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A NOTE ON THE JOINT MOVEMENTS OF THE PHILLIPS AND BEVERIDGE CURVES*

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In his recent study Blanchard (1989) investigates the nature and origin of persistent unemployment by a joint examination of the movements of the Phillips and Beveridge curves. According to Blanchard, the persistence of unemployment can be associated either with the reallocation or the bargaining factors, depending upon the degree of correlation between the shifts in the Phillips and Beveridge curves: If both curves shift simultaneously this provides support for the reallocation explanation of the rise in the non-accelerating rate of unemployment; if the shifts are not correlated, this implies that the bargaining factors explain the persistence of high unemployment. The aim of the present study is to investigate the usefulness of the testing methodology proposed and employed in Blanchard's study. This is done by examining the robustnesses of the results derived from such an analysis with respect to various specifications of the Phillips and Beveridge curves and different time periods. The analysis is carried out by using aggregate data on the Finnish economy from the period 1960 – 1987. The main result of the study is that no precise conclusions can be obtained by employing the proposed research strategy.

1. Introduction

In the European Community unemployment either rose or remained steady throughout the period 1974 – 1987. While the EC unemployment rate stood at a modest 3.0 per cent in 1974, it had risen to 10.5 per cent by 1987. The corresponding OECD figures, mainly owing to the relatively good performance of the labour markets of the Nordic countries and Japan, were slightly better, the average OECD unemployment rate rising from 3.2 in 1974 to 8.8 in 1983 and then remaining virtually unchanged at around 8 per cent during 1984 – 1987. Since 1988 the general trend has been downward: the EC (OECD) unemployment rate fell to 9.9 (6.7) in 1988 and to 9.4 (6.4) in 1989. Although unemployment is expected to fall in many countries in 1990, no immediate return to the unemployment levels prior to the mid 1970s is, however, anticipated. In fact, unemployment rates appear to be again on the rise. For instance, OECD (OECD Economic Outlook, June 1990) forecasts suggest that there may be around 1 million more unemployed in the

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OECD countries in 1991 than in 1990.

While the rise in unemployment across Europe during the 1970s has been commonly attributed to various supply-side shocks, including the oil crisis and a resulting productivity slow-down, its persistence at an extremely high level during the 1980s — by the standards of the 1950s and 1960s — has caused controversy and debate. One commonly employed argument is that the persistence of a high level of unemployment is due to deterioration in the *allocative efficiency* of the labour market, i.e. the functioning of the labour market has worsened. The causes, according to this view, include increased structural imbalance between workers and jobs, a decline in job search activity on the part of the unemployed, increased government regulations on firing and hiring practices and so forth. Another commonly raised view takes the role of trade unions as a point of departure. Within this group of studies the *rise* in unemployment is generally associated with the supply shocks of the 1970s combined with rigid wage policies pursued by the trade unions. According to this view the *persistence* of unemployment is to be explained by trade union resistance to real wage cuts in combination with union membership considerations: because employed workers (insiders) carry more weight in the wage-setting process than the unemployed (outsiders), supply or demand shocks affecting the labour market tend to cause persistent unemployment.[1]

These views as to whether reallocation or bargaining factors mainly underlie the unemployment problem are not however in competition in the mutually exclusive sense. In fact they are likely to co-exist and show interdependence.[2] The distinction between the underlying determinants of prolonged unemployment and, in particular, information about their relative importance is, however, crucial from the policy perspective. In fact, if the reallocation factors play an important role then possible cures for the unemployment problem should include measures affecting the imbalance between workers and jobs while in the case of bargaining factors the focus should be on policies affecting the wage aspirations of unions as well as other measures promoting wage flexibility.

As far as empirical research on the causes of persistent high unemployment is concerned, both views have gained some support; the former mainly from studies examining shifts in the position of the Beveridge (UV) curve, the latter from studies examining the role of insiders and outsiders in the wage-setting process. One unfortunate feature of these studies is that they do not however, in general, shed any light to the relative empirical importance of these explanations. Since the issue is important from the policy point of view, a recent study by Blanchard (1989) is a welcome attempt to that direction. The analysis carried out in his study is based on the joint examination of the movements of the Beveridge and Phillips curves. By analysing the shifts in the curves, Blanchard attempts to establish whether the persistence of high unemployment is mainly due to *reallocation factors* or *bargaining factors*. Since Blanchard employs a research strategy which has not previously been used in the literature, the robustness of the testing methodology applied in his study is worth examining. This is the primary purpose of the present paper.

2. An overview of Blanchard's study

The test applied in Blanchard (1989) is based on a joint examination of the movements of the Beveridge (UV) and Phillips curves and can be summarized as follows. Suppose that the reallocative effectiveness of the matching process decreases. This can be due to a decline in reallocation intensity or increased structural mismatch. In both cases, however, a higher level of unemployment is associated with a higher level of vacancies, i.e. the Beveridge curve will shift outwards. Since the unemployment — vacancy ratio remains constant, increased unemployment is unlike-

[1] *For a discussion on the European unemployment problem see e.g. Layard & Calmfors (1988) and references therein (including Lindbeck & Snower (1986), Blanchard & Summers (1988), Franz (1988) and Jackman & Roper (1987), among others).*

[2] *For example, although the original cause of a prolonged period of high unemployment might be due to union behaviour (i.e. membership considerations), it may in the end turn out to be a reallocation problem due to a deterioration in human capital. The discussion on insider effects versus outsider ineffectiveness is a case in point (see e.g. Bean & Layard (1988).*

ly to lead to a wage decrease. This suggests that if the shift in the Beveridge curve is due to a change in the *reallocative efficiency* of the labour market, the Phillips curve will shift accordingly. As far as the shifts in the Phillips curve are concerned, there are other factors beside the reallocation forces which can operate the shift. Blanchard (1989) refers to these factors as *bargaining factors.* Suppose that the worker (the union) is capable by extracting a larger share of the surplus of a wage agreement. This will lead to an increase in wages (and inflation) given prevailing level of unemployment and job vacancies. Similarly, any changes in product market conditions which lead firms to increase their mark-up over wage costs will lead to more inflation given unemployment and vacancies. The point is that such factors which shift the Phillips curve do not affect the position of the Beveridge curve.[3]

Blanchard (1989) attempts to trace shifts in the Phillips and Beveridge curves by simple econometric methods. The procedure is, in short, as follows. In the first stage the Beveridge and Phillips curves are estimated. Assuming that shocks to aggregate activity lead to movements along downward sloping loci in the Beveridge and Phillips curves (i.e. ignoring cyclical loops around the loci), the residual vectors thus obtained can be interpreted as corresponding shifts in the position of the curve. In the second stage the estimated shifts are compared. If the shifts in the Beveridge and Phillips curves move together, i.e. their correlation is high, this suggests that the shifts are due to the reallocation factors; if they are not, this points to the bargaining factors.

This testing methodology has several shortcomings. First, bivariate models where unemployment is regressed either on inflation (Phillips curve) or on vacancies (Beveridge curve) are unlikely to explain the movements in unemployment with accuracy. This implies that the residual vectors obtained from the Beveridge and Phillips equations tend more or less to track actual unemployment and are hence likely to be highly correlated. Consequently, the detection of a relatively high correlation between the shifts of the curves cannot be interpreted as a prima facie evidence in favour of the reallocation hypothesis.[4] Second, the plausibility of the assumption that the Beveridge curve does not shift if the shift in the Phillips curve is due to the bargaining factors is open to debate. For example, as Blanchard points out, a wage change caused by a change in the bargaining position may, given prevailing level of unemployment and job vacancies, affect the intensity of job search and consequently the supply of labour, hence shifting the Beveridge curve. Similarly the assumption that the wage responds only to changes in the U/V ratio can be questioned. Thirdly the procedure in which the residuals of the estimated equations are treated as *shifts* in the position of the Beveridge/ Phillips curve, respectively, explicitly rules out all cyclical movements *around* the steady-state Beveridge curve.[5] This may lead to estimation bias and, in particular, mean that the results are sensitive to the estimation period chosen.[6] Fourth, since there is in general no survey data on inflation expectations, the estimation of an expectation-augmented Phillips curve is subject to problems. Fifth, the availability of reliable data on job vacancies poses a similar problem.

As noted at the outset, the aim of the present study is to examine the robustness of the testing methodology employed in Blanchard (1989). This has been done by applying the methodology to the Finnish labour market data. By carrying out experiments with alternative specifications of the Beveridge and Phillips curves and using various time periods, we attempt to establish to what extent the pro-

[3] *As Blanchard points out this is only a first approximation.*

[4] *An alternative strategy, which is also employed in Blanchard, is to regress job vacancies and inflation, respectively, on unemployment. Although this method does not suffer from the above-mentioned correlation problem since the residuals are uncorrelated by definition, a possible simultaneous bias involved in the estimation remains.*

[5] *Changes in aggregate economic activity drive unemployment and vacancies in opposite directions: a negative demand shock leads to higher unemployment and reduced vacancies; a positive demand shock leads to lower unemployment and increased vacancies, i.e. cyclical shocks generate movements along the negative sloped UV-locus. If, however, the vacancy rate adjusts considerably faster than the unemployment rate, wide countercyclical loops around the steady-state UV locus are generated.*

[6] *Linden (1990), who analyses Finnish data, finds that the behaviour of the short-run countercyclical loops of the UV curve did not remain regular over the period 1971 – 1988.*

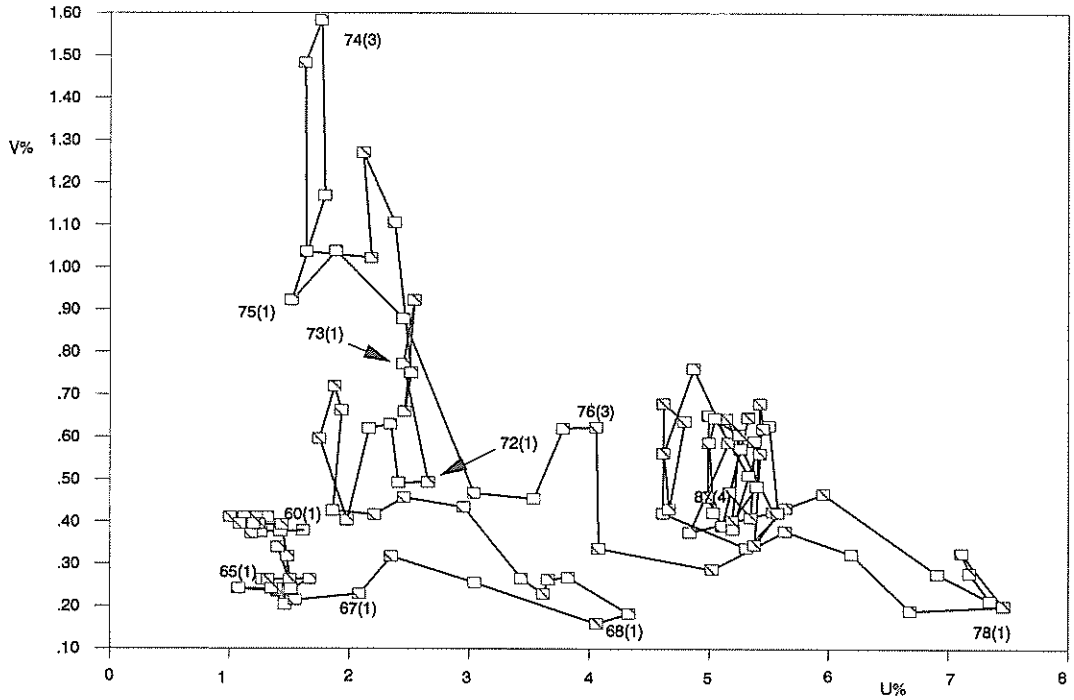

Figure 1. The relation between quarterly unemployment and vacancies, Finland, 1961 – 1987

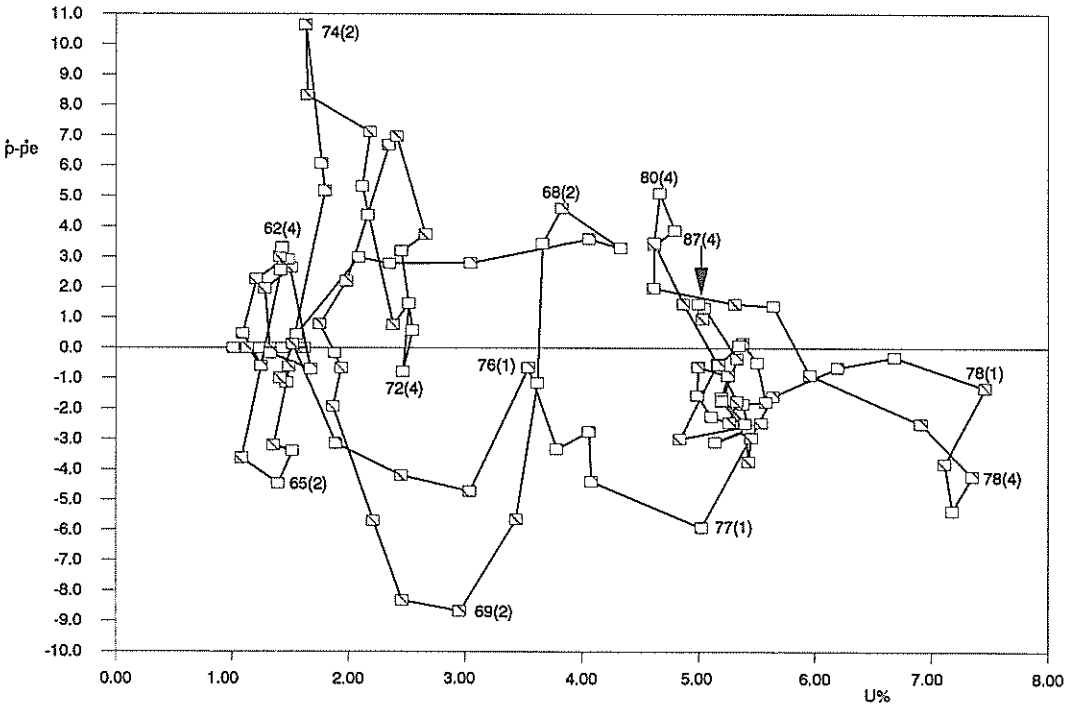

Figure 2. The relation between quarterly unemployment and unexpected inflation, Finland, 1961 – 1987; unexpected inflation is measured by the change in the inflation rate

posed methodology contributes to the discussion on the persistent unemployment.[7]

3. Results

Without entering into a detailed discussion on the rationalization of the simultaneous existence of vacancies and unemployment or the existence of the Phillips curve, we turn to Figures 1 and 2 which plot the Beveridge and Phillips curves for Finland.[8] As Figure 1 shows, the commonly held assumption that the UV curve can be approximated as a retangular hyperbola with the functional form $UV = \alpha$ does not seem to run counter to the Finnish data.[9]

A visual inspection of Figure 1 suggests that the Finnish Beveridge curve displays both cyclical movements along and around the negative sloped UV-locus arising from variations in aggregate activity as well as structural shifts arising from unspecified structural shocks affecting the labour market.[10] In the early 1960s these movements were moderate: during 1960(1) – 1966(4) there were no significant movements along the negative sloped UV curve nor did structural shifts in the position of the curve seem to occur. The end of the 1960s was in turn characterized by moderate movements along the UV curve: first downwards, then upwards. As far as developments in the 1970s are concerned, the UV curve shows a steady downward path from 1974(1) to 1978(4) after which it shows a reverse movement. In the 1980s cyclical movements along the UV curve were absent and the period was characterized by moderate cyclical movements around a steady-state point. As far as the structural shifts are concerned, there seemed to be an outward shift around 1972.[11]

As far as the Phillips curve is concerned, we, following Blanchard, looked at the tradeoff between unexpected inflation and unemployment. This formulation naturally prompts the question: how are expectations on inflation formed? Since there is no appropriate survey data on price expectations we adopted two commonly-used procedures and approximated unexpected inflation by either (i) a change in the inflation rate (static expectations) or (ii) the difference between actual inflation and forecasts generated by an AR(2)-process.

The Phillips curve depicted in Figure 2 shows evidence of steady-state shifts to the right throughout the period 1960(1) – 1978(1) and then to the left from 1978(2) to 1987(4). As far as the latter period is concerned, a decrease in unemployment appears in the first place to be associated with movements along the (short-run) Phillips curve (period 1978(4) – 1980(2)) and then with a shift to the left (and downwards) of the curve. Visual inspection suggests that the Phillips and Beveridge curves did not shift simultaneously around 1972 – 74 but that the shift in the Phillips curve seemed to occur somewhat later (1974 – 77). In addition, the shift of the Phillips curve to the left around 1986 did not appear to be associated with a corresponding shift in the

[7] To be precise it should be noted that the model employed in Blanchard's study is set up in terms of bilateral bargaining, not in terms of collective bargaining. The basic structure of the analysis is not however altered if the assumption can be sustained that the wage outcome of bargaining is affected by market influences. In the case of the Nordic countries where wage drift accounts for a considerable part of total wage increases this assumption is not implausible, although its validity, of course, can be questioned.

[8] The simultaneous coexistence of unemployment and vacancies is commonly explained either by appealing to the aggregation of separate labour markets, each of which has no friction, or alternatively, to a matching process which inefficiently allocates vacancies and unemployed workers. For further details see for instance Hansen (1970) and Blanchard and Diamond (1989).

[9] The data used in the study is as follows. Vacancy rate (VR) = number of vacancies divided by number of employees (V/LE); Unemployment rate (UR) = number of unemployed divided by the labour force (LU/LU + LE); Inflation (Ṗ) = annual change in the consumer price index. Seasonally adjusted data is quarterly and is taken from BOF4 (Bank of Finland), excluding the vacancy series which is taken from the Labour Force Survey (Ministry of Labour). The use of untransformed vacancy series implicitly assumes that the proportion of reported vacancies has been stable over the investigation period.

[10] While cyclical shocks generate movements along and around the negative sloped UV-locus leaving the product of U and V constant, structural shocks in turn shift the UV locus inwards/outwards leaving the ratio of U and V constant.

[11] This shift has been reported in Aarnio (1989), Eriksson (1985) and Sauramo and Solttila (1984). Aarnio (1989) also speculates as to whether there has been a further outward shift in the UV curve around 1984 – 1985.

position of the Beveridge curve. Now we turn to the results.[12]

As far as Table 1 is concerned, the shifts in the Phillips and Beveridge curves seem to be rather strongly correlated pointing towards the reallocation hypothesis. In fact, excluding column (iv) which reports the results derived from the error-correction presentations of the Phillips and Beveridge curves, the correlation between the shifts is, on average, 0.7. Given that in most cases the explanatory power of the estimated equations underlying the results reported in columns (i) – (iii) is rather limited (and hence the obtained residual vectors track the actual unemployment), the high correlation found between the shifts of the Phillips and Beveridge curves thus comes as no surprise. In this respect the robustness of this result is extremely ambiguous.

When we apply specifications which track both Phillips and Beveridge curves with reasonable accuracy the picture changes quite dramatically: in column (iv) the average value of the correlation coefficient is now only about 0.2, hence pointing towards the bargaining factors. The conclusion is similar if we look just at the post-1977 data: the average figure is now 0.3, again well below the figures reported in columns (i) – (iii).[13]

Table 2 reports results that are in line with those in Table 1 in the sense that the results show significant variation across the various specifications and time periods used. Contrary to Table 1, however, the results are now in favour of accepting the hypothesis that persistent unemployment is caused by the bargaining factors. As above, this conclusion is highly tentative and thus should be interpreted with care.

[12] *Because of the large number of equations estimated in the study, we do not discuss the actual regression results here but directly turn to the correlations between the derived shifts of the Beveridge and Phillips curves. Regression results and the time series of the estimated shifts are available from the author on request. See, however, Appendices 1 and 2 which present an illustrative set of regression results and graphs for estimated shifts.*

[13] *It is possible to interpret this result as an evidence supporting the view that the pre 1977 period was dominated by the reallocation factors while the post 1977 was characterized by the bargaining factors. The validity of this interpretation is however undermined by the results of Table 2.*

4. Concluding remarks

The purpose of a recent study by Blanchard (1989) was to investigate the nature and origin of persistent unemployment by a joint examination of the movements of the Phillips and Beveridge curves. According to Blanchard, the persistence of unemployment can be attributed either to reallocation or bargaining factors, depending upon the degree of correlation between the shifts in the Phillips

Table 1. Correlation coefficients between the shifts in the Phillips and Beveridge curves; dependent variable: $\ln(U)_t$

Period	Model			
	(i)	(ii)	(iii)	(iv)
1962 – 87	0.96	0.99	0.68	0.34
1968 – 87	0.77	0.78	0.49	0.11
1968 – 76	0.67	0.75	0.42	0.05
1977 – 87	0.41	0.35	0.22	0.14

Notes: Specifications are as follows: The Phillips curve is estimated by regressing the logarithm of the unemployment rate on unexpected inflation and the Beveridge curve by regressing the logarithm of the unemployment rate on the logarithm of the vacancy rate. Model (i) is the baseline specification in which the unexpected inflation is proxied by the change in the inflation rate. Model (ii) refers to specifications in which both the Beveridge and Phillips curves include a time trend. In model (iii) the unexpected inflation is proxied by the difference between the actual inflation rate and the forecast given by the AR(2) process. Model (iv) is based on the results obtained from the error-correction presentation of the basic model.

Table 2. Correlation coefficients between the shifts in the Phillips and Beveridge curves; dependent variables: $\ln(V)_t$ and $\dot{P}_t$.

Period	Model			
	(i)	(ii)	(iii)	(iv)
1962 – 87	0.28	0.41	0.31	0.10
1968 – 87	0.27	0.35	0.29	0.16
1968 – 76	0.22	0.48	0.24	0.28
1977 – 87	−0.03	−0.17	0.09	0.05

Notes: Specifications are as follows: The Phillips curve is estimated by regressing unexpected inflation on the logarithm of the unemployment rate; the Beveridge by regressing the logarithm of the vacancy rate on the logarithm of the unemployment rate. Otherwise the specifications are similar to those in Table 1.

and Beveridge curves: If both curves shift simultaneously this provides support for the reallocation explanation of the rise in the non-accelerating rate of unemployment; if the shifts are not correlated, this implies that the bargaining factors explain the persistence of unemployment. On the basis of his empirical analysis Blanchard concludes that movements in the NAIRU in the US and UK originate in changes in the reallocation process while changes in the German NAIRU are due to bargaining factors.

The aim of the present study was to investigate the usefulness of the testing methodology proposed and employed in Blanchard (1989). This was done by examining the robustnesses of the results derived from such an analysis with respect to various specifications of the Phillips and Beveridge curves and different time periods. The analysis was carried out by using data on the Finnish manufacturing sector from the period 1960 – 1987.

The main result of the study is that no precise conclusions can be obtained by employing the proposed research strategy. This conclusion rests upon the contradictionary evidence produced by the experiments: the results which were obtained by estimating the Phillips and Beveridge curves by regressing unemployment on vacancies and on inflation, respectively, were in favour of the reallocation hypothesis while the evidence obtained by regressing vacancies on unemployment and inflation on unemployment, respectively, lent support to the bargaining hypothesis. Furthermore, in both cases the point estimates for the correlation between the shifts of the Phillips and Beveridge curves showed considerable variation thus causing additional uncertainty about the robustness of the results. Although these findings relate only to the Finnish data, the evidence obtained in this study, combined with the shortcomings involved in the research strategy, clearly suggests that care should be taken in interpreting the results derived from the Blanchard's methodology.

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Appendix 1.

Some illustrative regression results

Table 1, specification (i)

$$\ln UR_t = 1.16 - 0.04\ (\dot{P} - \dot{P}^e)_t$$
$$(10.6)\quad (2.83)$$

$DP = 1962.1 - 1987.4;\ \bar{R}^2 = 0.08;\ DW = 0.07$

$$\ln UR_t = 1.17 - 0.01\ \ln VR_t$$
$$(7.1)\quad (0.1)$$

$DP = 1962.1 - 1987.4;\ \bar{R}^2 = 0.01;\ DW = 0.04$

$$\ln UR_t = 1.33 - 0.04\ (\dot{P} - \dot{P}^e)_t$$
$$(13.9)\quad (3.56)$$

$DP = 1968.1 - 1987.4;\ \bar{R}^2 = 0.14;\ DW = 0.09$

$$\ln UR_t = 0.74 - 0.69\ \ln VR_t$$
$$(6.62)\ (7.45)$$

$DP = 1968.1 - 1987.4;\ \bar{R}^2 = 0.42;\ DW = 0.10$

Table 2, specification (i)

$$\ln VR_t = -1.00 - 0.07\ \ln UR_t$$
$$(7.36)\ (0.09)$$

$DP = 1962.1 - 1987.4;\ \bar{R}^2 = 0.10;\ DW = 0.11$

$$\ln (\dot{P} - \dot{P}^e)_t = 2.02 - 1.68\ \ln UR_t$$
$$(2.21)\ (2.80)$$

$DP = 1962.1 - 1987.4;\ \bar{R}^2 = 0.07;\ DW = 0.34$

$$\ln VR_t = -0.04 - 0.61\ \ln UR_t$$
$$(0.34)\ (7.40)$$

$DP = 1968.1 - 1987.6;\ \bar{R}^2 = 0.51;\ DW = 0.15$

$$\ln (\dot{P} - \dot{P}^e)_t = 4.03 - 3.14\ \ln UR_t$$
$$(2.8)\quad (3.56)$$

$DP = 1968.1 - 1987.4;\ \bar{R}^2 = 0.14;\ DW = 0.33$

Appendix 2. Estimated shifts, some illustrative examples

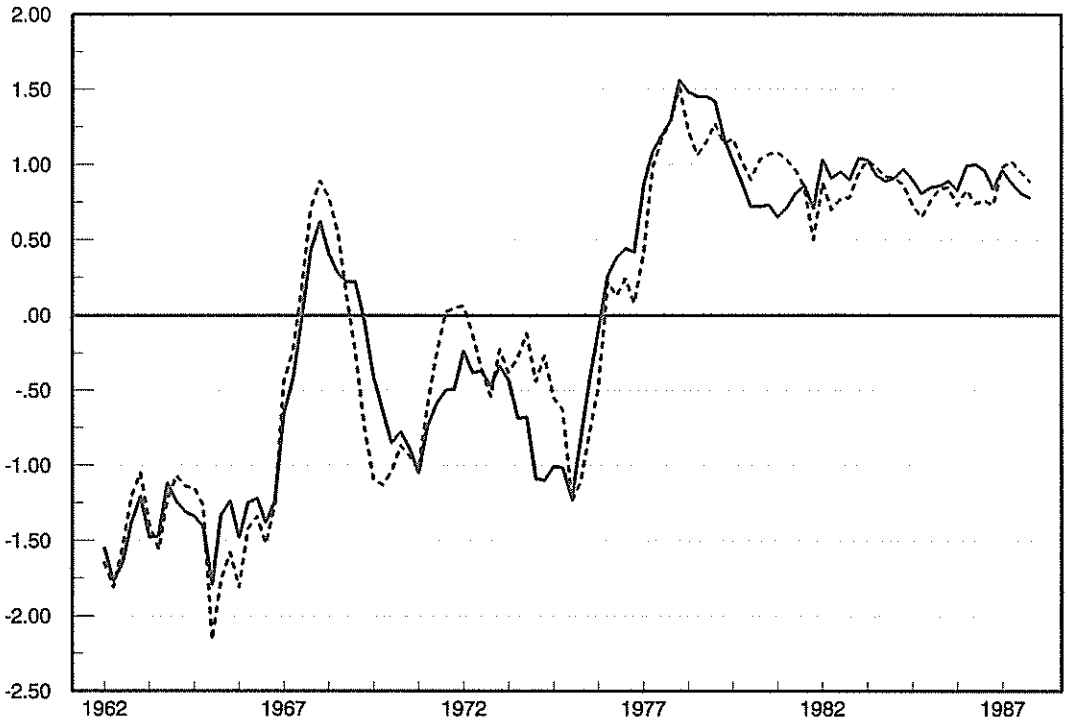

Figure 1. Estimated shifts (table 1, specification (i), period 1962.1 – 1987.4)

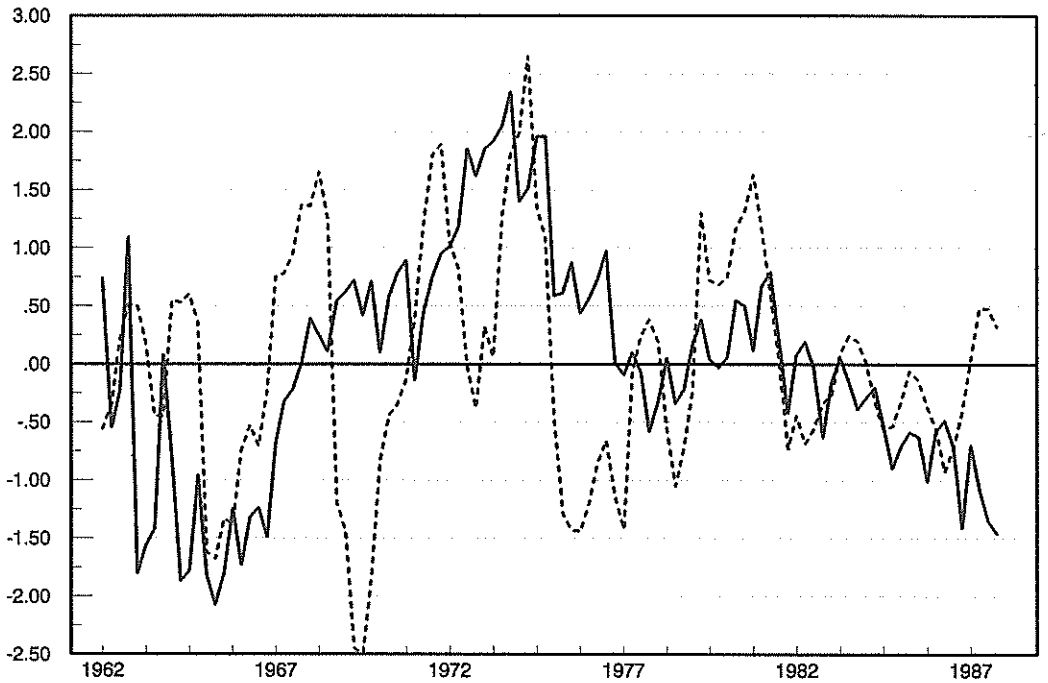

Figure 2. Estimated shifts (table 2, specification (i) period 1962.1 – 1987.4)

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