

# Samuelson and Solow on the Phillips Curve and the "Menu of Choice": A Retrospective Johannes A. Schwarzer, *Œconomia*, 3-3, 2013, p. 359-388

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In one of his last contributions, presented at a conference in August 2006, Milton Friedman spoke on the topic "Trade-offs in Monetary Policy". In his view (2010, 114), Samuelson and Solow (1960) are still the starting point of interpreting the Phillips curve as offering a trade-off between inflation and unemployment:

Phillips himself did not present the curve as a policy tool, but less than two years later Paul Samuelson and Robert Solow published a celebrated article in the *American Economic Review* (1960) in which they did. Given the long period for which the Phillips curve appeared to hold in Britain, Samuelson and Solow concluded that it could be treated as a long-run structural equation which provided the missing equation that the then conventional Keynesian system needed. They treated it as a menu from which the monetary authorities could choose. By tolerating higher inflation they could experience lower average unemployment and vice versa.

Hence, their idea of a "menu of choice between different degrees of unemployment and price stability" (Samuelson and Solow 1960, 192, caption in Figure 2) is still regarded as the beginning of applying the Phillips curve to economic policy. This possible trade-off hence tempted politicians to "stay in the saddle by riding the Phillips curve" as it was believed that "there was no longer a unique Full Employment but rather a whole family of possible equilibrium rates, each associated with a different rate of inflation" (Modigliani 1977c, 3). The subsequent development is well known. Phelps' (1967; 1968) and Friedman's (1968) incorporation of inflation expectations marked the beginning of the end of trading off inflation for unemployment as the model economy now would, in effect, always return to its natural rate of unemployment in the long run.1

Finally, however, the upcoming concept of rational expectations (Lucas, 1972; 1973) and Sargent, 1973) inclined economists to completely refrain from "Keynesian" Phillips curve analysis and the idea of a "menu of choice" ended up in the drawer, and—at least asserted by some economists—"the undermining of any notion of a trade off between inflation and unemployment delivered the *coup de grâce* to official Keynesianism" (Desai, 1995, 346).2

Samuelson's and Solow's contribution as the possible starting point of the trade-off discussion was in the focus of attention of many scholars: The evolution of this trade-off idea and its relation to Samuelson and Solow (1960) is tracked in Humphrey (1985a), Laidler (1997), Leeson (1997) and Forder (2010a).

Humphrey (1985b, 5ff.) takes the point of view that the trade-off interpretation in the 1960s was widespread but makes no reference to Samuelson and Solow (1960) as the inventor of the trade-off (but Humphrey, 1985b, 24 does). However, the trade-off interpretation of the Phillips curve takes centre stage in his contribution.

Laidler (1997, 91f.) remarks that already the Radcliffe Report (Committee on the Working of the Monetary System, 1959) hinted at systematic policy trade-offs between different goals of economic policy, in particular unemployment and inflation. Also in the US, the Report of the Commission on Money and Credit (1961) not only pointed, but was particularly aimed at "studying not only the positive nature of those tradeoffs, but also the welfare considerations that might enable the goals to be weighed against one another" (Laidler, 1997, 93). Hence, in particular from the perspective of economic policy, the stage had been set for making use of the Phillips curve as a "menu of choice". Laidler (1997, 93) therefore interprets Samuelson and Solow (1960) as offering such a trade-off view, even though he admits that they were quite cautious regarding the stability of the Phillips curve.

The political background at the end of the 1950s is covered in Leeson (1997)—a view not shared by Solow (in Snowdon and Vane, 1999, 284): Leeson supposes that in the wake of the presidential election campaign Samuelson and Solow (1960) might be interpreted as providing an overdue analysis of the inflationary consequences of the high employment target of the Kennedy administration so that "Samuelson and Solow believed that they had uncovered evidence that suggested that tolerable and stable rates of inflation were associated with high employment; the system also looked reversible—aggregate demand could be manipulated to move the economy down the Phillips curve, if necessary" (Leeson 1997, 145).

Finally, Forder (2010a), provides an extensive literature review which focuses on how Samuelson and Solow (1960) were interpreted by later writers. In sum, he finds that many authors cited Samuelson and Solow (1960) as an example of the instability of the curve (Bronfenbrenner and Holzman, 1963, 620; Kaliski 1964, 6, n. 11; Shonfield 1967, 436f.) or as depicting a relationship between inflation and unemployment (Gray, 1968, 58, n. 1; Smyth 1971, 426, n. 1) instead of the original wage-change-unemployment relation by Phillips (1958). According to Forder (2010a), the possible trade-off interpretation of Samuelson and Solow (1960), however, barely shows up in the literature. Hence, Forder (2010a, 19) concludes that the contribution by Samuelson and Solow was not as important in the 1960s as one might think at first sight. Thus, the role Samuelson and Solow actually played might be attributed to them with hindsight to fill a gap in the trade-off story which seems to be heavily influenced by Friedman's Nobel Lecture (Friedman 1977a) in 1976 (see Forder 2010b).

Forder (2010a, 19), after an own analysis of Samuelson and Solow (1960), furthermore sums up that "Samuelson and Solow's was an early attempt to bring together what one might call the accumulated lessons of the experience of the period and to determine the prospects of actually achieving full employment and price stability." Forder (2010a, 1) thus emphasises that the long-run trade-off interpretation or a pledge for an inflationary policy cannot be found in Samuelson and Solow (1960). Even though Forder's view is partly shared in this paper, it will be argued that there remains a strong ambiguity in Samuelson and Solow (1960). Furthermore, an often neglected aspect of the previous discussion will be emphasised, namely the direction of causation underlying the Phillips curve, which changed in the wake of the monetarist counter-revolution. Moreover, it will be argued that Friedman's attack against the trade-off interpretation rested on a completely different view of the economy and of the inflationary process. Therefore, Samuelson's and Solow's trade-off interpretation must be judged in the light of the cost-push demand-pull debate, which Friedman did not take into account in his presidential address.

The remainder of this paper is organised in five parts. First of all, in Section 1, a short overview about the historical and theoretical background is necessary to provide the basis for the subsequent discussion. In particular, the cost-push demand-pull debate in the second half of the 1950s will be reviewed. Section 2 then focuses on Samuelson's and Solow's own assessment of this lively discussion in the 1950s. In Section 3, the paper will

focus on Samuelson's and Solow's presentation of the Phillips curve as an alternative tool for analysing the inflationary process. This section will also discuss immediate conference comments to their 1960 paper. Section 4 will compare Friedman's and Samuelson's and Solow's trade-off framework. It will be shown that their trade-off view was shaped by the economic issues of the 1950s and hence was very different from Friedman's trade-off explanation. Finally, Section 5 concludes.

# 1. Historical and Theoretical Background

By the midst of the 1950s the economics profession was confronted with the pressing issue of why the economy was facing rising prices despite ongoing slack in the economy (see Figure 1)—an ongoing inflation which was usually called "creeping inflation".<u>3</u> Thus, at least at first sight, it seemed that a new kind of inflation entered the stage which did not emerge solely because of "too much money chasing too few goods". In general, it was feared, as pointed out for example by Lewis (1959, 311), that this "creeping inflation" might accelerate without bounds (see for example Lipsey, 1961 who focuses on this discussion and argues on empirical grounds that inflation can indeed be stable and will not necessarily become explosive). In search of a remedy for this new kind of inflation, the underlying causes of inflation attracted attention of the economics profession. Hence, a lively debate evolved which led to numerous approaches on how to describe best the inflationary period since the mid-1950s.<u>4</u> Bowen (1960, 199) summarises this discussion pointing at the many different linguistic distinctions which emerged to identify the specific character of each cause of inflation:

A distinguishing characteristic of much recent thinking and writing in the general area of price behavior has been the rapid proliferation of inflation "types." It is no longer fashionable to speak simply of "inflation"; instead, one must specify whether he means "cost inflation," "demand inflation," "excess-demand inflation," "wage inflation," "money inflation," "structural inflation," "log-rolling inflation," "buyers' inflation," "sellers' inflation," and so on.



Inflation and unemployment in the US, 1945-1960

Own illustration. Source: Unemployment data: U.S. Bureau of the Census (1975, 135), Series D 85-86, "Unemployment: 1890 to 1970"; notes: persons 16 years old and over; prior to 1947 14 years old and over; new population data in 1953, 1960, 1962. Inflation: Consumer Price Index; data from Samuel H. Williamson, "Seven Ways to Compute the Relative Value of a U.S. Dollar Amount, 1774 to present", MeasuringWorth, April 2013; for data details see Lawrence H. Officer, "<u>What Was the</u> <u>Consumer Price Index Then? A Data Study</u>".

Bowen (1960, 199) also singles out "the most popular single dichotomy", that is, "the distinction between 'cost inflation' and 'demand inflation'." Such a distinction seemed useful "to decide what (if any) public policy measures should be adopted to curb mild inflationary pressures which occur side-by-side with non-frictional unemployment" (Bowen 1960, 204). Whereas demand inflation (for example due to rising investment demand) can be cured in a straightforward way by restrictive monetary and fiscal policies, fighting cost-

push inflation (for example aggressive wage claims by trade unions) by the means of restrictive demand policies involves accepting higher rates of unemployment. Thus, as pointed out by Newman (1958, 243), "[t]he price level-employment dilemma was brought into the arena of public discussion following the start of the so-called 'creeping inflation' of 1956-1957." Wage and price controls hence were often favoured by cost-push adherents (see the discussion in Bronfenbrenner and Holzman, 1963, 595). In particular, the inflationary period between 1955 to 1958 became to be regarded as "exhibit A" (Bronfenbrenner and Holzman 1963, 629) by cost-push theorists (for example, Machlup, 1960, 132 considers this period to belong to cost-push inflation whereas 1945-1948 and 1950-1952 are regarded as demand-pull periods). However, while the different proposed concepts to describe the causes of this new inflation seemed to be sharply separated at first sight, from a more founded analytical perspective the distinction between cost-push and demand-pull inflation turned out to be quite difficult.

For example, Selden (1959, 10) proposes that a shift of the supply curve in a certain market may be called cost inflation, while demand inflation could be identified as a shift of the demand curve. Selden also tries to empirically separate both inflationary types. However, in his view (1959, 19), a rising velocity of money along with overly expansive monetary policy (see also Johnson, 1959, 1034) were more responsible for inflation than cost-push factors in this period. On the other hand, however, it was also brought forward that in particular the velocity of money (Fleming 1961, 515) and also the supply of money (Machlup 1960, 127) may rise endogenously due to the dynamics of cost-push inflation.

With regard to the problem of separating these two different approaches, Bowen (1960, 201ff.) provides a well-founded analysis emphasising the difficulties of such an attempt. Problems arise in particular due to non-linear and interdependent supply and demand curves (see also Poole, 1960). For example, the ability of trade unions to succeed in enforcing their wage claims (cost-push) may depend on the state of demand for the products of this industry (demand-pull). How far these wage claims will be translated into cost-push inflation, however, will depend on other factors on the supply side as well. Furthermore, cost-push inflation in one particular industry due to rising wages may at the same time show up as demand-pull inflation in another industry where the higher income of workers is being spent. Bowen (1960, 204) thus concludes that "[a]ttempts to use the 'cost inflation' versus 'demand inflation' distinction as a way of classifying inflations must be abandoned." At the same time, this implies, however, that without the knowledge about the exact causes of inflation, policy prescriptions are prone to be inadequate.

This overall sceptical view on the distinction between cost-push and demand-pull inflation and on the difficult task of finding a remedy for inflation was also the main research question of the contribution by Samuelson and Solow (1960) as will be shown in the next section.

## 2. Samuelson and Solow on Cost-Push and Demand-Pull

In line with other contemporary authors, for Samuelson and Solow (1960, 177) inflation in the period 1946-1948 seems to be best explained by demand-pull inflation, while the period 1955-58, however, remains a "puzzling phenomenon". Their own research objective is twofold: On the one hand, "to emphasize the types of evidence which can help decide between the conflicting theories" and, on the other hand, to discuss "some policy implications that arise from the different analytical hypotheses." <u>5</u> Thus, after a short summary of contemporary demand-pull and cost-push approaches, for example Lerner (1958) and Schultze (1959), Samuelson and Solow (1960, 182) stress the "problem of identification" on how to decide empirically which kind of inflation the economy is facing (my italics):

If I believe in cost-push, what should I expect to find in the facts that I would *not* expect to find were I a believer in demand-pull?

For example, the data may show that money wages rose faster than productivity which might be interpreted as cost-push inflation. However, as also demand-pull inflation can make wages rise faster than productivity—and so the clause starting with "not" in the quote above is not fulfilled—the criterion "wages rising faster than productivity" is not appropriate to decide between these two types of inflation.

Samuelson and Solow (1960, 183) then go on and emphasise another difficulty on how to separate both inflationary types. In particular, the timing of wage and price increases is not an appropriate criterion either for identifying cost-push or demand-pull inflation as it is not possible to determine a "normal initial standard from which to measure". Therefore, a wage-push might be interpreted as autonomous but might also be just the result of earlier excess demand for labour if the timespan under consideration is extended accordingly. Furthermore, Samuelson and Solow (1960, 184) emphasise that an analysis based on shifts of demand and supply curves is equally prone to the problem of interdependencies as wages are cost and income at the same time. Thus, inflation may be self-sustaining due to spillovers and feedback to and from other sectors of the economy, or in the words of Samuelson and Solow (1960, 184) "it may be that one of the important causes of inflation is—inflation."

Samuelson and Solow (1960, 185) thus conclude that other tools might serve better for analysing the problem they are facing: On the one hand "the behavior of real demand under inflationary conditions" and, on the other hand, "the behavior of money wages with respect to the level of employment" —this last relation being, of course, the Phillips curve. However, they are pessimistic about the stability of both relations. In particular, rising prices over some time may spur further inflation by altering the economic system (Samuelson and Solow 1960, 185):

[T]here seems to us to be some doubt that ordinary reversible behavior equations can be found, and this very difficulty points up an important question we have mentioned earlier: that a period of high demand and rising prices molds attitudes, expectations, even institutions in such a way as to bias the future in favor of further inflation.

Hence, with regard to the (in-)stability of the behaviour of real demand, the experience of an endogenous rise of the velocity of money from 1955 to 1957 leads them to the conclusion "that the whole distinction between cost-push and demand-pull begins to evaporate" (Samuelson and Solow, 1960, 186)—an issue, as has been shown in Section 1, which was also brought forward by other authors in the 1950s.

In sum, until now, the arguments and evidence presented by Samuelson and Solow (1960) fit pretty well into the climate at the end of the 1950s and no statement as such is innovative or original in its own way. This assessment, however, changes as soon as we take a closer look at their treatment of the Phillips curve in the next section of this paper.

## 3. The Role of the Phillips Curve

Samuelson and Solow (1960, 186f.) start their investigation of the Phillips relationship with a short review of Phillips (1958). They note that "[h]is findings are remarkable" as the curve estimated for the period 1861-1913 also fitted other periods (1913-1948 and 1948-1957) well. Furthermore, Samuelson and Solow (1960, 186f.) focus on Phillips' results about the level of unemployment needed to assure stable wages (5 per cent of unemployment) or stable prices (2-3 per cent). 6 For the US, they only mention the studies by Schultze (1959) and Garbarino (1950)7, which are either "too casual" or "hardly a full-scale analysis". Thus, Samuelson and Solow (1960, 187ff.) present their own empirical analysis, at first on the relation between money wage changes (in manufacturing) and unemployment. They suggest that 8 to 10 per cent of unemployment might be necessary to assure stable money wages. However, and this is the more interesting argument, Samuelson and Solow (1960, 187) point out that such a relation might be unstable on

theoretical grounds. In particular, money wage stickiness8 might be endogenous:

But would it take 8 to 10 per cent unemployment forever to stabilize the money wage? Is not this kind of relationship also one which depends heavily on remembered experience? We suspect that this is another way in which a past characterized by rising prices, high employment, and mild, short recessions is likely to breed an inflationary bias—by making the money wage more rigid downward, maybe even perversely inclined to rise during recessions on the grounds that things will soon be different.

Thus, their overall sceptical view about a too simple-minded description of the inflationary process is pronounced once more. However, also based on the empirical evidence available, they suggest other causes for an unstable relation over time. For example, in the period 1933-1941 money wages did not fall despite high and ongoing unemployment. One explanation brought forward by Samuelson and Solow (1960, 189) is that "one could argue that by 1933 much of the unemployment had become structural, insulated from the functioning labor market, so that in effect the vertical axis ought to be moved over to the right." 9 Compared to Phillips' rather stable relation, Samuelson and Solow (1960, 189) thus remark that there is "the strong suggestion that the relation, such as it is, has shifted upward slightly but noticeably in the forties and fifties." 10 In the first two decades of the 19th century, the unemployment rate needed to stabilise money wage rates was—according to their estimates—4 to 5 per cent (stable prices 3 per cent, assuming an increase in productivity of 2 to 3 per cent). However, for the period since 1946 to the late 1950s around 8 per cent of unemployment seemed to be necessary to achieve stable wages (5 to 6 per cent with respect to price stability).

As concerns economic policy, Samuelson and Solow (1960, 187) try to answer their own question of "[w]hat policy decisions might conceivably lead to a decrease in the critical unemployment rate at which wages begin to rise or to rise too fast?" One possible approach is to reduce imperfections on the labour market especially with respect to the mobility of labour (between regions but also between sectors) which seems to be higher in the UK than in the US (see Samuelson and Solow, 1960, 190)). The mobility of labour, however, depends "heavily on the pull of job opportunities elsewhere" and hence is influenced by the overall state of aggregate demand. <u>11</u> Samuelson and Solow (1960, 190) thus emphasise "that a deliberate low-pressure policy to stabilize the price level may have a certain self-defeating aspect."

Be that as it may, with regard to the cost-push demand-pull debate, Samuelson and Solow (1960, 191) see themselves as taking an intermediate position—and this is where finally the Phillips curve comes into play since the curve shows that neither pure demand-pull nor pure cost-push inflation is at work in the economy. <u>12</u> The Phillips curve thus is regarded as an alternative tool to analyse the inflationary process and to draw policy conclusions. The US Phillips curve (see Figure 2) hence is interpreted as showing "the different levels of unemployment that would be 'needed' for each degree of price level change" (Samuelson and Solow, 1960, 192).<u>13</u>



Source : <u>Samuelson and Solow</u> (1960, 192). Redrawn by the author with permission from the American Economic Association. The original caption reads: "MODIFIED PHILLIPS CURVE FOR U.S. This shows the menu of choice between different degrees of unemployment and price stability, as roughly estimated from last twenty-five years of American data."

Samuelson and Solow (1960, 192) emphasise two points on their curve, whereas they call these results "guesses":

• Point A: To assure price stability, an unemployment rate of 5 to 6 per cent seems to be necessary, which indicates that at this rate of unemployment wages do not increase by more than the growth rate of productivity which Samuelson and Solow (1960) consider to be 2.5 per cent per year: "That much unemployment would appear to be the cost of price stability in the years immediately ahead." <u>14</u>

• Point B: To achieve an unemployment rate of 3 per cent (a "nonperfectionist's goal"), inflation of up to 5 per cent per year has to be accepted: "That much price rise would seem to be the necessary cost of high employment and production in the years immediately ahead."

However, Bronfenbrenner and Holzman (1963, 627) remark that structural and frictional unemployment at that time for the US was usually estimated to be 3 per cent of the labour force. This means that the 3 per cent goal, which is not in line with price stability, is not necessarily an over-employment target but rather compatible with the notion of full employment. <u>15</u> On the other hand, it becomes clear that Samuelson and Solow (1960, 193) do not regard an unemployment rate of 5 to 6 per cent needed for price stability as the full employment level as they "expect that the tug of war of politics will end us up in the next few years somewhere in between these selected points. We shall probably have some price rise and some *excess* unemployment" (my italics).

That the relation may shift due to economic policy is in focus of attention once again. Samuelson and Solow (1960, 193) emphasise:

Aside from the usual warning that these are simply our best guesses we must give another caution. All of our discussion has been phrased in short-run terms, dealing with what might happen in the next few years. It would be wrong, though, to think that our [...] menu that

relates obtainable price and unemployment behavior will maintain its same shape in the longer run. What we do in a policy way during the next few years might cause it to shift in a definite way.

Most noteworthy is their focus on the consequences of a low-pressure economy. In particular, Samuelson and Solow (1960, 193) hint at the possibility of adjusting inflation expectations 16 as a beneficial by-product 17 of this low-pressure economy:

Nevertheless, it might be that the low-pressure demand would so act upon wage and other expectations as to shift the curve downward in the longer run—so that over a decade, the economy might enjoy higher employment with price stability than our present-day estimate would indicate.

On the other hand, the problem of hysteresis on the labour market may cause an inflationary bias in such a low-pressure economy as pointed out once more by Samuelson and Solow (1960, 193):

But also the opposite is conceivable. A low-pressure economy might build up within itself over the years larger and larger amounts of structural unemployment (the reverse of what happened from 1941 to 1953 as a result of strong war and postwar demands). The result would be an upward shift of our menu of choice, with more and more unemployment being needed just to keep prices stable.

Samuelson and Solow (1960, 193) also focus on whether or not a low-pressure economy might be able to compensate the loss of output (compared to a high pressure economy) in the long run: On the one hand, a low-pressure economy "could succeed in improving the efficiency of our productive factors" and thus may even forge ahead. However, also a falling behind of the low-pressure economy is conceivable (Samuelson and Solow 1960, 193):

On the other hand, if such an economy produced class warfare and social conflict and depressed the level of research and technical progress, the loss in growth would be compounded in the long run.

In sum, the focus of Samuelson and Solow (1960) on the Phillips curve must be interpreted as an alternative way of analysing the inflationary process in the 1950s compared to the, in their view, not fruitful discussion about cost-push versus demand-pull inflation. Their assessment of different combinations between inflation and unemployment is well balanced: On the one hand, they are well aware of the dangers of an ongoing "creeping inflation" and especially point out the problem that an economy subject to such permanent price increases may bread an inflationary bias. On the other hand, they are sceptical about fighting inflation by engineering a low-pressure economy: Even though there are some advantages (as for example the beneficial effect on inflation expectations), Samuelson and Solow (1960, 193) also stress the possibility of structural unemployment or below average technical progress. Taking into account this discussion of endogenous possible shifts, it becomes clear that they did not treat the Phillips curve as a stable relationship.

Also immediate comments at the conference<u>18</u> questioned the long-run stability of the curve even though all commentators seem to have understood Samuelson and Solow as offering such a "menu of choice". In particular Chandler (1960, 213f.) doubts the usefulness of Samuelson's and Solow's "quantitative 'guesstimates''' for practical policy and emphasises the issue of endogenous changes in the behaviour of interest groups as soon as economic policy tries to maintain a certain level of employment. Moreover, a policy focused on creating short periods of high growth may also create high rates of price increases and therefore inevitably restrictive policy which could lead to severe social losses as "[t]he resulting disappointment of widely held highly inflationary expectations could be quite damaging to employment, output, and growth" (Chandler, 1960, 215).

On the other hand, Laidler (2003, 22, n. 9) points out that another commentator, Lerner (1960), "gently chides them for not recommending the purchase of less unemployment with more inflation." Without doubt Lerner (1960, 217) discusses such a trade-off:

One can apply the economic principle of equalizing marginal cost and marginal benefit, indulging in creeping inflation as long as the value of the additional output is greater than the damage from the additional inflation involved.

Nonetheless, Lerner (1960, 217) is fully aware of the accelerationist hypothesis as he points out that "[a]s adjustment is made to the inflation it has to run faster and faster to keep output in the same place." Inflation for Lerner (1960, 217) is not an obstacle for proposing expansionary policies as the distributive effects of inflation are considered to be the lesser of the two evils as "a 3 per cent cut in output is much worse than a 3 per cent inflation which can never do more than redistribute a fraction of 3 per cent of the output. A small part of the difference in output would be sufficient to correct the injustices since much of the redistribution will cancel out or will be in desirable directions."

The last commentator, Pechman (1960, 218), while being very sceptical about the results derived by Samuelson and Solow (1960), also interprets the contribution of Samuelson and Solow (1960) as discussing "the 'terms of trade' between unemployment and price stability. By this I mean the cost in terms of a higher rate of unemployment of achieving price stability or, alternatively, the cost in terms of higher prices of reducing unemployment to a tolerable level." The trade-off notion thus was certainly there at the conference and also taken up by commentators. Even though Samuelson and Solow (1960) can be interpreted as offering a "menu of choice" between inflation and unemployment, it will be argued in the next section that their trade-off view is very different from that of Friedman.

4. Friedman vs. Samuelson and Solow on the "Menu of Choice"

To fully understand the divergent interpretations of the Phillips curve trade-off by Friedman and Samuelson and Solow, it is necessary to discuss two major differences between both lines of thought: On the one hand, it must be discussed if and how the underlying causality changed with Friedman's critique as the direction of causation is crucial for the interpretation of the trade-off itself. On the other hand, it seems necessary to judge Samuelson's and Solow's possible trade-off interpretation in the light of the late 1950s and the cost-push demand-pull debate.

As concerns the underlying causality, it seems that Samuelson and Solow (1960) did not change the direction of causation of the Phillips curve: Like Phillips (1958, 283) himself, Samuelson and Solow (1960, 189) state that "[w]age rates do tend to rise when the labor market is tight, and the tighter the faster." Thus, changes in the rate of unemployment are regarded as the driving force of the relationship, which indicates that causality runs from unemployment to inflation and not from (unanticipated) inflation to unemployment.

This different theoretical understanding of causality to explain movements on the Phillips curve is most important as the interpretation of the Phillips curve by Samuelson and Solow points to its role as an adjustment relation for an economy in disequilibrium, which was particularly brought forward by Lipsey (1960; 1974), and not to an aggregate supply curve of labour based on the misperception of relative prices or on the confusion of nominal and real wages as in Friedman (1975, 41ff.).20

Friedman (1968), however, was ambiguous about the underlying causation—or at least there is a certain tension in his argument: On the one hand, unemployment is, as in the original Phillips curve, treated as a proxy for excess supply or demand on the labour market so that the Phillips curve remains a disequilibrium relation as "transactions occur *out of equilibrium* because price does not adjust instantaneously" (Lipsey 1974, 69). On

the other hand, reducing unemployment below the natural rate is only possible due to misperceptions of the "true" real wage on the side of workers since inflation expectations adjust only slowly. Thus, given their perceived price vector the reaction of the labour force is as if workers are moving on their supply curve (and firms respectively moving on their demand curve)—the Phillips curve thus becomes an equilibrium relation embedded into a framework of full price flexibility. Friedman (1975, 41ff.) finally chose sides and opted for the direction of causation from prices to quantities and therefore for the equilibrium interpretation (see Laidler 1990, 55 and Laidler, 2012, 20ff.; see also De Vroey, 2001). But even before Friedman's full commitment to the Fisher-type causality (see Fisher, 1926) regarding the Phillips curve, Lucas and Rapping (1969) reinterpreted the Phillips curve as an aggregate labour supply curve.

Thus, if there was any trade-off idea involved in the paper by Samuelson and Solow then it did not rest on the grounds of cheating workers and producers alike by creating unexpected inflation. The most important weakness of this contribution thus may be the fact that there is no fully developed underlying theoretical framework<u>21</u> for explaining movements on the curve and thus for how it may be possible to pin the economy down to a point on it.

Moreover, it seems that their view of the trade-off is much more different than the "modern" version and becomes only visible in light of the previous discussion of cost-push and demand-pull inflation. Of course, their overall ambiguity makes other interpretations feasible as well, but contrasting Friedman's and Samuelson's and Solow's view from another perspective might prove helpful.

The "menu of choice" in Samuelson's and Solow's view only exists as inflation is a mixture of cost-push and demand-pull forces. Thus, the economy may either enjoy price stability and unemployment or full employment and rising prices. These rising prices at full employment, however, are not the result of general excess demand (which cannot be full employment by definition) but are caused by many different market imperfections, most notably the unequal distribution of demand over different sectors (those with excess demand pushing inflation, but those facing excess supply not reducing their prices accordingly) and labour markets involving trade unions and other bargaining elements so that "price inflation does not wait for full employment" (Burns in Mitchell, 1951, xxi; see also Solow, 1978, 203 with reference to the 1960s). Samuelson's and Solow's emphasis on the Phillips curve concept hence can be interpreted in the sense that it provided "[a] more eclectic model of imperfect competition in the factor and commodity markets" in order "to explain the fact of price and wage rises before full employment and full capacity have been reached" (Samuelson and Solow 1960, 180).

This "cruel dilemma" (Tobin 1967, 101) for the policymaker thus only exists as price stability and full employment are not possible at the same time. In Friedman's presidential address, however, neither cost-push forces nor other market imperfections mentioned above play a role for the rate of price increases. Additional evidence can be found in Friedman (1966a), in which he first introduced the concept of the "'natural' level of unemployment" (Friedman 1966a, 60). In his discussion of the feasibility of guideposts, Friedman (1966a, 57) denies that there is any issue of "premature inflation" due to costpush forces. This result is based on Friedman's argument that "[i]nsofar as market power has anything to do with possible inflation, what is important is not the level of market power, but whether market power is growing or not." Hence, cost-push inflation, if at all, is only a temporary issue.22 Inflation in Friedman's sense, but in the terminology of the late 1950s, is pure demand-pull inflation since "[i]nflation is always and everywhere a monetary phenomenon" (Friedman 1966b, 18). In such an inflationary environment, however, a long-run trade-off clearly is not only non-existent, it is also completely unnecessary since full employment and price stability then are not incompatible policy objectives. The negative slope of the (short-run) Phillips curve in Friedman's framework

hence only exists as unexpected inflation alters the supply of and demand for labour. The "cruel dilemma" in such a framework boils down to a deliberate choice of the best rate of inflation, be it price stability or not. Thus, in such an economy "[t]he problem of macroeconomic policy is the transparent one of dosage" (Samuelson in Burns and Samuelson, 1967, 55).

In contrast, in Samuelson and Solow (1960), the negative slope of the short-run or long-run (as this distinction is not applicable here) Phillips curve exists due to inflationary pressures even before full employment is achieved so that "the days of happy and simple Keynesianism" (Samuelson in Burns and Samuelson, 1967, 46) are over.23

The "menu of choice" in Samuelson's and Solow's analysis hence is not opening up an opportunity set to maximise social gain, but to the contrary shows the social loss as both objectives are not compatible at the same time. In effect, the policymaker and society as a whole would be better off if such a "menu of choice" never existed. Samuelson's and Solow's (1960, 192) "nonperfectionist's goal of high enough output to give us no more than 3 per cent unemployment"—a level which was, as already noted, in line with contemporary estimates of frictional unemployment and hence full employment—is simply not attainable without accepting some inflation. Friedman thus did not only change the direction of causation, but also altered the underlying causes of inflation by denying the issue of permanent cost-push inflation, which in the original trade-off interpretation prevented the economy from reaching and keeping full employment without any rise in the price level. This becomes clear by looking at Friedman's (1966a, 60) critique about the assumptions of why guideposts are necessary (and why there exists a trade-off between inflation and unemployment in the sense of Samuelson and Solow):

Hence, the alleged case for the guidelines seems to me to rest on two basic fallacies: first, that market power is a source of rising prices, and second—on the belief that somehow or other you can fool the people all the time—that by increasing the rate of monetary expansion, you can thereby induce people to maintain a permanently lower level of unemployment.

However, in Friedman's presidential address the first "fallacy" is not mentioned at all, whereas the second "fallacy" took centre stage. Thus, Friedman, by only accepting the concept of demand inflation, removed any qualified reason to discuss a trade-off as in such an economic setup there is no need to choose between inflation and unemployment. Furthermore, the second "fallacy" was never there as such. It rather emerged artificially due to Friedman's implicit change of causality. In a Samuelson-Solow economy, monetary expansion may remove unemployment. Inflation, however, is an unwelcome by-product of this process, but it is not the cause of this lower unemployment rate. This becomes very clear by Solow's (1966c, 64) immediate reaction to Friedman's (1966a, 60) critique:

I don't think I'm guilty of the fallacy of which Milton charges me—of believing that inflation generates employment. I'm not arguing that. I'm arguing that demand pressure, whether it is generated by monetary or other means, generates both inflation and employment. And that is what creates the dilemma ...

As a final assessment of Friedman's critique, it is worth discussing the results by Forder (2010a, 19), stating that Samuelson and Solow filled "a gap in a story" and that "Friedmans Nobel Lecture is no more than mythologizing" (Forder 2010b, 344). Some of the results of this paper are in line with Forder's statement: First, the discussion has shown that Samuelson and Solow are very cautious about the stability of the curve and that there is no inflationary position taken in their contribution. 24 Second, Friedman not only reinterpreted the underlying causality but also the inflationary process itself. The latter point seems to be even more important as it is in particular this combination between cost-push and demand-pull inflation which gives rise to the specific trade-off interpretation in Samuelson and Solow (1960). Both trade-off views hence are completely

different in both the underlying assumptions and the consequences of making use of the trade-off. In Friedman's view, the trade-off allows the economy to temporarily deviate from full employment by inflationary surprises but breaks down as soon as inflation expectations adjust. In Samuelson's and Solow's framework, there is indeed the possibility of a trade-off even in the long-run (besides their qualifications on the possible instability of the curve) but only in the sense that the policymaker has to accept the higher rate of inflation at full employment—a rate of inflation which arises mainly due to market imperfections.25

However, the way Samuelson and Solow present their argument indeed causes the impression of a trade-off between inflation and unemployment in the sense of Friedman. At least their Phillips curve diagram is described in such a way as if the policymaker has the explicit choice between the two discussed combinations—and there is no clear statement to the reader that the choice stops here. Hence, in principle, any point on the curve is feasible, even though Samuelson and Solow (1960) warn that inflation expectations may adjust or that there might be hysteresis. Solow (2002, 74) therefore also acknowledges that "the prosecution has a case too. It is that the qualifications are just qualifications, and the reader is left with the impression that the recorded Phillips curve really does provide [...] 'a menu of choice'.''

Furthermore, Solow (2002, 73) admits that "we were interested in the possibility that the Phillips curve might represent an exploitable trade-off between unemployment and inflation", while also noting that "we were very skeptical about the durability of any such trade-off". Moreover, it also seems to be the case that both Samuelson and Solow had some kind of confidence in this interpretation, too, as Solow (1979, 38) remarks:

I remember that Paul Samuelson asked me when we were looking at those diagrams for the first time, "Does that look like a reversible relation to you? What he meant was, Do you really think the economy can move back and forth along a curve like that? And I answered, Yeah, I'm inclined to believe it, and Paul said, Me too.

As has been shown, one favourable way of reading Samuelson's and Solow's "menu of choice" interpretation is based on taking into account the cost-push and demand-pull inflation discussion which heavily alters the trade-off interpretation since this view points at the conflict between inflation and full employment. Nevertheless, the authors unfortunately missed to take a clear position and to present a solid theoretical model of their "menu of choice", so that different interpretations are indeed possible. This issue also showed up at the conference as all commentators more or less interpreted their contribution as offering in a favourable way the possibility of trading off inflation for unemployment.

# 5. Conclusion

As this discussion has shown, it should be stressed that there is indeed a strong ambiguity in the work of Samuelson and Solow (1960), for on the one hand the idea of getting less unemployment by accepting more inflation (and vice versa) is sketched. On the other hand, it has been argued that the trade-off interpretation in light of the cost-push versus demand-pull debate in the 1950s probably needs to be reformulated: The trade-off concept in their view shows the rate of inflation that has to be accepted for increasing employment up to its full-employment level. This unavoidable rise in prices is not the cause but the outcome of full employment due to various imperfections in the economy. The main issue hence is that "of an inflationary bias of the economy at full employment" (Ackley 1966, 78). The Phillips curve thus provided an alternative view on the inflationary process and therefore "served to dispose of the rather sterile 'cost push'-'demand pull' controversy" (Modigliani 1977c, 3).<u>26</u> Hence, the Phillips curve "can be used to portray a modified cost-push model" (Samuelson 1961, 383) in the sense that the slope of the curve is an in-between case of pure demand-pull inflation (vertical curve at full employment) and pure cost-push inflation (horizontal curve until full employment, that is, no demandinflation until full employment). <u>27</u> Therefore, the choice between unemployment and inflation resembles a dilemma<u>28</u> as Samuelson (1961, 383) explains to his students in his textbook:

There is, so to speak, a choice for society between reasonably high employment with maximal growth and a price creep, or reasonably stable prices with considerable unemployment; and it is a difficult social dilemma to decide what compromises to make.

Even though the paper of Samuelson and Solow (1960) is very cautious when it comes to the stability of the curve and particularly considers inflation expectations and hysteresis, the overall climate at that time seems to have been less worried about these qualifications as Solow (1995, 199) concedes that "[t]he eclectic American Keynesians of the 1960s were not sufficiently alert to the force of inflationary expectations. They expected more from the Phillips curve than it could deliver in practice." Probably some contemporaries thus acted in the spirit of hydraulic Keynesianism (Coddington, 1976, 1265). However, also Solow (1995, 199) admits that their presentation of the policy possibilities was too optimistic. On the other hand, as has been shown, immediate reactions at the conference to the contribution questioned the possibility of a long-run trade-off without accelerating inflation (see also Leeson, 1998).

However, the causality of the curve was still regarded by Samuelson and Solow (1960) as running from quantities to prices. Inflation thus was considered to be the outcome of lower unemployment and of adjustment processes in the economy (a view explained in Tobin, 1972, 9ff.) and not the cause and starting point like in Friedman's presidential address in 1967 and even more pronounced in his later work (see Friedman 1975; Friedman 1976; Friedman 1977a).

Also, Solow (1995, 199) admits that the famous Phillips curve article which despite all qualifications still seems to offer this trade-off possibility "is one of the things I would do differently now"—probably as its ambiguity not only opened up the trade-off interpretation of the Phillips curve in general, but as it also prepared the stage for Friedman, who remembers that "the basic idea grew out of the discussions about guidelines and, in particular, out of the Samuelson and Solow paper on the Phillips curve" (Friedman in Taylor, 2001, 124).29 Likely, it was precisely this ambiguity of the contribution by Samuelson and Solow which made it tempting for Friedman to do "what we all do when we try to differentiate our products; namely, to set up straw men" (Friedman, 1977b, 13).30

However, as has been argued in this paper, the theoretical core assumptions of Friedman's and Samuelson's and Solow's approaches are very different. For Samuelson and Solow a trade-off only exists as it is not possible with the given structure of the economy (in particular with respect to cost-push forces) to achieve full employment and price stability at the same time, which is contrary to Friedman's reading of the trade-off interpretation based on pure demand-pull inflation. Accordingly, full employment and price stability in Friedman's concept do not exclude each other and the (short-run) negatively sloped Phillips curve is nothing more than an artificial outcome of policy surprises.

A modern interpretation of Samuelson's and Solow's reading of the Phillips curve would be very close to the reasons given by today's central banks on the choice of a positive inflation target. These reasons in favour of a positive inflation target include, amongst others, wage rigidities, business cycle fluctuations, or also a flexible environment for economic growth (see Horváth and Matěju, 2011, 268). As has been shown, all these arguments also play a role in the contribution by Samuelson and Solow even though costpush forces are by far more pronounced than today. This interpretation of Samuelson and Solow (1960) is supported by a remark of Samuelson (1960, 265) about monetary policy in the 1950s (my italics):

A careful reading of the Federal Reserve positions suggests the authorities are willing to entertain the hypothesis that there are important *cost-push* mechanisms operating in the present system. As Solow and I indicated at the 1959 meeting of the American Economic Association, in our paper [Samuelson and Solow, 1960] dealing with the apparent "Phillips curve" that roughly relates American wage increases to the degree of unemployment in our system, I agree that *tendencies toward sellers' inflation* and related *inflexibilities in the face of demand changes* do seem to throw up something of a *dilemma* for fiscal and monetary policy. [...]

With important cost-push forces assumed to be operating, there are many models in which it can be shown that some sacrifice in the requirement for price stability is needed if short- and long-term growth are to be maximized, if average long-run unemployment is to be minimized, if optimal allocation of resources as between different occupations is to be facilitated.

In sum, the main idea behind the "menu of choice" for monetary policy in the 1950s and 1960s was very close to that of today: Due to various deviations of the real world economy from its perfect theoretical counterpart, zero inflation and full employment are difficult to achieve at the same time. This view, by downplaying these real world deficiencies, was opposed by Friedman. In his framework, Samuelson's and Solow's pessimistic dilemma view was reinterpreted as offering an occasion for opportunistic (but myopic) policy surprises to push the economy away from full employment and price stability to over-employment at the cost of surprise inflation.

Nonetheless, it should be clear after this exhaustive journey that if a policymaker had the choice between Samuelson's and Solow's imperfect economy giving rise to a "menu of choice" and Friedman's perfect economy with no choice at all, every policymaker should choose the latter one since the optimal choice would be not having a choice.

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#### Notes

1 However, one important difference between Phelps (1967) and Friedman (1968) should not be neglected: Whereas Friedman's contribution criticised the approach of fine tuning, Phelps (1967) focused on modelling economic policy as a dynamic optimisation problem. Economic policy in this approach hence still relied on active management of the economy instead of a constant money growth rule (see Laidler 2010, 124 and Laidler 2012, 18, n. 19). Phelps (1972) extended this approach which also relied more and more on the formalisation of the decision problem the policy-maker was facing. Johnson (1968, 986) critically discusses this increasing formalisation (for example by using preference functions) as "formalization, while popular, is unfortunately rather empty of economic content, since it simply postulates that society is able to weigh more unemployment against more inflation in some unspecified manner to arrive at a preferred position."

2 The Phillips curve is often regarded as a Keynesian concept (Johnson, 1970, 110): "the only significant contribution to emerge from post-Keynesian theorizing"), however, without being related to the core arguments of Keynes, as it solely provided an explanation for the speed of adjustment if the economy is in disequilibrium (see Lipsey, 1978, 53ff.). Nevertheless, the misinterpretation of the Phillips curve, like the idea of a stable trade-off which should be utilised to push the economy even beyond full employment, not only discredited the Phillips curve in its original interpretation but also the core ideas of Keynes (see e.g. Hahn 1982, 74f.; Meltzer, 1983, 51 and Harcourt, 2000, 305ff.; see Davidson, 1972, for a thorough analysis of Keynes' framework and Lipsey, 2000, 58ff.) for an investigation of the relation of the IS-LM model and the Phillips curve to the Keynesian core).

3 For example, Holzman (1959, 324) titled his review on different contemporary contributions dealing with this inflationary period (amongst others the report of the Joint Economic Committee, 1958) "creeping inflation".

4 An extensive literature review on this episode can be found in Bronfenbrenner and Holzman (1963).

5 Solow (in Solow et al. 2009, 73) points out that the 1960 paper was devoted to the debate between cost-push and demand-pull inflation (see also Solow 1976, 4), Solow in Snowdon and Vane, 1999, 284 and Solow, 2002, 71f.). Solow also commented on other articles covering this cost-push demand-pull controversy, for example Holzman (1960).

6 The original values in Phillips (1958, 299) are 5.5 and 2.5 per cent respectively.

7 As there are no exact references in the whole contribution of Samuelson and Solow (1960), Garbarino (1950) is the author's best guess based on available contributions in JSTOR by Garbarino (1950) in the year specified by Samuelson and Solow (1960, 187).

8 Solow (1975, 59) argues on these grounds that the absence of severe depressions (due to stabilising economic policy) in the last decades might have contributed to the inflationary bias modern economies are facing.

9 Today, this issue of long-term unemployed who lose their disciplining effect on the wage claims of those still employed is one cause of "hysteresis" (Blanchard and Summers, 1986). In particular Ball (1999, 231) emphasised this mechanism.

10 Laidler (2010, 123, n. 2) hence remarks: "The US data presented by Samuelson and Solow (1960) are much less convincing in their support for the relationship's existence. That these authors' conjectures about the existence of a trade-off were taken so seriously on the basis of such flimsy empirical analysis is a minor mystery in the history of postwar empirical economics". Unfortunately, Samuelson and Solow (1960) do not provide much information about data sources used and the timespan under consideration. Keeping this in mind it seems as if the scatter plot, from which conclusions about a shifting Phillips curve were drawn, contains data from the beginning of the 19th century to 1958. King (2008, 318, n. 5) supposes that the earliest data is from 1890. See Hall and Hart (2010, 5f.) for data sources most likely used.

11 Also Samuelson (in Burns and Samuelson, 1967, 124f., 139f.)) points at such beneficial effects of a "long, steady expansion" for the location of the Phillips curve as structural unemployment might be reduced successfully in this way.

12 Solow (in Solow, Taylor, and Mankiw, 2009, 73) points out that they "thought that a more useful distinction was between movements along the Phillips curve and shifts of the Phillips curve" as inflation caused by excess demand could be explained by movements along the curve, whereas cost-push influences on inflation would shift the relation between inflation and unemployment (see Solow, 2002, 73). This, however, as Samuelson and Solow (1960, 189) remark, would only be a correct interpretation of the Phillips curve if "the relation we have been discussing represents a reversible supply curve for labor along which an aggregate demand curve slides. If that were so, then movements along the curve might be dubbed standard demand-pull, and shifts of the curve might represent the institutional changes on which cost-push theories rest." As "[t]here are two parties to a wage bargain" Samuelson and Solow (1960, 190) remain sceptical about the "identification of the relationship as merely a supply-of-labor phenomenon."

13 Solow (2002, 73) recalls that Samuelson and he himself explicitly chose not to fit a multiple regression: "It is a remarkable fact that we made no attempt to fit a multiple regression. I was teaching econometrics regularly at the time, so we knew how; but we both thought that running regressions after so much eyeballing of the

data would be inappropriate. Neither of us would have thought the simple bivariate relation to be an adequate representation." Thus, their paper was "no great show of econometrics" (Solow 1976, 4). The curve hence seemed to mainly serve illustrative purposes as Solow (1979, 39) points out: "Then, using no more than a couple of rules of thumb and educated guessing, we converted those post-war observations into a hypothetical relation between the rate of price inflation and the unemployment rate." Peston (1971, 130, n. 15), however, notes that sketching such a smooth line was "foolhardiness" and that "this was one of the first articles to take the two dangerous steps of drawing the Phillips curve as a smooth relationship without a scatter of points around it, and to replace the change in wages with the change of prices on the vertical axis."

14 See Klein and Bodkin (1964, 393f.) for comparable estimates. Phillips (1962, 14f.) discusses Samuelsons and Solow's results. His own estimates for the US, however, "made lead me to think that the situation in the United States is less favourable than this. I estimate that 7 to 8 per cent unemployment would be needed to maintain a stable price level, and that at 4 per cent unemployment the price level would rise at about 4 per cent per annum."

15 See Gordon (1965, 45ff.) for a contemporary discussion about the level of unemployment considered to be full employment in the US.

16 Solow, in a letter to Sleeman in 1982 (cited from Sleeman, 1983, 152, n. 47, Solow's brackets), states: "I think a reading of our (i.e. Samuelson and Solow's) AEA paper (which started off by worrying about cost-push vs. demand-pull) will suggest that we already realized that both past and expected future price movements could have an influence on wage behavior." Solow (2002, 73) thus remarks that "we were obviously wondering about something like an expectations-augmented Phillips curve", even though "we did not see it as being as central as it became later" (Solow in Snowdon and Vane, 1999, 285). In the same vein, Solow (in Solow, Taylor, and Mankiw, 2009, 76) points out: "We said explicitly that it is unlikely that one could successfully exploit the Phillips curve in the long run. We even mentioned the possibility that it was inflationary expectations that would shift the curve adversely if one tried. But I think we had something more general in mind: that the mere experience, however you process it, whether through expectations or the development of norms or behavior, would have that effect. So when I read Milton's address, that part didn't come as much of a surprise, though Milton dwelt on that point much more than we had thought to do so." Solow (2002, 74), however, emphasises that these qualifications should not be misread as a forerunner of the vertical long-run Phillips curve as "[n]either of us ever had much confidence in the accelerationist model when it was finally formulated".

17 Also Samuelson (in Burns and Samuelson, 1967, 163) points at the positive effects of a (temporary) lowpressure economy for the Phillips relationship: "I think it might be argued that the optimal policy in a mixed economy like ours might be intermittent periods of letting a certain amount of slack develop, then getting the benefit of this slack in breaking inflationary expectations, and then going on strong." In the same vein, Solow (1962, 14) remarks that a period of high unemployment and stable prices might be beneficial for reducing unemployment without strong wage pressure compared to "a time when the expectation of inflation is fresh and strong".

18 The conference was the seventy-second annual meeting of the American Economic Association, held in Washington, D.C., from December 28 to 30, in 1959. The topic of the Samuelson-Solow session was: "Problem of Achieving and Maintaining a Stable Price Level" (see American Economic Association, 1960 ix).

19 This view is bolstered by Solow, in a letter to Sleeman in 1982 (cited from Sleeman 1983, 130, n. 4, omission by Sleeman himself), in which he explicitly refers to the disequilibrium interpretation of the Phillips curve: "From the very beginning I regarded the Phillips curve as analogous to any price adjustment equation driven by excess supply or demand" and "I have always thought of...the Phillips curve as a model of disequilibrium states with causality running from RHS to LHS."

20 This was also emphasised by Solow (in Solow, Taylor, and Mankiw, 2009, 77): "What Milton did without ringing any bells to warn you, was simply to take it that the causality ran the other way, that it's the deviation of the rate of inflation from the expected rate of inflation that pushes the unemployment rate away from the 'natural' rate. Phillips is about disequilibrium in the labor market. There is no question about that [...]. After Milton's address, everybody treated this as an equilibrium matter, looking in the reverse direction."

21 Also Solow (1976, 4f.) admits: "It did not occur to me then that the Phillips curve (or perhaps Phillips surface would be better, to signal that more than the unemployment rate governs the rate of wage increase) needed any subtle theoretical justification. It seemed reasonable in a commonsense way that the change in the money wage, like the change in any other price, should respond to the demand-supply balance in the labor market." This very basic explanation is the same as in Phillips (1958, 283). A first model to derive the curve is provided in Lipsey (1960, 12ff.).

22 This view was criticised by Ackley (1966, 71), who points at the connection between the state of demand and the possibility for making use of market power. See also Solow (1966c, 44) and in particular Solow (1968, 4f.) regarding the issue of ongoing wage push.

23 See also Samuelson in Burns and Samuelson (1967, 53ff.) and Tobin (1967, 101f.).

24 Solow furthermore became an opponent to Johnson's expansionary policies in the second half of the 1960s

(see Solow, 1966d, describing his change of mind and Solow 1992, 163f. as a retrospective).

25 Market imperfections are also a determinant of Friedman's (1968, 8) "natural rate of unemployment". However, contrary to Samuelson and Solow, market imperfections for Friedman define the level of wages but play no role for the dynamics of wages in general.

26 Phillips (1958, 298f.) makes use of his curve to separate cost-push and demand-pull inflation, too.

27 See also Samuelson (1970, 808ff.).

28 As pointed out by Bronfenbrenner and Holzman (1963, 626, n. 57) it was Reder (1948) who first used the term "dilemma" (in Reder, 1948, 47) "policy dilemma") to describe the problem of achieving full employment and price stability at the same time.

29 Friedman (1968, 9) also exemplarily chooses an unemployment target of 3 per cent for his critique, which, as has been shown, is one of the targets—the one not in line with price stability but with full employment—discussed by Samuelson and Solow: "Let us assume that the monetary authority tries to peg the 'market' rate of unemployment at a level below the 'natural' rate. For definiteness, suppose that it takes 3 per cent as the target rate and that the 'natural' rate is higher than 3 per cent." The natural rate is assumed to be 4 per cent in Friedman (1966a, 60).

30 This quote, of course, is not directed at his own work, but at a discussion of Modigliani (1977d).