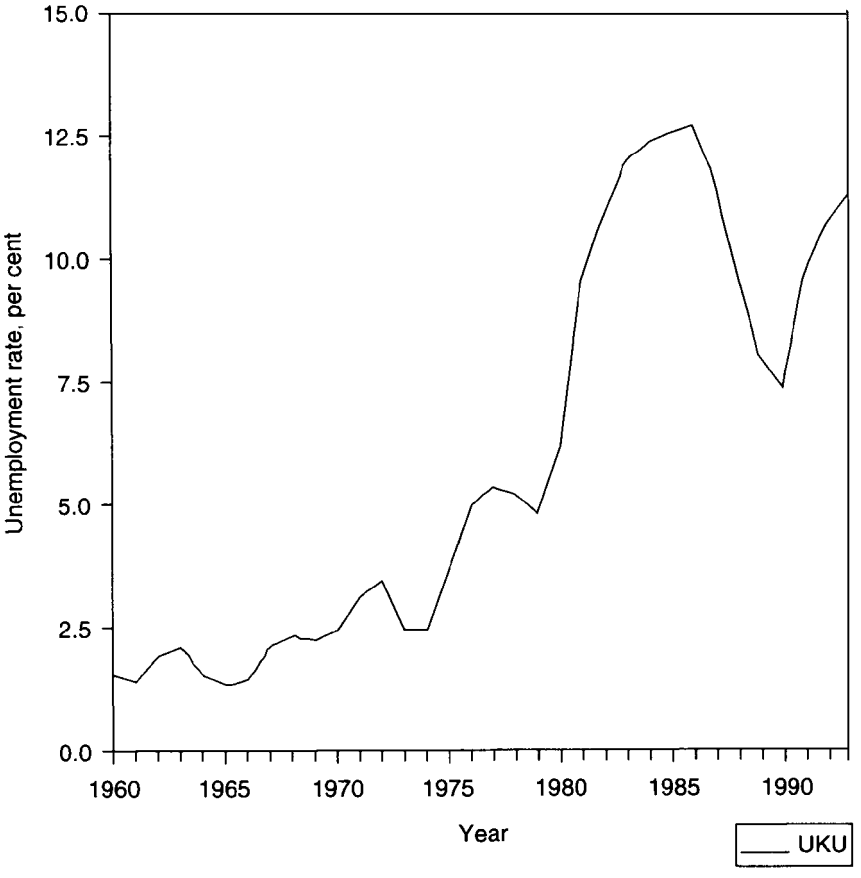


Figure 9.1 UK unemployment rate, 1960–93

which is available, and by a higher level of noise in the data than is usual in, say, the physical sciences. But presenting the data in this way can give a fresh perspective on the behaviour of a series. For example, the important role which the institutions and values of a society play in reacting to major economic shocks can be illustrated by presenting the data on unemployment over time in a different way than how it is usually seen.

Figure 9.1 plots the unemployment rate in the UK—defined by the official statistics—in the standard way over the period 1960 to 1993. As can be seen, unemployment was very low during the 1960s and early 1970s. The rate doubled very rapidly in the mid-1970s and then stabilized for a few years. In the early 1980s the rate once again rose rapidly and strongly, while since the middle of the 1980s unemployment has shown very marked fluctuations around a high average level.

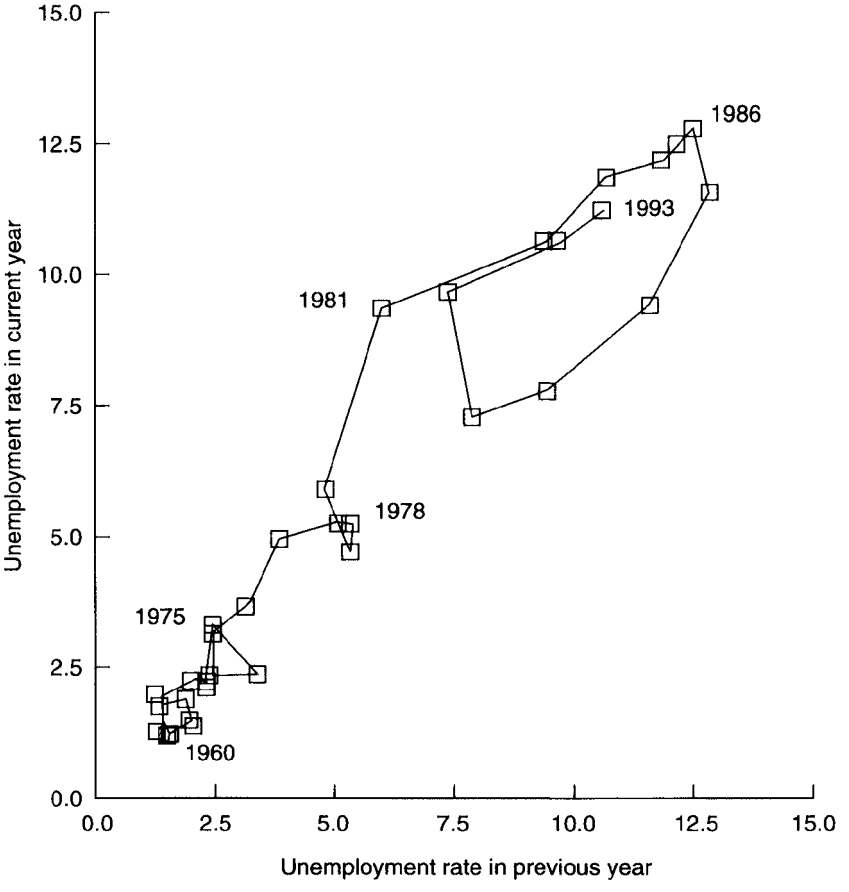


Figure 9.2 Connected scatter plot of UK unemployment, 1960–93

Figure 9.2 plots these same data as a connected scatter plot. The chart is drawn up in two stages. First, unemployment in each year is plotted against unemployment in the previous year and the point is marked on the chart. For example, the point labelled 1975 on the chart tells us two things. By reading across the left-hand axis of the graph, we can see that unemployment in 1975 averaged around 4 per cent. Then, by reading down to the bottom axis, we see that in the year previous to 1975, in other words 1974, unemployment averaged around 2.5 per cent.

The next step to produce the graph is to connect the points together in sequence. A number of individual years are marked for convenience and arrows are used to indicate the direction of change from one point on the graph to the next.

Figure 9.2 shows that the period began with the economy moving around a low level of unemployment, marked by the points in the bottom left-hand corner. But the impact on the economy of the oil price rise of 1973–4, and the specific reactions to it, pushed unemployment higher. It began to stabilize at the end of the 1970s, marked by the small cluster of points in the middle of the figure, and then rose dramatically in the 1980–1 recession. The data at the top right-hand corner of the chart, however, are beginning to show signs of moving in an ellipse, centred on an attractor point of around 10 per cent unemployment.

For interest, Figures 9.3 and 9.4 plot West German and French unemployment in the same way and over the same period. In Germany as in Britain, unemployment was very low in the 1960s and early 1970s. The oil shock increased unemployment to around 4 per cent. But the German social market system absorbed the shock more easily than the British economy, so that not only did unemployment rise less quickly, but a new attractor point emerged more rapidly.

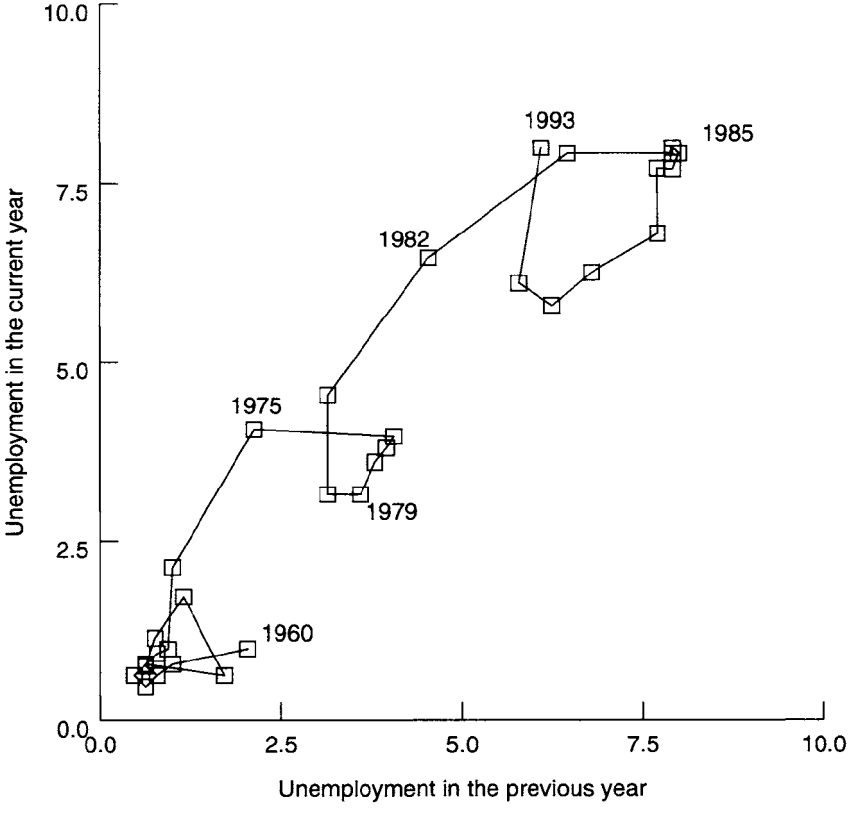


Figure 9.3 Connected scatter plot of German unemployment, 1960–93

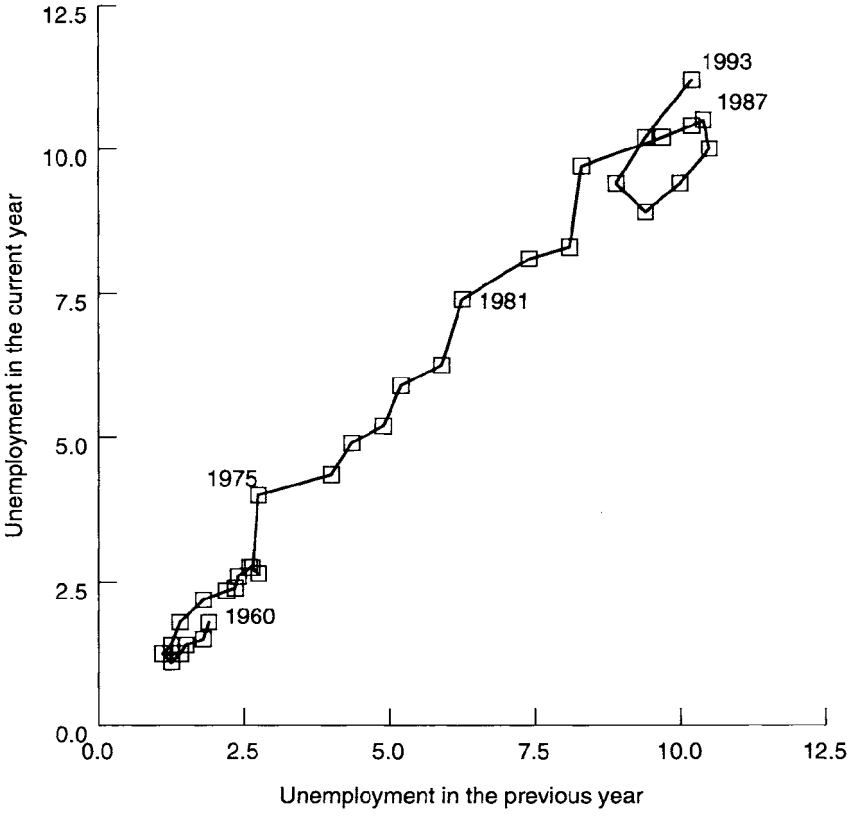


Figure 9.4 Connected scatter plot of French unemployment, 1960–93

French unemployment exhibits a different pattern. Since the mid- 1960s, unemployment rose almost inexorably. But, just recently, as in the rest of the EC, an attractor point is beginning to emerge around a high level of unemployment with large fluctuations around it.

THE ABSORPTION OF SHOCKS AND LOW UNEMPLOYMENT

The graphical approach used above highlights the facts that unemployment usually settles into periods of regular cyclical behaviour, but that it is subject to sharp shocks, following which there is no tendency for it to revert to its previous pattern of behaviour. Non-linear mathematical models can be used to describe the behaviour of an economy during periods of regular behaviour—how growth is generated and the interaction of the growth process with short-term cycles. But the response of any particular economy to shocks very much depends upon the shape of its institutions, its social values and its history.

A number of economies have preserved low levels of unemployment, not just in the 1950s and 1960s but after the 1973–4 oil shock until the present day. Japan, Austria, Norway, Switzerland and, until very recently, Sweden and Finland, have all maintained very low levels of unemployment for most of the post-war period. These countries are a very diverse group in terms of their economic and social policies and are typically governed by parties of quite different ideologies. But each of them has kept unemployment low by maintaining a sector of the economy that effectively functions as the employer of last resort, which absorbs the shocks which occur from time to time and more generally makes employment available to the less skilled, the less qualified.

In Japan, the shock absorber has been the domestic service sector. Japanese manufacturing, competing in world markets, is formidably efficient, but the domestic service sector—travel, restaurants, leisure activities, and so on—employs far more people than comparable companies elsewhere in the West. The cost of the employees carrying out apparently trivial or pointless roles in restaurants, for example, appears on the customer's bill. The private service sector in Japan is by Western standards very inefficient, but it serves a valuable role for society as a whole. In the smaller European economies which have maintained low unemployment, the function of 'employer of last resort' has been carried out by the public service sector, the costs of which appear less in the expenses of private consumption than in high levels of taxation. But in both these cases, though by very different means, the electorates have been willing to pay for high employment by tolerating sectors of the economy which by the narrow standards of free market theory are inefficient.

The overall efficiency and performance of such economies has not been handicapped at all by paying the cost of their various types of social values. Japan, of course, has outstripped every other developed country in terms of growth, and the smaller European countries outside the EC—some now within the EU—have generated growth rates at least equal to those within the Community. The power of markets has been harnessed to the wider benefit of society.

ECONOMIC GROWTH, EMPLOYMENT AND UNEMPLOYMENT

The importance of a country's institutions and social values in determining the rate of unemployment can be seen not just in the different ways in which economies respond to shocks, but in the ways in which the benefits of economic growth are distributed within the economy.

Contrary to received wisdom, both of policy-makers and of orthodox economics of whatever nuance, there is little connection over time between the rate of economic growth and either the growth in employment or the rate of unemployment. Most emphatically, this does not mean that governments should cease to promote growth. But it must be recognized that growth is not necessarily

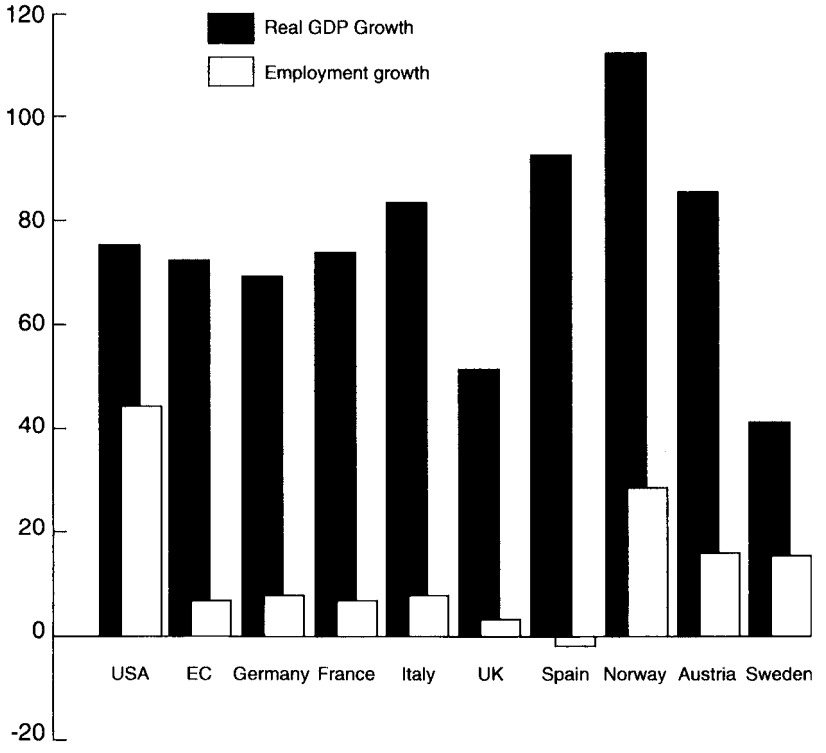


Figure 9.5 Growth and employment since 1970

a solution to unemployment. The connection between movements in output and employment over the course of the economic cycle misleads people into believing that this relationship necessarily persists over the course of several cycles. In most European countries, the proceeds of economic growth in the past twenty years have not been used to generate new jobs (in net terms), but have been appropriated by those who have remained in employment

The Spanish economy provides the most striking example of this. Since 1970, in real terms Spanish output has virtually doubled in size. Yet employment is actually lower now than it was over twenty years ago. Figure 9.5 shows the total output growth in a number of Western economies since 1970 and the corresponding change in employment. It is clear that there is no connection between economic growth and employment growth over this time scale.

The lack of connection between output growth and the labour market extends to unemployment as well. The growth rate in many Western economies from the late 1970s, once the initial impact of the oil price shock had been absorbed, has been very similar, at an average of around 2 per cent a year. Yet against this background of similar growth rates over a period of some fifteen years,

unemployment rates vary very substantially across countries. France, Germany (Western), Italy, Austria and Spain all grew at an average annual rate of some 2¼ per cent in the past fifteen years. Yet unemployment averaged 9 per cent in France, 6 per cent in West Germany, 9 per cent in Italy, only 3 per cent in Austria and 16 per cent in Spain.

Britain, Sweden and Switzerland—countries with governments of quite diverse attitudes to economic policy—all grew at just under 2 per cent over the same period. Unemployment averaged 9 per cent in Britain, almost 3 per cent in Sweden, and less than 1 per cent in Switzerland.

The experience of the twenty-odd years immediately following World War II misled people into believing that a rapid rate of growth is necessary to bring about low unemployment. During this period, growth was higher and unemployment lower than in the two decades following the 1973–4 oil price shock. But even in the earlier period, very low unemployment was preserved with markedly different growth rates in a number of countries. For example, unemployment averaged around 2 per cent in Germany, Norway and Britain and average annual output growth was, respectively, 5.5, 4, and 3 per cent; while despite an average growth rate of 3.5 per cent, the USA experienced an average of almost 5 per cent unemployment.

UNEMPLOYMENT AND CONVENTIONAL DEMAND AND SUPPLY SIDE POLICIES

One of the few—perhaps the only—genuine contributions made to human knowledge by orthodox macroeconomic theory is the distinction between cyclical movements in the growth of an economy and the underlying rate of growth itself. Yet this distinction is neglected in a great deal of economic policy debate.

Conventional macroeconomic demand management policy is almost invariably intended to be counter-cyclical in nature. But such policy is conceptually distinct both from policy intended to raise the sustainable growth rate of an economy and from policy designed to bring about full employment. Potentially, a successful policy of demand management, or more precisely the belief that the authorities could carry out such a policy whenever required so to do, could influence the state of long-term expectations and hence raise the proportion of any given share of profits in national income which is devoted to investment in both physical and human capital. In this way, demand management could theoretically influence the long-term growth rate.

But, in general, demand management policies simply alter the particular shape of the short-term cycle around a given underlying growth path of output and around a given attractor point for the rate of unemployment. In the medium to longer term, unemployment is not determined by the state of aggregate demand in an economy.

Newly fashionable policies designed to improve the supply side performance of the economy and, in particular, the quality of the labour force through

education and training, form part of almost every goverment's plans. But it does not necessarily follow that such policies, even if successful, will succeed in reducing the average level of unemployment in any particular economy over time. Any single individual can increase his or her prospects of employment, whether moving from one job to another at a higher real wage or becoming employed in the first place, by appropriate training. But it is a fallacy of composition to suppose that such an effect will necessarily take place in aggregate if either all or even a large number of individuals increase the value of their human capital through training and education.

Successful supply side policies of this kind will increase the underlying rate of growth in the economy which is sustainable in the medium to longer term and it may therefore be sensible to try to implement such policies. They may also succeed in reducing unemployment, but whether they do or not will depend upon the effect in aggregate of the response of other individuals already in employment. The empirical evidence shows that there is no necessary connection between the longer term rate of growth of an economy and either the rate of job creation or the rate of unemployment. Given the state of long-term expectations and the associated 'animal spirits' of entrepreneurs, a certain share of profits in national income will be required in order to validate a particular path of underlying economic growth.

But the division of the resulting share of wages among the population of working age who wish to participate in the labour force, as between the employed and the unemployed, is a separate and distinct question. It is entirely possible, as the experience of Western Europe over the past twenty years shows, for the employed to operate in aggregate as a cartel and to appropriate the entire proceeds of economic growth, to the exclusion of the unemployed. Of course, in practice there are not two homogeneous groups, the employed and the unemployed, and individuals do move between the two, but it is helpful in terms of an analytical framework to interpret the European experience in this way.

EUROPE, THE USA AND FLEXIBILITY

It is perhaps appropriate at this stage to comment on the different experiences of Europe and the USA in the past twenty years. At first sight the US labour market appears to have performed better than such markets in the countries of the EU. Figure 9.5, for example, shows that over the course of the past two decades, while the total numbers in employment in the EU have risen by only 7 per cent, in the USA the corresponding increase has been no less than 45 per cent. At present, the measured rate of unemployment in the USA is below 7 per cent, while in Europe it is over 10 per cent.

An important debate at present in Europe about employment centres on the desirability or otherwise of deregulating labour markets and reducing the level of involvement by the state. Much of the conventional wisdom of economics ascribes the apparently poor European performance to a lack of flexibility in the

labour market, particularly with respect to wages, and to a lack of incentive to move out of unemployment caused by both the level of benefits relative to wages and to the length of time for which unemployment benefit is paid.

In a very limited sense, conventional economics has moved on from the last period of high unemployment, the 1930s. Then, the orthodox had a stronger belief that the self-adjusting tendencies—whatever they might be—were already sufficiently powerful to guarantee that full employment would eventually be restored in the absence of government intervention.

In the 1990s the solution offered is one of the state intervening in order to remove obstacles to the workings of the free market. Economics has a strong faith that if the market economies of Europe can be moved closer to the ideal world described in free market theory, unemployment will fall. (This is not the place to discuss the very serious problems which exist with the free market theoretical model itself. These are discussed, for example, in Ormerod 1994 and in an article by Arrow 1994, who did more than anyone to establish a more mathematically rigorous theoretical foundation for orthodox competitive theory in the 1950s.)

The contrast between the USA and Europe is held to be a vindication of this latter point. The American economy has indeed created many more jobs than the EU economies, but it has needed to do so because the supply of labour has expanded more rapidly.

These two points are in fact linked analytically. Essentially, the USA operates a policy of open borders for the migration of labour. From time to time the authorities attempt with varying degrees of effort to keep out immigrants, but for all practical purposes anyone who wishes to enter the USA to work can do so. The Clinton administration has recently, for example, offered to regularize the status of millions of illegal residents. Almost all the inflow of labour into the USA is from Third World economies—indeed the USA has a major border with Mexico which is a Third World economy. Such people are willing to work for what are, by Western standards, very low wages. This low wage employment makes up most of the increase in employment in the USA.

A byproduct of this situation has been that many unskilled Americans have rejected the low wages which are on offer and have chosen crime as a career instead. But the main point of relevance here is that American labour markets have been flexible because of the supply of millions of workers from Third World countries. Arguments about the Social Chapter in Europe are very much a second order issue in terms of the flexibility of labour markets. By far the most effective way to bring about flexibility in the American sense to the labour markets of Western Europe would be to open the borders to migration from Eastern Europe and North Africa. Without such a policy, European labour markets, even in Britain, will remain qualitatively different from those in the USA. However, whatever judgement is formed on the desirability or otherwise of the economic effects, it is highly unlikely that an open border policy

would command the support of West European electorates and is hence not a practical option.

Overall, the contrasts between the American and European labour markets reflect the different social values of the two systems to a far greater extent than does the organization of markets for goods and services. As John Hicks recognized in his last work (1969), in which he recanted many free market views, labour markets are different in principle from those markets he describes as belonging to the 'mercantile economy'. The labour market is fundamentally hierarchical: 'a relation based partly on force, but partly upon its own variety of ethical sentiment, loyalty on the one side, responsibility on the other'.

CONCLUSION

A system of economic relationships has been built up in many Western economies, deriving from the response of social institutions and of the general social fabric to major economic shocks, which now prevents the achievement of full employment through conventional economic policies, whether Keynesian, monetarist, or supply side.

Conventional economics, in so far as the effects of its policy prescriptions are understood—which given the record of macroeconomic models is at the very least debatable—is essentially concerned with policies which are counter-cyclical in nature. These are conceptually different from policies for sustainable full employment. The real challenge facing policy-makers is not to move the economy around the present attractor points of unemployment which exist in Europe. It is to shift the attractor points themselves sharply downwards.

The average rate of unemployment in the long run—the attractor point in the figures—is ultimately not a question of technical economic policy, but of social values. Japan and some of the smaller European economies have succeeded in maintaining low unemployment because of their willingness to pay the costs associated with a sector of employment of last resort, be it public or private. Whatever the motives of individuals in employment in the EU, their behaviour in aggregate has meant that they form a cartel which excludes the unemployed from the benefits of economic growth. It is this cultural attitude which must shift if unemployment is to be lowered permanently.

Economic policy-makers have become accustomed to being presented with detailed checklists of policies of the form: 'change taxes by x per cent, public spending by y per cent, interest rates by z per cent', and so on. While it is important to avoid serious mistakes in the design of such polices, they are essentially counter-cyclical rather than policies for full employment.

Policy-makers have far less control over the social attitudes and values which are so important to the creation and preservation of low unemployment. But encouragement can be given to the revival of the long-run trend expressed by Western Europeans over many decades, temporarily halted in the 1980s,

towards substituting leisure for work. This is the direction which is required for full employment.

REFERENCES

Arrow, K. (1994) 'Problems mount in application of free market theory', *Guardian*, London, 3 January.

Church, K.B. *et al.* (1993) 'Comparative properties of models of the UK economy', *NIESR Review*, August.

Hicks, J. (1969) *A Theory of Economic History*, Oxford: Clarendon Press.

Mullin, T. (ed.) (1993) *The Nature of Chaos*, Oxford: Clarendon Press.

Organization for Economic Co-operation and Development (OECD) (1993) *Economic Outlook* June, Paris: OECD.

Ormerod, P. (1994) *The Death of Economics*, London: Faber and Faber.