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QUADERNI DEL DIPARTIMENTO  
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ERNESTO SCREPANTI

**A PURE INSIDER THEORY OF HYSTERESIS  
IN EMPLOYMENT AND UNEMPLOYMENT**



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Ernesto Screpanti

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**Abstract.** A hysteresis equation is proposed in which changes in inflation depend on the rate of change of employment. To justify this equation it is assumed that wage claims are fixed by insiders, that the workers' bargaining strength is inversely related to the fear of losing their jobs, and that the latter increases when employment decreases. Then it is argued that the NAIRU need be neither unique nor stable. It is also shown, moreover, that, if trade unions exist which strive to stabilize the rate of unemployment, the workers' militancy can be influenced in such a way that a stable inflation is compatible with a constant and path-dependent rate of unemployment. Lastly the Keynesian implications of the analysis, both theoretical and political, are highlighted.

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## 1. Introduction

Following a decade of debates on the 'expectations augmented Phillips curve', several empirical studies on unemployment in the OECD countries have blossomed in the 80's (e.g. Clark & Summers, 1982; Coe & Gagliardi, 1985; Layard et al., 1986; Franz, 1987; Mitchell, 1987; Nickell, 1987; Alogoskoufis & Manning, 1988; Jaeger & Parkinson, 1994) which have cast doubts on the relevance of the very notion of a unique and stable NAIRU. Indeed many estimates in different countries, by showing that the NAIRU coincides with the actual unemployment rate experienced in the recent past, have fed the debate on hysteresis in unemployment opened by Phelps (1972) and Hargreaves Heap (1980).

In point of fact, two different kinds of hysteresis in unemployment can be observed. There are cases in which inflation stabilizes when unemployment stabilizes, and this can occur at any rate of unemployment determined by past history. There are other cases in which inflation stabilizes whilst the rate of unemployment keeps on changing. For the sake of brevity, let us call these two phenomena 's-hysteresis' (hysteresis with stationary NAIRU) and 'm-hysteresis' (hysteresis with moving NAIRU).

M-hysteresis seems to be easily accounted for in 'persistence' models<sup>1</sup>, in which - in the spirit of the original Phillips' analysis - both unemployment and its rate of change appear as arguments of

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<sup>1</sup> On the notion of 'persistence' see Franz (1987, p. 94), Wyplosz (1987, pp. 124, 126), Katzner (1993, p. 331).

the Phillips curve (Cottrell, 1984-85; Nickell, 1987; Coe, 1988; Layard, Nickell & Jackman, 1991; Phelps, 1992; Franz & Gordon, 1993; Isaac, 1993; Manning, 1993). Persistence is not the same thing as hysteresis proper, however, and, although the strength of the monetarist analysis is much reduced when persistence effects are acknowledged, its basic message is salvaged insofar as the notion of a NAIRU is preserved (Davidson, 1993, p. 319). In fact, in persistence models a determinate and stable NAIRU can still exist which is independent of past history and which attracts, at least in the very long run, the actual unemployment rate (Setterfield, 1993, p. 351).

To this literature belong the insider-outsider models (Blanchard & Summers, 1986; Gregory, 1986; Lindbeck & Snower, 1986, 1988, 1989; Corruth & Oswald, 1987; Blanchard & Fischer, 1989, ch. 9, Lockwood & Philippopoulos, 1994), the basic idea of which being that wages are set by placing low weight on those in the labour force who do not take part in wage bargaining. However, these approaches give the impression of trying to accommodate hysteresis into the NAIRU theory without realizing that 'accounting for hysteresis effects will require revolutionary changes in the way Keynesian (and classical) macroeconomists view the world' (Summers, 1988, p. 11). Furthermore no convincing explanation has so far been offered of the reasons why the insiders' action is affected by the changes in unemployment. After all, insiders are employed workers.

The so-called 'full hysteresis' equation seems more interesting, especially because it appears able to account for s-hysteresis. This kind of equation, in which inflation is taken to

depend on the rate of change of unemployment, is opening a new path in the investigation into the inflation-unemployment relationship. It has recently been estimated by Gordon (1989), Cross, Hutchinson & Yeoward (1990) and Ormerod (1994), but no convincing theoretical explanation for it, particularly in terms of behavioural hypotheses, has so far been put forward, nor have its striking policy implications been fully brought to light. But the main problem with this approach is revealed by empirical research, which has shown that, although there is a definite influence of the *change* in unemployment on inflation, the possibility that also the *rate* of unemployment exerts some influence cannot be excluded (Elmeskov & MacFarlan, 1993, p. 81). This result could be interpreted to mean that s-hysteresis does not exist. Yet the 'full hysteresis' equation was devised precisely to explain that phenomenon: a puzzle that has not yet been solved.

The model of wage determination set out in the present essay is very ambitious in its simplicity, since it attempts to offer a unified explanation of both s- and m-hysteresis. A 'wage conflict curve' is proposed in which inflation depends on the *rate of change of employment*. It is then proved that no unique NAIRU exists and that the level of unemployment at which inflation can stabilize depends on past history both stochastically and deterministically.

The basic hypotheses are introduced in section 2, where the wage conflict curve is presented and its behavioural justification is set out. A few complications of the analysis are supplemented in section 3, while in section 4 hysteresis in unemployment is accounted for by means of a transformation of that curve. Finally

some policy implications of this analysis are brought to light in section 5.

## *2. The wage conflict curve and accelerating inflation*

Two simple facts are typical of the process of wage fixing in advanced capitalist countries. First, it is the wage increases that are fixed and not the wage levels. Second, It is the insiders that decide the wage target, not outsiders.

Wage claims depend on the bargaining strength of employed workers. It is assumed, here, that the latter is a decreasing function of the workers' fear of losing their jobs<sup>2</sup> and that this is higher when employment decreases. On the other hand unemployment is assumed not to exert any relevant influence on the workers' bargaining strength.

There is, first of all, a motivational factor that justifies this behaviour. The assumption of self-interested behaviour implies that employed workers are not unduly worried about the fate of the unemployed, and would not be prepared to give up any chance of increasing their incomes when business conditions are improving, independently of the amount of unemployed people extant.

Secondly, there is an information problem. Even if workers were worried about the probability of finding a new job once fired, the information they can collect on this variable is very poor and

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<sup>2</sup> See Blanchflower (1991) for some empirical evidence on the argument that the 'risk of being fired... will typically generate lower wages' (p. 484)

uncertain; surely much more uncertain than the information they can collect on the probability of being fired. The enterprise in which a worker is employed is like an island; and, if the industrial district in which it operates is like an archipelago, the national economy is like a wide ocean. It is perhaps easy to know the nation-wide rate of unemployment, or that prevailing in a great regional area; what is difficult is to form any reliable idea about the rate prevailing in a specific industrial district. But a worker is much more interested in the latter than in the former. On the other hand, the information one can get from friends, neighbours and colleagues about what is going on in an archipelago, is more likely to concern the movements of recruitments and dismissals, i. e. the change in employment, rather than the level of unemployment. Furthermore it is even more difficult for an employed worker to form any idea about the probable time length of unemployment, a variable that weighs heavily upon the probability of finding a new job once dismissed. Under these conditions of highly incomplete information about local unemployment and highly reliable information about the change in employment, it is reasonable that workers allow their behaviour to be governed by the latter.

Finally, there is what could be called a 'political' factor, and this is perhaps the decisive one. Workers are much more impressed by the probability of losing their jobs than by that of finding a new one once fired. The probability of a worker being fired is higher when business is going badly and employment decreases, even if unemployment is low. In the same way, even with high unemployment that probability would be low if business

conditions were improving. Thus it seems obvious that employed workers are not particularly impressed by the rate of change of unemployment, let alone its level (Setterfield 1993, p. 336), whilst they are much more worried by the rate of change of employment. On the other hand it is well known that the workers' capacity to withstand a labour dispute is higher when business conditions improve than when they deteriorate. This so precisely because the workers' self-confidence strengthens when the probability of losing their jobs decreases. It could be added that, by the same token, prosperity augments the vulnerability of firms to labour disputes, and this heightens the efficacy of labour struggles in good times.

Thus:

$$(1) \quad \dot{W} = T(\dot{N}), \quad T' > 0$$

where  $\dot{W} = (1/W)(dW/dt)$  is the rate of change of money wages,  $T(\dot{N})$  is the wage target and  $\dot{N} = (1/N)(dN/dt)$  the rate of change of employment.

It is well known that, apart from employment, the two economic variables which most strongly affect wage claims are the rate of inflation, and the rate of growth of productivity. This fact can be rationalized by assuming that the workers' claims aim at checking the wage share. The expected wage share does not change when

$$(2) \quad \dot{W} = \dot{P}^e + \dot{y}$$

where  $\dot{P}^e$  is the expected rate of inflation and  $\dot{y}$  the rate of growth of productivity. Therefore a workable form for the  $T(\dot{N})$  function is

$$(3) \quad T(\dot{N}) = \dot{P}^e + \dot{y} + \alpha \dot{N}$$

which yields a constant wage share when  $\dot{N}=0$ . Workers try to raise the wage share when employment rises, whereas they are prepared to swallow reductions in the wage share when employment shrinks.  $\alpha$  is the employment elasticity of wage claims. It measures the intensity with which the target wage increase reacts to a percentage change in employment.

From (1) and (3) we obtain the 'wage conflict equation':

$$(4) \quad \dot{W} = \dot{P}^e + \alpha \dot{N} + \dot{y}$$

As far as price dynamics is concerned, it is assumed that the rate of inflation is a function of the rates of change of wages and productivity, which is a dynamic version of the mark up principle:

$$(5) \quad \dot{P} = \dot{W} - \dot{y}$$

Thus, taking account of (4):

$$(6) \quad \dot{P} = \dot{P}^e + \alpha \dot{N}$$

In order to describe the inflationary process in the simplest way, let us assume, for the moment, that productivity is constant, so that a change in the real wage rate corresponds to a change in the wage share. Furthermore, workers are assumed to entertain a naïf form of expectations:

$$(7) \quad \dot{p}^e = \dot{p}_{-1}$$

There is a different wage conflict curve for each different inflation expectation. In figure 1 three such curves are drawn corresponding to expectations  $\dot{p}_1^e$ ,  $\dot{p}_2^e$ ,  $\dot{p}_3^e$ .

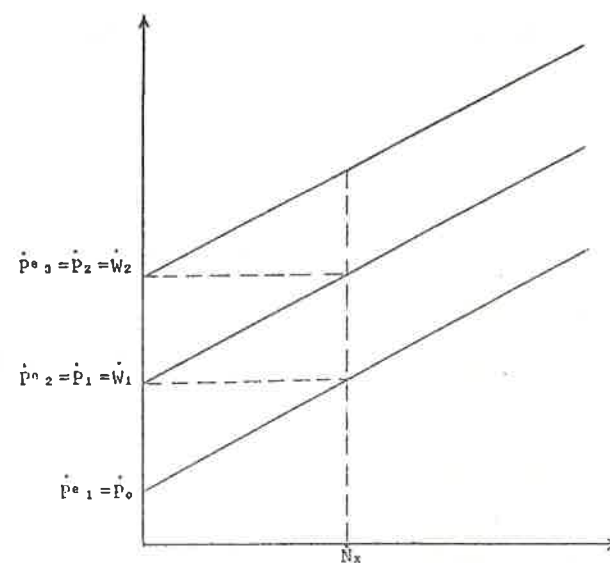


Figure 1

When  $\dot{p}_1^e = \dot{p}_0$  holds and employment changes at the rate  $\dot{N}_x$ , workers claim  $\dot{w}_1 > \dot{p}_1^e$ . They obtain a wage increase greater than  $\dot{p}_1^e$  because employment is rising and the wage share must be expected to grow. Entrepreneurs immediately fix  $\dot{p}_1 = \dot{w}_1$ , so that workers' inflation expectations rise to  $\dot{p}_2^e = \dot{p}_1$ . But, if employment goes on

increasing at the rate  $\dot{N}_x$ , the wage share must further be expected to rise. Workers will claim  $\dot{w}_2 > \dot{w}_1$  and firms will fix  $\dot{p}_2$ . Inflation expectations will further soar. The process would come to a halt only when the rate of employment stops rising. Inflation stabilizes at the rate expected by workers when employment stabilizes.

In other words, when employment is increasing, inflation accelerates. With a similar exercise it could be shown that, when employment is decreasing, inflation decelerates; and that, with a constant level of employment, a constant rate of inflation must be in force which coincides with the workers' expectations.

The exercise represented in figure 1, as well as the conclusions that can be drawn from it, can be condensed into two equations. By substituting from (7) into (4) and (6), the latter are transformed into

$$(8) \quad \dot{w} - \dot{w}_{-1} = a\dot{N}$$

$$(9) \quad \dot{p} - \dot{p}_{-1} = a\dot{N}$$

the meaning of which is striking, but now obvious: the acceleration of price and wage inflation is an increasing function of the rate of change in employment. Notice that, although the exercise of figure 1 assumed constant productivity for the sake of simplicity, equation (9) holds true also when productivity grows, and equation (8) when it grows at a constant rate.

Now a non-accelerating inflation rate of growth of employment can be defined. With equations (8) and (9) it is  $\dot{N}=0$ .



### 3. The autonomous degree of militancy

A little more flesh<sup>3</sup> could be added to the bare bones of the theory expressed by equations (4), (5) and (6). An exogenous, or autonomous, degree of militancy,  $M$ , could be introduced into equations (4). This new variable represents the evolution of workers' strength and aggressiveness which occurs independently of changes in employment.

Equations (8) and (9) become

$$(10) \quad \dot{W} - \dot{W}_{-1} = a\dot{N} + M$$

$$(11) \quad \dot{P} - \dot{P}_{-1} = a\dot{N} + M$$

The 'equilibrium' level of employment, i.e. that compatible with stationary inflation, is always hysteretic. When  $M=0$  the equilibrium level of employment may be whatever, but must be stationary. On the other hand, when  $M>0$ , employment must decrease continually in order to have a stationary rate of inflation. In particular, the higher the degree of autonomous militancy, the faster employment must decrease if inflation is to be kept constant. This is so because a more incisive worsening of induced wage claims,

<sup>3</sup> The addition of still more flesh would imply considering the possibility that all the coefficients of equations (4) and (5) are different from 1, as well as the possibility that prices do not immediately adjust to wage changes. Another interesting extension can be obtained by working out a truly dynamic model in which employment changes endogenously. That these modifications do not alter the basic results reached in the present essay is shown in Scarampi (1995).

$a\dot{N}<0$ , must be brought about in order to make up for the higher degree of autonomous militancy.

Now it is possible to illustrate briefly how this model works in accounting for phenomena such as stagflation. Assuming an economy growing with peaceful workers' moods and a constant rate of inflation (which, broadly, was the case in most industrialized countries in the early 60's), inflation could be made to accelerate by introducing some shocks that shift up the wage conflict curve. Just think of the increase in workers' militancy that occurred unexpectedly in the late 60's and early 70's all over the world. But think also of the effects of the 1973-4 and 1979 oil shocks. The price level inflated drastically and  $\dot{P}^e$  rose dramatically and repeatedly. The ensuing increase in unemployment could be interpreted as the consequence of the governments' attempts to induce deflationary processes through demand contraction.

The ineffectiveness, or the very delayed effectiveness, of such policies can be accounted for on two grounds. On the one hand, it is necessary to take into account the length of time over which collective labour agreements are renewed. The longer the time, the slower the adaptation of the bargained wage increase to the changes in employment. On the other hand there is the possibility of a long-lasting real wage resistance on the part of the workers, which can be represented as a situation in which the autonomous degree of militancy strives to withstand bad times. A high unemployment rate, or a moderate increase in it, might not be sufficient to counteract the real wage resistance. In this case a major and persistent reduction in employment might be necessary to curb inflation.

#### 4. Hysteresis in unemployment and the role of the Unions

On the basis of equation (11) it is relatively easy to account for the hysteresis effect in unemployment. Let us substitute from equation (17) (see appendix 1) into (11). The latter becomes

$$(12) \quad \dot{P} - \dot{P}_{-1} = \alpha \dot{F} - \frac{U}{1-U} \alpha \dot{U} + M$$

A non accelerating inflation implies

$$\dot{U} = \frac{1-U}{\alpha U} (\alpha \dot{F} + M)$$

so that a NAIRU is

$$(13) \quad U = \frac{\dot{F} + M/\alpha}{\dot{U} + \dot{F} + M/\alpha}$$

This equation has three types of economically meaningful solutions (see appendix 2):

- 1) if  $M/\alpha > -\dot{F}$ , then  $U$  goes on increasing at a decreasing rate;
- 2) if  $M/\alpha < -\dot{F}$ , then  $U$  goes on decreasing at a decreasing rate;
- 3) if  $M/\alpha = -\dot{F}$ , then  $U$  is constant but undeterminate.

Notice that hysteresis in unemployment is always a derived phenomenon: it arises from any gap that might occur between the actual rate of change in employment and the rate of growth of the labour force. Furthermore notice that the three kinds of solution to equation (13) are sufficient to account completely for both m- and

s-hysteresis in unemployment. There is m-hysteresis when  $M/\alpha > -\dot{F}$  or  $M/\alpha < -\dot{F}$ , so that  $\dot{F} > \dot{N}$  or  $\dot{F} < \dot{N}$ , and the NAIRU is continually changing. There is s-hysteresis in unemployment when  $M/\alpha = -\dot{F}$ , so that  $\dot{N} = \dot{F}$ , and the NAIRU is stationary.

A unique NAIRU does not exist. The NAIRU is path-dependent, either because it is ever changing deterministically (solutions 1 or 2) or because it is undetermined (solution 3). More generally, the rate of unemployment at which an economy can stabilize is not determined by any vertical long run Phillips curve, but by past history. Equilibrium unemployment, intended as a resting point for the inflationary process, depends on history.

Hysteresis is not a conundrum, but a normal characteristic of modern capitalist economies. So normal that the very idea of a 'hysteretic NAIRU' should be handled with care. In fact the hysteresis effect represents a problem only for those approaches that predict the stabilization of inflation when the economy reaches the 'natural rate of unemployment'.

But no theoretical difficulty arises if the very notion of a 'natural rate of unemployment', or others similar, is abandoned. In other words, what is suggested here is to learn not to reason in terms of a NAIRU, but rather to do without the notion of a NAIRU. What happens in the real world is that the rate of unemployment continually changes. Sometimes it stabilizes, but it can stabilize at any level.

Let us return to the solutions of equation (13), in particular to the type-3. They correspond to the full hysteresis solutions of the 'unit rooter' Phillips curves (Gordon, 1989; Cross, Hutchinson &

Yeoward, 1990; Ormerod, 1994), in which any unemployment rate may be a NAIRU provided it is constant<sup>4</sup>. In the approach developed here this result depends on the possibility of the degree of autonomous militancy stabilizing at a particular level, call it 'unemployment-neutral degree of autonomous militancy'. It is easy to see, from equations (12) and (13), that the unemployment neutral degree of autonomous militancy is  $M = -a\dot{F}$ . Furthermore, by substituting this in equation (11), it can be seen that  $\dot{N} = \dot{F}$ . The unemployment neutral degree of autonomous militancy is the one which enables the level of employment to grow at the same pace as the labour force without causing inflation to accelerate.

It is here that trade unions come on to the scene. So far the subject of wage bargaining has been taken to be the employed workers, whilst wage negotiation has implicitly been assumed to consist in company bargaining. In this context it typically results that, with the employment neutral degree of autonomous militancy, inflation stabilizes while unemployment goes on increasing.

If the main goal of the unions, in *collective bargaining*, is to make workers' action compatible with the functioning of the whole economic system and conducive to the interests of the entire working class (*including the unemployed*), then their job should be to quench workers' militancy in order to keep the degree of autonomous

<sup>4</sup> A quirk which is worth while noticing is that, with the type-3 solution of equation (13) it is possible to obtain the same results as with the so-called 'full hysteresis' equation (whose sole argument is  $\dot{U}$ ), despite the fact that equation (13) also has  $U$  among its arguments. The reason for this strange result is that  $\dot{U}$  and  $U$  combine multiplicatively in equation (13), so that, when  $\dot{U} = 0$ , 'full hysteresis' ensues anyway. This solves the puzzle brought to light by Elmeskov & Mac Farlane (1993): a 'full hysteresis' equation which is the most suitable for accounting for s-hysteresis, but whose predictive power is surpassed by the 'persistence' equation (which also has  $U$  among its arguments).

militancy at its unemployment neutral level. Trade unions are both the agents of the insiders and the patrons of the outsiders. The former, however, remain the true, though ultimate, actors of the industrial relations game. The unions function as a driving belt from the workers to the negotiation table; but also as a shock absorber between the collectivity and the workers.

As the insiders' agents the unions strive to increase the elasticity of wage claims in good times (for example by stepping up wage bargaining) and to reduce it in bad times (for example by slowing it down). As the outsiders' patrons they work at abating the degree of the insiders' autonomous militancy when unemployment is high.  $a$  and  $M$  are the weapons with which the unions play their game. The weapon used by the government, on the other hand, is the rate of change of employment.

## 5. Policy implications

The first important policy implication of this analysis is that, if the government aims at stable inflation *and* stable unemployment, it needs the collaboration of the unions. The government alone cannot succeed in simultaneously pursuing both goals. If the degree of autonomous militancy is not under control, m-hysteresis would be inevitable. With  $M/a > -\dot{F}$ , not only could increasing inflation go hand in hand with increasing unemployment, but the government could succeed in stabilizing inflation only at the price of maintaining increasing unemployment.

Therefore a first fundamental policy stake of any government aiming at stabilizing inflation and unemployment hinges on the industrial relations set-up: the unions must be induced to collaborate, for example by offering a reduction in unemployment in exchange for a moderation in militancy.

Now let us assume that this collaboration has been ensured. Then it is possible to bring out a second important policy implication: the government must not worry too much about the inflationary effects of a policy aimed at maintaining too low a rate of unemployment. No 'too low' unemployment exists which causes accelerating inflation. This means that any desired level of unemployment can be aimed at, provided it is maintained constant and provided the unions do their job well.

The sole preoccupation should be to keep under control the inflationary push which takes place during the process of lowering unemployment. And this can be done in various ways.

First of all, the government can implement a disinflationary fiscal policy aimed at reducing the wedge between the real take home pay and the after tax profits. The effects of this policy cannot be spelled out in this essay since the equations used here have been formulated by ignoring taxes. However it would be easy to complicate the analysis<sup>5</sup> to show how it is possible to lower the bargained wage increases, and, as a consequence, the rate of inflation, linked to any given rate of change in employment or unemployment.

<sup>5</sup> For a clear treatment of the policies aimed at attacking the tax wedge see Carlin & Soskice (1990, ch. 7). For an in depth analysis, Leese & Manning (1992).

Secondly, the government can implement an incomes policy aimed at reducing the target wage increase. This policy can be adopted to achieve two goals. First, to control inflation in a traverse from a high unemployment rate to the low one aimed at. Second, to reduce inflation, without raising unemployment, if the rate holding under the desired rate of unemployment were considered too high.

It is interesting to observe that incomes policy does not need to be applied permanently. Any government intervention in the process of wage fixing is required only as a temporary measure (Coe & Gagliardi, 1985, p. 11; Mitchell, 1987, p. 106). A disinflationary incomes policy, for example, must remain in force only for the period during which unemployment *decreases* in the process of reaching a predetermined goal. Once the goal is reached, if the government has succeeded in stabilizing unemployment, and the unions the degree of autonomous militancy, inflation would automatically stabilize, and those policies could be dismissed.

Sometimes a policy of reduction of unemployment benefits is advocated by monetarists, and even by some new Keynesians, as an instrument for reducing inflation. The rationale of this policy, in a new Keynesian perspective, is that it would increase the pressure of the unemployed on the labour market and strengthen the negative effects of unemployment on the wage target, thus slowing down inflation (Carlin & Soskice, chap. 7). However, if the wage push depends on the *rate of change of employment*, the wage claims being fixed by employed workers, this policy would not work: in fact it does not affect the changes in employment. Worse still, it could work perversely. A reduction in unemployment benefits would raise



the burden of the unemployed on the family budget and therefore on the real consumption of employed workers. This could exacerbate workers' moods and make for an increase in the autonomous degree of militancy. A policy of reduction of unemployment benefits is certainly not advised by the economist following the approach developed here.

A kind of supply side policy sometimes deduced from hysteresis models, especially of the insider-outsider type, is the one that aims at restricting closed shop practices and restraining the influence of trade unions in wage setting (Adams, 1988, p. 395). It is supposed that the market power of insiders is impaired by this kind of policy, while the effect of unemployed people on labour supply is enhanced. Wages and unemployment should decrease. This policy, indeed, could have some effects in slowing down inflation when employment is decreasing, but mainly insofar as it contributes to raising the employment elasticity of wages. However it does not necessarily have expansionary effects during periods in which *Keynesian* unemployment is rising. In these periods the wage bill decreases also because effective demand is lacking. If a weakening of the trade unions causes stronger wage decreases, the consequence will be an additional depression in aggregate demand and a further increase in unemployment. But this policy is especially self-defeating if trade unions are ready to work to abate workers' militancy. A weakening of the unions' control over the rank and file, might perhaps have some immediate deflationary effects, but would produce perverse long-lasting effects on the running of industrial relations.

Admittedly, the policy suggestions offered here are very cursory. In fact the intention was just to give some hints on the way this analysis could be developed into a proper Keynesian theory of economic policy in the face of stagflation and, especially, in times of high unemployment. Were the analysis proved to be theoretically robust and empirically relevant, it might be worth while building on these hints.

## 6. Conclusions

A modification to the expectations augmented Phillips curve has been proposed here, namely, to substitute, among its arguments, the rate of change of employment for the rate of unemployment. A minor modification, then, but with significant theoretical and political implications.

Once the modification is accepted, many theoretical and political implications of the monetarist and new Keynesian approaches to the Phillips curve break down: a unique NAIRU does not exist; nor do 'too low' unemployment rates, making for accelerating inflation, exist.

On the other hand, some truly Keynesian implications of this modification are worth while bringing to the fore. First of all, it is no longer possible to obtain long run perverse effects of an expansionary measure (accelerating inflation) as a consequence of its positive short run effects (low unemployment). Quite the contrary, a permanent real effect (low unemployment) can be obtained

at the cost of a nominal effect (increasing inflation) which can be only temporary. Secondly, it is no longer sensible to speak of one 'equilibrium rate of unemployment'. If equilibrium implies non accelerating inflation, then any level of unemployment (or employment) can be one of equilibrium. This vindicates Keynes's vision of the capitalist economy as one that is characterized by a moving equilibrium and, indeed, an underemployment equilibrium: a state which is, or may be made, compatible with different levels of unemployment (Cross, 1993, p. 71; Isaac, 1993, p. 453). Thirdly, and most important, the argument is reaffirmed that macroeconomics is not just the subject of the 'economics of the short run' - a conclusion which is rather more in keeping with a genuine post-Keynesian approach.

Nor are the policy implications of the present analysis less remarkable. A very important consequence of the disconnection of the nominal and real effects of demand management is that some impervious anti-inflationary instruments such as incomes policy need be implemented only for a limited period of time. Finally it is argued that some supply side interventions in the labour market which are often advocated as far-reaching anti-inflationary policies have scarce, if not perverse, effects.

## Appendix

1. In this section of the appendix an attempt is made to answer the question: if the wage conflict equation is theoretically sound and

empirically robust, how is it possible to reconcile it with the fact that the Phillips curve seems to work somewhere and sometimes?

Here is a general form for the Phillips curve:

$$(14) \quad \dot{W} = g(h, \dot{P}, U, \dot{U})$$

And here are two special cases:

$$(15) \quad \dot{W} = g_1(h, \dot{P}, U)$$

$$(16) \quad \dot{W} = g_2(h, \dot{P}, \dot{U})$$

where  $h$  stands for 'other variables'.

The difference with equation (4) is evident. However it is possible to obtain equation (14) from (4). In fact,  $F$  being the labour force,

$$U = \frac{F-N}{F} = 1 - \frac{N}{F}$$

$$N = F(1-U)$$

$$\ln N = \ln F + \ln(1-U)$$

$$\frac{d(\ln N)}{dt} = \frac{d(\ln F)}{dt} - \frac{1}{1-U} \frac{dU}{dt}$$

$$(17) \quad \dot{N} = \dot{F} - \frac{U}{1-U} \dot{U}$$

The rate of growth of the labour force is fairly low and stable in industrialized countries. Thus it is plausible that, in econometric research, a part of it disappears in the constant term of the normal Phillips curves.  $(1-U)$  is very near to 1, so that  $U/(1-U)$  is an increasing monotonic transformation of  $U$  very near to  $U$ . Therefore, by using (17), equation (4) can be transformed into (14), which can now be interpreted as a pseudo-Phillips curve. Perhaps what is estimated in econometric research is a linear approximation of it.

2. In this section values of the NAIRU are determined as the economically meaningful solutions of equation (13). Meaningful solutions are those that lie in the interval  $[0,1)$ .  $a$ ,  $\dot{F}$  and  $M$  are exogenous variables and can be treated as arbitrary constants. To simplify, let us put  $k = \dot{F} + M/a$ , so that  $k \geq 0$  when  $-\dot{F} \leq M/a$ ,  $\dot{F} > 0$ .

Equation (13) can be rewritten

$$U(t) = \frac{k}{\dot{U}(t) + k}$$

or

$$(18) \quad U'(t) + kU(t) = k$$

where  $U'(t) = dU(t)/dt$ . Let equation (18) be transformed into the following:

$$e^{kt}U'(t) + e^{kt}kU(t) = e^{kt}k$$

Taking integrals and developing,

$$\int_0^t (e^{kt}U'(t) + e^{kt}kU(t))dt = \int_0^t e^{kt}kdt$$

$$e^{kt}U(t) - U(0) = e^{kt} - 1$$

$$e^{kt}U(t) = U(0) + e^{kt} - 1$$

$$U(t) = e^{-kt}U(0) + 1 - e^{-kt}$$

Thus

$$(19) \quad U(t) = 1 - e^{-kt}(1 - U(0))$$

and

$$(20) \quad \dot{U}(t) = \frac{ke^{-kt}(1 - U(0))}{U(t)}$$

In figures 2a and 2b the phase diagrams of equation (13) are represented for  $k$  greater or lower than zero respectively. In figures 2c and 2d the trajectories of  $U(t)$  are drawn for those same values of  $k$ .

The following results obtain:

- i) with  $k > 0$ ,  $U(t)$  tends to 1 in infinite time at a decreasing positive rate of growth;
- ii) with  $k < 0$ ,  $U(t)$  tends to 0 in finite time at a decreasing negative rate of growth;
- iii) with  $k = 0$ ,  $U(t)$  is constant at the initial condition.

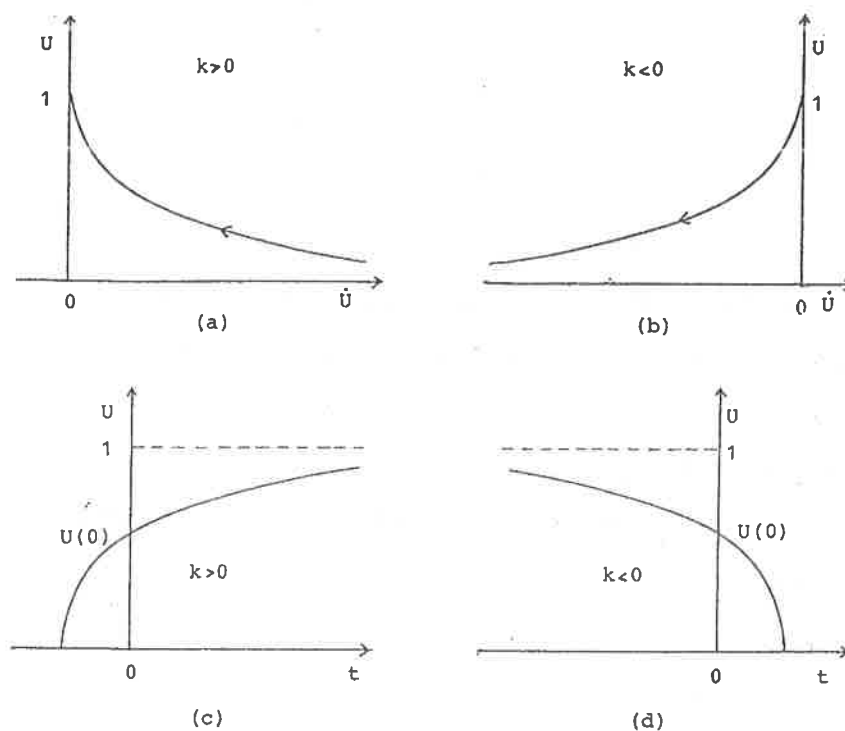


Figure 2

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