Robert Schuman Centre

European Unemployment: Macroeconomic Aspects

Has the Phillips Curve Been Reborn?

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1. Introduction

It is nearly forty years since A.W. Phillips (1958) published his seminal paper, testifying to a robust, negative link between the rate of increase in money wages and the level of unemployment. (In fact, Fisher (1926) provided the first empirical investigation into association between these variables, with later contributions from Tinbergen (1951) and Brown (1955)). Phillips' original work was based on a century of British data. Other investigators quickly obtained similar findings for a host of other countries.

But barely a decade was to pass before evidence began to suggest that the relationship Phillips had discovered was breaking down, possibly because governments were trying to exploit it (the expectations-augmented Phillips curve of Phelps (1967) and Friedman (1968) were landmarks here; the original idea can be traced back to Champernowne (1936)). Many theorists and some econometricians attributed its failure to changes in inflation expectations. The oil shocks of the 1970s were to generate jumps in both inflation and unemployment rates in most OECD countries; for the economics profession, two powerful papers by Lucas (1972, 1973) were to convince many that the idea of a dependable, persistent trade-off between inflation and unemployment was a chimera.

This paper begins, in Section 2, with a brief examination of post-1983 data, to see whether the experience and economic analysis of the 1970s have been borne out by subsequent experience, or whether anything like the old Phillips curve has reappeared. We find no significant link between wage increases and unemployment for Belgium or Britain in this most recent period. For the United States, there is a significant relationship - and it is **positive**. But for a large group of other OECD economies, the old negative association is, surprisingly, well attested. For these countries, the significance level attached to the coefficient on unemployment ranges from 92% to 99%. In short, reports of the Phillips Curve's demise appear somewhat exaggerated.

In Section 3, we consider explanations for these empirical findings. There is some evidence to suggest that medium-term or "core" inflation expectations have steadied over the period, and possibly become more detached from actual current rates of inflation. We also explore the idea that the pattern of inflation and unemployment changes we observe can be attributed to changes in fiscal policy parameters accompanying the trend towards disinflation. Section 3 ends with a model of labour market menu costs and imperfect competition, which generates the traditional kind of negative inflation-unemployment relationship that Phillips discovered, and which the bulk of recent OECD evidence suggests has reappeared. Section 4 concludes.

2. The Evidence Since 1983

Has the Phillips Curve reappeared?

We shall concentrate here on the issue of how closely Phillips' original equation, or simple variants or extensions of it, fit recent experience. What follows is not an attempt to identify a complete model of wage inflation-unemployment relationships, nor a full investigation of the many issues recently surveyed so well by Bean (1994). Our emphasis is on the existence (or otherwise) and character of Phillips curves in a number of OECD economies for the past dozen years.

We begin in 1983, the first year when most of the repercussions of the 1979-80 oil shock in inflation and unemployment are likely to have worked themselves out. We examine quarterly data for money wage increases and unemployment for the ensuing twelve or thirteen years for Australia, Canada, Japan and the United States, as well as a larger group of West European countries for which comparable statistics are available: Belgium, Denmark, Finland, France, West Germany (up to 1993), Ireland, Italy, the Netherlands, Norway, Spain, Sweden and the United Kingdom. Data were taken from OECD and Eurostat publications.

Our initial regressions confined themselves to just these two variables. We began with a linear specification. We then tried to replicate Phillips' original logarithmic specification

$$\ln(w + 0.9) = \alpha + \beta \ln u \qquad (1)$$

where w denotes the annual rate of change in money wage rates, and u the level of unemployment. More often than not, (1) outperformed the linear specification on the standard criteria, testifying to the presence of convexity in the relationship. We then investigated the simpler convex relationship

$$w = \alpha + \beta \ln u \qquad (1')$$

The results of these last two sets of regressions are reported in Tables I and 2. In sum, what we find is this. For the United States, there is a significant and *positive* association between money wage advances and unemployment in this period. In Belgium and Britain, there is no significance attached to the coefficients on unemployment in either set of regressions. For the remaining countries, however, there is a *negative* association. In the case of Canada and Spain, the unemployment coefficients are nearly significant at the 5% level, while for the others they are highly significant, often at the 1% level.

We then added three lagged values of unemployment to (1′). Comparison of the coefficients on current and lagged unemployment in the (1′) specification (not reported) shows maximum impact from a nine month lag for Australia, Belgium, Canada and France, and a six month lag for Britain and Spain. For the remaining countries, it is current unemployment with which wage rises have the strongest link.

In sum, our findings so far suggest that, Belgium and Britain aside, the hypothesis that the Phillips curve is horizontal in the period after 1983 can be safely dismissed. For the U.S., it slopes up; for the others, down.

Our central inquiry, however, centres on the hypothesis that the Phillips curve has recently been vertical rather than horizontal. Can this, too, be rejected, at least for most of the countries? To answer this question, we inverted the equation, to regress unemployment on the rate of money wage increase.

We also seek to discover whether the short run Phillips curve differs from the long run one. One simple way of throwing light on this is to add a lagged value of the dependent variable as an extra regressor. We now proceed to do this, for the wage-increase-on-unemployment relationship. We also adopt another approach: we obtain quarterly proxies for core inflation expectations for many countries, using methods described in Section 3.1, and add these to our specification (1′).

The consequences of inserting lagged dependent variables are displayed in Table 3, for the wage-increase-on-unemployment regressions. The coefficients on the lagged wage increase are consistently significant. In most cases, the coefficients are about two-thirds. This suggests that the long run Phillips curve is some three times steeper than the short. Britain is an outlier here, with a coefficient of about .95. Britain displays a very high degree of inertia in the momentum of nominal wages in this period. We also discovered powerful support for the hypothesis of hysteresis in the UK case although the *level* of unemployment plays no significant role here or in several other countries. Table 4 reports t ratios from regression results for the unemployment-on-wage increase relationship, with lagged dependent variable omitted. It appears that the hypothesis of a vertical short-run Phillips curve can be confidently rejected for almost all countries. Table 5 presents our results for (1′) amended by the insertion of the core inflation expectation proxies. One notable feature is the fact that the coefficient on unemployment for Belgium now approaches significance (it is negative). Our core inflation expectations proxy is nearly always significant.

3. Explanations

Evidence may be mixed. But in much of Europe, at least, the traditional Phillips Curve seems to be well-attested. Why?

The standard Keynesian explanation starts with the idea of Walras' auctioneer turning prices in the direction of excess demand, only very slowly. Convexity of the adjustment mechanism is attributed to the lopsidedness of unemployment as a proxy for excess supply/demand, to asymmetric responses (faster up, than down), or to the way imbalances are distributed across individual markets. A firmer basis for the inflation-unemployment relationship is provided by the price misperceptions model of Lucas (1972).

Data reveal that the short - run Phillips Curve in most countries has recently been quite flat (flatter now than it presumably was, say, between 1967 and 1983). Lucas could explain this as a shift in the perceived relative variances of aggregate nominal shocks, and real sectoral shocks (with the former now smaller than they had been earlier). The more the public expects the authorities to aim for price stabilization, the more sensitive short - run output and unemployment become to a nominal disturbance. In a period where a monetary suprise is thought to be rare, it is powerful.

The phenomenon of the renascent Phillips Curve can certainly be explained along Lucas-Keynes lines. Perhaps it provides the main explanation. But it is interesting to see whether other explanations fit too. One justification for doing this is the fact that the Lucas price misperceptions hypothesis sits awkwardly with the free availability of good, up-to-date aggregate price information. Another is that the older Keynesian doctrine that hypothesis displaced - money illusion on the part of the sellers of labour - opens a real can of worms. It is worth seeing if we can explain the seeming rebirth of the Phillips Curve without having to assume that economic agents are silly or implausibly uninformed.

We consider, therefore, three explanations. The first is essentially Lucasian: we try to see whether there is empirical support for the idea that inflation expectations have become much less fluid than they were in the 1970's. The second and third explanations we postulate are theoretical. They involve taxation, or imperfect competition with labour market menu costs.

3.1. A Lucasian Explanation

The Champernowne - Phelps - Friedman story involves a relationship between actual inflation, expected inflation and unemployment. There is a unique negative link between the first and the third of these variables, for any given value of the second. This is the short - run Phillips Curve. The long - run Phillips Curve emerges when the first and second variables are equated. For Friedman, this long - run curve is vertical; for Phelps, it need not be. But both Friedman and Phelps agree that it is steeper in the long - run that the short.

Empirical tests of such models have to confront the issue of inflation expectations. Independent data on consumer price expectations are available directly for only one or two economies (such as The United States). For others, we must proxy them. The proxy we consider is nominal interest rates.

For Fisher, nominal interest rates are the sum of two elements: the real rate of interest and the expected rate of inflation. Set aside taxation, default and transaction costs, and impose uniformity of expectations across agents and neutrality to risk. Fisher's equation then emerges as an arbitage condition linking real assets to nominal bonds.

There are numerous difficulties with the Fisher equation. Here are the three main ones. One is the restrictiveness of the assumptions stimulated to generate it. The second is the fact that, in monetary models of endogenous growth (such as Sinclair (1996)), real interest rates cannot be assumed independent of expected inflation. The third is the fact that short nominal interest rates are now best treated as policy levers, set by the monetary authorities, to alter the rate of growth of monetary aggregates.

For a decade or so from about 1974, many OECD countries placed great reliance on monetary targets. Perhaps the most celebrated experiment was the New Operating Procedures applied in the US from 1979 to 1982. It was soon discovered that short-term nominal interest rates had to be allowed to bounce up and down sharply, with a high average level, if monetary growth was to be brought down to meet pre-announced targets. In dismay at the costs of high interest rate volatility, monetary authorities gradually switched to a policy of setting short nominals - raising them when monetary growth was too rapid, and reducing them in opposite conditions. Some countries relied increasingly on exchange rate regulation, while others did not; but both groups made great use of short nominal interest rate manipulation.

In these circumstances, a high short nominal rate could not be taken, as Fisher's equation suggests, as a simple indication of high expected inflation. If anything, the reverse was true- particularly when the term structure of nominal rates sloped down. A high short rate would then signal the authorities' determination to rein back monetary growth, prevent slippage in its foreign exchange rate, and thereby engineer lower inflation in future years. Furthermore, implicit nominal rates for the next few quarters came to be dominated by market expectations of the future course of nominal rates that Central Banks would aim to set.

At the short end of the maturity spectrum, an "anti-Fisher" effect like this was frequently in operation. Higher short rates could well imply lower inflation predicted later on. But further along the spectrum, the Fisher effect could come to the fore. If the market expected the Central Bank would win its fight for lower inflation, the need for excessive short nominals would fade; and as and when inflation fell, short nominals could converge upon what Fisher's equation would predict.

Another important development of the past fifteen years or so has been increasing international capital mobility. Foreign exchange controls limiting domestic residents' foreign investment opportunities were scrapped by Britain in 1979, and later by France, Italy, Spain and many other countries. In 1981, the UK authorities began to issue long-term indexed bonds, an initiative recently copied in some other OECD countries. Furthermore, there is now growing evidence for exchange rates tracking (some suitably modified form of) PPP over a long horizon of a decade or so.

These observations have led us to adopt the following procedure for attempting to proxy "core", medium-term inflation expectations on a country-by-country basis. Redemption yields on UK indexed bonds proxy ex-ante medium-term real interest rates for Britain. International capital mobility implies that expected real interest rates in other OECD economies cannot differ greatly from these UK rates. If PPP becomes a reasonable prediction over a decade or so, that implies that international nominal interest rate differentials at such a horizon become reasonable predictors of both relative inflation differentials (the Fisher equation) and nominal exchange rate trends (the UIP hypothesis). We can then provide some information about the behaviour of core inflation expectations for a large range of economies. This will enable us to see whether inflation expectations have become decreasingly sensitive to current inflation; and this, in turn, may throw some light on why the short-run, negatively-sloped Phillips Curve may have reappeared.

Data for UK indexed bond yields have been taken from *Financial Statistics*. From 1983 to 1986, they refer to the yield on such bonds maturing in 1996; for later years, the yield has been calculated for a hypothetical ten year horizon as a weighted average of the yields on the 1996 and 2016 bonds. Nominal interest rate data on medium and long bonds for selected countries have been taken from successive issues of *International Financial Statistics.*

3.2. A Fiscal Explanation

Advanced countries today count inflation rapid when prices move upwards by perhaps 0.5% or 1% per month. Reducing the rate of inflation in such a range (or below it) unquestionably deprives the authorities of seignorage. If governments meet their expenses (transfers and direct spending) by a mix of tax receipts and seignorage, typically relying much more on the former than the latter, loss of seignorage can be made good in one of three ways: higher tax rates, lower transfers, or reduced direct spending. What happens to unemployment, as disinflation proceeds, will depend critically upon the fiscal changes that accompany it.

What follows will sketch a simple model to explore these issues. Consider a populous economy where agents differ in their ability to earn, such as in Mirrlees' (1971) model of optimum income taxation. Each person faces a wage rate, w, and can choose work hours, h, freely. The distribution of w is $\phi(w)$. It has unit mass. Labour is the only factor of production. Original income, I, is $\int_o^\infty \phi\ (w)\, wh\, dw$. The real interest rate is zero.

Our agents hold real balances of money, m, because that enables them to save on time devoted to transactions. Transactions time, s (m), is decreasing and convex in m. The drawback with holding money is the rate of inflation, π. Seignorage, equal to πm, is paid over to the State.

The State taxes wage income at a proportional tax rate, t. Income tax receipts and seignorage, S, together balance a transfer paid to all (b) and a level of direct government spending (g):

$$g + b = tI + s \tag{2}$$

An individual's total net payment to the state is twh + πm - b; her consumption, c, is given by

$$c - (1 - t)wh - b + \pi\, m = 0 \tag{3}$$

Individuals have common preferences; utility, U, is increasing and concave in c and leisure, z. Each person has a time endowment of 1, so that:

$$1 - z - h - s(m) = 0 \tag{4}$$

The individual optimizes by maximizing U (c,z) subject to the budget constraint (3), the time constraint (4), and a non-negativity constraint on h. An interior equilibrium satisfies the first-order conditions $U_1(1-t) = U_2$ and $-s' = \theta/w$, where $\theta = \frac{\pi}{1-t}$. The first states that the person's after-tax wage rate equals her marginal rate of substitution between leisure and consumption, while the second that the post-tax value of the marginal time saving of real money ($-w(1-t)s'$) balances the cost (π). If the lower support for the ability distribution is low enough relative to the transfer b, the non-negativity constraint on h will bind. If $\tilde{w}$ denotes the highest ability level at which this occurs, $\tilde{w}(1-t) = U_2/U_1$ at h=0, and the money holdings of anyone not participating in the labour force, $\tilde{m}$ will be given implicitly by $-s'(\tilde{m}) = \theta/\tilde{w}$. So we may write:

$$h^* = Max\left[O, arg\max_h U\big((1-t)[wh - \theta\, m(w,\theta)] + b, 1 - h - s(m(w,\theta))\big)\right] \tag{5}$$

$$O = arg\max_h U\big((1-t)[\tilde{w}h - \theta\,\tilde{m}(\tilde{w},\theta)] + b, 1 - h - s(\tilde{m}(\tilde{w},\theta))\big) \tag{6}$$

where h* (w, t, θ, b) is the individual's optimal labour supply when the non-negativity constraint is not violated.

Let u denote the proportion of the population for whom w falls below $\tilde{w}$. We may interpret u as an unemployed rate. The State's total receipts, the right hand side of (2), may now be written:

$$tI + S = tJ + (1-t)y\theta[K + u\tilde{m}(\tilde{w},\theta)] \tag{7}$$

where

$$J = \int_{\tilde{w}}^{\infty} \phi(w) w h^*(w,t,\theta,b) dw \text{ and } K = \int_{\tilde{w}}^{\infty} \phi(w) m(w,\theta) dw$$

Total differentiation of (6) yields

$$0 = -\tilde{A}_1 db - \left[\theta\tilde{m}\tilde{A}_1 + \tilde{w}\tilde{U}_1\right]dt + \left[\tilde{U}_1(1-t) - \frac{\tilde{B}\theta^2\tilde{m}'}{\tilde{w}^3}\right]d\tilde{w} + \left[\tilde{A}_1\tilde{m}(1-t) + \frac{B\theta\tilde{m}'}{\tilde{w}^2}\right]d\theta \equiv \tag{8}$$

$$\tilde{A}_1 db - D_1 dt + D_2 d\tilde{w} + D_3 d\theta$$

where $A_1 \equiv U_{2_1} - w(1-t)U_{11.}$ $A_2 \equiv w(1-t)U_{12} - U_{22.}$ $B = A_1 w(1-t) + A_{2.}$

and the tilde (~) refers to a person who optimizes freely by setting h=0.

We may also differentiate (1) totally, using (6), to find

$$(1-tJ_b)db + dg = C_1 d\tilde{w} + C_2 dt + C_3 d\theta \tag{9}$$

where J_i (K_i) denotes the partial derivative of integral J (K) with respect to i, and C_1, C_2 and C_3 are given by

$$C_1 \equiv t\tilde{J}_{\tilde{w}} + \pi K_{\tilde{w}} + \pi m, \left(\frac{du}{d\tilde{w}} - \frac{u\theta\,\tilde{m}'}{\tilde{w}^2}\right)$$

$$C_2 \equiv J + tJ_t - \theta(K + u\tilde{m})$$

$$C_3 \equiv tJ_\theta + K(1-t) + \pi K_\theta + \left(\tilde{m} + \frac{\theta\tilde{m}'}{\tilde{w}}\right)u(1-t)$$

This sets the stage for conducting two monetary-fiscal experiments. Experiment I involves raising π, and altering b for fixed values of g and t. Experiment II consists of raising π and altering t for fixed values of g and b.

In experiment I, since u and $\tilde{w}$ must be positively related, we can identify the marginal effect of inflation on unemployment when it is the transfer payment that is adjusted:

$$\left.\frac{d\tilde{w}}{d\theta}\right|_t = \left[\frac{\tilde{A}_1 C_3 - D_3(1-tJ_b)}{\tilde{A}_1 C_1 - D_2(1-tJ_b)}\right] \equiv L \tag{10}$$

Experiment II gives us a qualitative impression of how inflation affects unemployment, when it is the tax rate that is adjusted:

$$\left.\frac{d\tilde{w}}{d\theta}\right|_b = \left[\frac{C_3 D_1 - C_2 D_3}{C_1 D_1 + C_2 D_2}\right] \equiv M \tag{11}$$

Can these derivatives be signed?

If leisure is normal, and our assumptions ensure that it will be, $\tilde{A}_1 > 0$. This suffices for $D_1 > 0$. Given m′ is always negative (higher inflation reduces real balances), $D_2 > 0$. D_3 is, alas, ambiguous but it must be positive if $\tilde{m}$ is finite at π

$\rightarrow 0$, and π is low enough. With leisure normal, $J_b < 0$, so $1 - tJ_b > 0$. Turning to the expressions C_1 and C_2, we note that C_1 really must be negative, since it shows the marginal effect on the government's total receipts of a rise in the level of unemployment (proxied by $\tilde{w}$). Income tax receipts and seignorage can only fall. C_3, on the other hand, pinpoints the effect of higher inflation on government's total tax receipts. This will be positive if the inflation-elasticity of money demand is sufficiently small. Lastly, C_2 shows the marginal effect of t on income and tax and seignorage receipts; it is necessary for t to be set efficiently that this be positive.

These observations ensure that L will have a negative denominator. Its numerator must be positive if $\tilde{A}_1 C_3$ is sufficiently positive, which seems eminently reasonable. Together those conditions imply that inflation reductions should lead to <u>lower</u> unemployment, when it is the transfer payment, b, that is reduced in parallel to keep the government's budget in balance.

Turning to M, we may note that its numerator will be positive if C_2 is large enough, and that its denominator will also be positive if the term in D_2 dominates $C_1 D_1$. In that event, disinflation accompanied by a rise in the income tax rate will lead to *higher* unemployment.

These inferences - that the Phillips Curve is likely to slope up when inflation and transfers are adjusted together, but downward when inflation and the income tax rate are altered in unison — can be confirmed exactly for a helpful special case. If utility is linear in leisure and logarithmic in consumption, and ϕ (w) is uniform on (0,1), (6) reduces to

$$u(1-t)=b-\theta\,\tilde{m} \tag{6'}$$

Moreover, with s quadratic in m,

$$s=\gamma-\delta\, m+\frac{\varepsilon}{2}m^2$$

we have m = $\frac{1}{\varepsilon}\left(\delta-\frac{\theta}{w}\right)$, and $\tilde{m}=\frac{1}{\varepsilon}\left(\delta-\frac{\theta}{u}\right)$. The government's budget constraint simplifies to

$$b+g=\frac{t}{2}(1-u)^2+\frac{\theta}{\varepsilon}\left[\delta(1-t)-\theta\left(1-\ln u-\frac{t}{u}\right)\right] \tag{7'}$$

Eliminating b, (6´) and (7´) yield

$$\frac{t}{2} = \left[g + u - \frac{\theta^2}{\varepsilon u}(1 - u + u \ln u) \right] \left[1 - u^2 \right]^{-1}$$

so that $$\left.\frac{du}{d\theta}\right|_t = \frac{\partial t / \partial \theta}{\partial t / \partial u} = \frac{2\theta}{\varepsilon u} \frac{[1 - u + u \ln u][1 + u^2]}{(1-u)^2 - 2g + \frac{\theta^2}{\varepsilon u^2}\left[(1-u)(1+3u^2) + 2u^3 \ln u\right]} \qquad (10´)$$

which will be positive. That illustrates Experiment I. Experiment II calls on us to eliminate t, so that (6´) and (7´) imply

$$\frac{b}{2} = \left[u + \frac{\theta}{\varepsilon}\left(\delta - \frac{\theta}{u} \right) \right] \left[\frac{\theta^2}{\varepsilon u}(1 - u + u \ln u) - g + \frac{(1-u)^2}{2} \right] \left[1 + u^2 \right]^{-1}$$

From this we can obtain

$$\left.\frac{du}{d\theta}\right|_b = -\frac{\partial b / \partial \theta}{\partial b / \partial u} \rightarrow -\frac{(1+u^2)\left[\frac{\delta}{\varepsilon}\left(\frac{(1-u)^2}{2} - g \right) \right]}{(1-u)\left[\frac{1 - 3u - u^2 - u^3}{2} - g(1+u) \right]} \qquad (11´)$$

for low θ. Experiment II gives us a Phillips curve that must slope down, at low inflation.

How do these results bear on the econometric findings of Section 2, that the Phillips curve has recently sloped up in the United States but down, by and large, elsewhere? It could be argued that what differentiates the United States from most other OECD countries in the past decade or so has been a marked divergence in the way their tax/benefit systems have evolved. Let us take 1983 as the starting point, and see what has happened to the ratio of Social Security and Welfare Spending to Total Government Spending in the various countries. We examine the annual rate of change in this ratio from 1983 to the latest date for which data are available (from successive issues of **Government Finance Statistics Yearbooks**).

For the United States, the relevant statistic is a **decline** of 3.23% per year. In the UK, it has dropped very slightly (0.07% per annum). The unweighted average for eight other EU countries in our sample (Belgium, Denmark, Finland, France, Ireland, the Netherlands, Sweden and West Germany) registers, in contrast, a rise of 0.8% per year.

The ratio of Social Security and Welfare Spending to total Government Spending is, of course, endogenous. It rises automatically with unemployment. For this and other reasons, our figures need to be treated very cautiously. The fact that unemployment has been dropping in the United States over the period, but rising in most of the EU, would lead us to expect our ratios to move in the directions they have. But the decline in the US ratio far outstrips what one would have predicted on the basis of unemployment movements alone; less than a third of social security and welfare spending there is in any case devoted to unemployment benefits. Eligibility restrictions have been tightening, and the scale of provision to each potential recipient has been cut back quite sharply, in relation to average incomes. In sum, the US tax/benefit system has become markedly less progressive.

We are inclined to conclude from this that these fiscal changes, which happen to have accompanied a monetary policy of disinflation, are responsible in large measure for the positive gradient that the US Phillips curve displays in these years. By contrast, in most of the rest of the developed world, benefit payments per recipient appear to have fallen, if at all, by much less, while monetary policies have been broadly similar.

The tightening tourniquet on US transfer payments may well have prompted much of the drop in its unemployment. With leisure a normal good, potential transfer beneficiaries who have suffered from this will have reacted, as a group, by increasing their desired labour force participation. The flexibility of US labour markets has, given time, led to a fall in unskilled wage rates to accommodate this. But this is not to argue that US policy is justifiable on more general, welfare criteria; nor to suggest that the EU countries should necessarily aim to copy it. The marked rise in the disparity of US after-tax incomes and earnings that has followed upon the fiscal changes may strike some observers as purchasing greater economic efficiency (of which reduced unemployment is an instance) at an excessive cost in increased inequality and injustice.

The analytical point to stress is, however, a simpler one. Models of the kind just explored reveal that the vertical (long-run) Phillips Curve is, in general, a *theoretical impossibility*. Altering the rate of inflation implies alterations in seignorage, labour supply and labour force participation, as well as alterations in tax/benefit parameters to keep the budget in balance. There is no reason whatever to expect that the net impact of all these changes, either on output or rates of unemployment, disappears.

3.3. An Explanation in Terms of Labour Market Menu Costs

The third possible explanation for the reappearance of a clear, negative inflation-unemployment link relates to menu costs (the fixed costs of nominal price changes).

The basic idea is this. A firm cannot adjust to its nominal selling prices continuously, if menu costs are present. It alters its prices at discrete intervals, by sizable steps. Faster inflation makes the intervals somewhat shorter, but the step jumps get bigger.

Suppose the firm has monopoly power, cannot price-discriminate and aims to maximize profits. In an inflation-free, perfectly certain and unchanging environment, it will set its price equal to marginal cost, marked up by the familiar margin (the gap between price and marginal cost, expressed as a proportion of price, equals the reciprocal of the elasticity of demand for its product).

Now retain the certainty and absence of shocks, but introduce a steady upward trend in all other prices (including its marginal cost). The real price of its product will drift down in the interval between nominal price revisions. For nearly all the time, it will be constrained to deviate from the "ideal" real price it would have fixed in the absence of menu costs. Interestingly, its average real price will have to fall. This means that its average levels of production and employment will rise.

Diamond (1993) is to be credited with establishing these last, important results - and with their intriguing implications for welfare, namely that there is typically a positive optimal level of inflation.[†] The welfare gain from bringing prices closer to marginal costs has to be set against the cost of a distortionary tax on money balances, but the net gain is generally maximized, given imperfect competition and menu costs, with a positive rate of inflation.

One difficulty with the story is that the fixed costs of altering product prices may be very small for a large firm enjoying high levels of production. Menu costs appear to be much more serious, by contrast, in the market for labour. Negotiations over wage increases between employer and employee are risky. Bargaining could lead to strikes or lockouts. Each side will seek to protect a reputation for toughness, which is likely to result in the occasional calling of bluffs. Disrupting employment and production is very costly for both sides; the process of bargaining itself consumes inputs, even when it operates smoothly; each party will see the advantage of limiting the frequency with which new deals have to be struck.

[†] see also Benabou and Konieczny (1994)

But it is nominal wage rates and earnings that are revised on such occasions. The faster the general rate of inflation, the more frequently nominal wage rates will have to be renegotiated. A key question now arises: do labour-market menu costs imply that the *average* levels of employment increases in the rate of inflation? In other words, does the analogy with Diamond's results on product-market menu costs actually apply?

In what follows, we construct a simple example of efficient bargaining over employment and wages for a firm in product market monopoly, in order to throw light on this question. Its maximand is the Nash Cooperative product of real profit and workers' utilities. The firm is a monopolist in its single product market. The demand for that product is isoelastic. The worker's utility is his real wage, if employed, and an exogenous, constant real benefit, b. if not. There are M potential workers who participate in the bargain; N(t) of them will be working at time t.

To keep matters simple, there is no discounting, and labour is the only factor of production, with constant returns to scale. Labour's average product is constant at 1. The entire environment is deterministic. All other nominal prices advance at an average rate of π. The firm is presumed to synchronize its nominal adjustments for the nominal wage and its nominal product price. The frequency of these adjustments is endogenous, chosen to maximize the average value of the profit-workers' utility product, net of the wage-menu-costs that the coalition faces. There are no inventories: employment leads to instantaneous sale of product. There are no taxes.

As to further notation, let p(t) and w(t) stand for the real values of the product price and the wage at date t, and c be the real fixed cost of a nominal wage adjustment. The interval between adjustments is τ, while ε (defined as positive) is the price-elasticity of product demand, and α the level of demand (and hence employment, N) if p(t) =1. The logs of p(t) and w(t) have a negative drift of πt, and p(t) and w(t) are raised to p_0 and w_0 at each adjustment. The mean values of p, w and N are denoted by overbars.

Nash-cooperation implies setting p_0, w_0 and τ to maximize

$$\phi = -\frac{c}{\tau} + \frac{a^2 p_0^{-2\varepsilon}}{\tau}(P_0 - W_0)\int_o^\tau \left(w_o e^{\eta_1 t} + z e^{\eta_2 t} - b e^{\eta_3 t}\right)dt \tag{12}$$

where $\eta_1 \equiv 2\pi(\varepsilon - 1) \equiv 2\eta_2 \equiv \eta_3 \equiv \pi$, and $z \equiv bMP_o^{\varepsilon} / \alpha$. The first term on the RHS of (1) is the average value of menu costs, while the second is the product of real profits

$(N(t))(P(t) - w(t)) = \alpha P_o^{-\varepsilon} e\eta^{2t}(P_o - W_o)$) and real total utilities for the firm's M potential workers $(w(t)N(t) + b(M - N(t)))$. The integrand reduces to $w_oH_1 + zH_2 - bH_3$, where $H_i = \frac{1}{\eta_i}\left[e^{\eta_i \tau} - 1\right]$.

The first order conditions for the problem are:

$$O = \frac{\partial\phi}{\partial w_0} = F\left[H_1(P_o - 2W_o) - zH_2 + bH_3\right] \tag{13}$$

$$O = \frac{\partial\phi}{\partial P_o} = F\left[(W_oH_1 + zH_2 - bH_3)\left\{\frac{-2\varepsilon}{P_o}(P_o - W_o)\right\} + 1 + \frac{\varepsilon z}{P_o}(P_o - W_o)H_2\right] \tag{14}$$

$$O = \frac{\partial\phi}{\partial\tau} - \frac{\phi}{\tau} + F(P_o - W_o)\left[W_oe^{\eta_1\tau} + ze^{\eta_1\tau} - be^{\eta_1\tau}\right] \tag{15}$$

where $F \equiv \left[\alpha P_o^{-\varepsilon}\right]^2 / \tau$

The first two of those three conditions yield a solution for the post-adjustment real price:

$$P_o = \frac{b}{1 - \frac{1}{\varepsilon}} \frac{H_3}{H_1} \tag{16}$$

The post-adjustment real wage, W_o, is given by

$$W_o = \frac{b}{H_1}\left[\frac{\varepsilon - \frac{1}{2}}{\varepsilon - 1}H_3 - \frac{zH_2}{2}\right] \tag{17}$$

Both (16) and (17) give P_o and W_0 in terms of the choice parameter τ. Substitution of (16) and (17) into (15) yields an implicit solution for τ:

$$C = \frac{1}{H_1}\left(\frac{bG}{2}\right)^2\left[\frac{1}{\varepsilon} - J / G\right] \tag{18}$$

where $G = M\left(H_2 + \frac{H_3}{z(\varepsilon - 1)}\right)$ and use of the approximation

$H_i\eta_i = e^{\eta_i\tau} - 1 \sim \eta_i\,\tau\left(1 + \frac{\eta_i\tau}{4}\right)$ implies

$$J \sim \frac{(\pi\tau)^2 M\left[(\varepsilon - 1)^2 + \frac{2\varepsilon - 1}{z}\right]}{2 + \pi\tau(\varepsilon - 1)}$$

Implicit differentiation of (18) yields the marginal effect of inflation on the optimum wage and price adjustment interval

$$\frac{\partial\tau}{\partial\pi} = -\frac{(\partial c/c)/\partial\pi}{(\partial c/c)/\partial\tau} = -\frac{\tau\theta}{1 + \pi\theta} \tag{19}$$

where $\theta \sim \frac{\varepsilon\tau/2}{1 + M/N_o}$ for low $\pi\tau$. The magnitude of the proportional wage/price adjustments increases with the inflation rate π, since

$$\frac{\partial[\pi\tau]}{\partial\pi} = \frac{\tau}{1 + \pi\theta} \tag{20}$$

Our main interest is in how inflation affects the *mean* price, $\overline{p}$. Now $\overline{p}$ is given by

$$\overline{p} = \frac{p_o}{\tau}\int_o^\tau e^{-\pi\tau} dt = \frac{p_o e^{-\pi\tau}}{\pi\tau}\left(e^{\pi\tau} - 1\right) \tag{21}$$

Use of the earlier quadratic approximation on $e^{\eta_i\tau}\left(\sim\left(1 + \frac{\eta_i\tau}{2}\right)^2\right)$, together with (J), allows us to express $\overline{p}$ by

$$\overline{p} \sim \frac{b}{1 - \frac{1}{\varepsilon}} \frac{(H_3/H_1)(1 + \pi\tau/4)}{(1 + \pi\tau/2)^2} \tag{22}$$

The RHS of (22) is only very slightly less than $\frac{b}{1 - \frac{1}{\varepsilon}}\left(\frac{1 + \pi\tau/4}{1 + \pi\tau/2}\right)^2$ *which is unambiguously decreasing in* $\pi\tau$. We may therefore conclude that faster inflation, since it must raise $\pi\tau$ from (9), must lower the average price charged. If $\bar{p}$ falls as π rises, the mean level of employment, N, must go up.

These results have been identified only by way of an example, and with the use of approximations that require $\pi\tau$ to be modest. The setting is partial equilibrium, non-stochastic, and dependent on specific functional forms. Yet reflection suggests that our findings may well extend to more general cases. The assumption of demand isoelasticity extends, for example, to small general equilibrium models of imperfect competition, such as the Dixit-Stiglitz (1977) model of monopolistic competition, with Bertrand pricing, symmetry, and a fixed number of firms. The introduction of (very minor) shocks would not greatly disturb the time-patterns of real wages and prices, driven predominantly by the general rate of inflation - nor would it seriously undermine the feature of temporary nominal inertia in each wage and price amid continuous increases in aggregate indices.

Furthermore, the story could be extended from a partial setting to a general one, for example by making preferences quasi-linear (with utility concave in consumption levels of various goods, and linear in leisure as in the previous section). Labour would now be infinitely elastic at a given real wage rate, and monopolies would always underemploy and underproduce.

If our prime concern is with reducing unemployment, however, the conclusion that lower inflation aggravates that problem must not blind us to the existence of other possible policies in this regard. One could be to constrain monopoly mark-ups directly, by regulation or trade liberalization measures, for example, or by more vigorous "market-testing" in the sphere of public procurement and government spending. Another might be lower unemployment benefits, if this is the interpretation to be placed on the parameter b. A reduction in the opportunity cost of labour leads to a multiplied reduction in the monopolist's product price, in the context of our Nash Cooperative, efficient-bargaining model. A third could be some combination of specific employment subsidy and a valorem tax on the product or the wage, of the kind used by Artis and Sinclair (1996).

In sum, to establish that inflation reductions may make unemployment slightly worse is not to deny that there may be other policy combinations that could lead to lower unemployment and possibly lower inflation too. Inflation induces numerous costs, and it is unlikely to display comparative advantage as an unemployment-cutter.

By way of postscript, it must be confessed that the models presented in both 3.2 and the present subsection make labour the only factor of production. There is no role for capital in either. The real interest rate is set to zero in both. The omission of the real interest rate is of course a simplification, and one we hope the reader will forgive.

In the context of a swift worldwide trend to higher unemployment, to which the US, and to a lesser extent, the UK are rare exceptions, it is worth stressing that the sharp increase in real interest rates may have played an important role. For given, constant-returns technology and a given, two-factor unit cost function, a rise in the real reward to the factor capital must depress the equilibrium real reward to the other factor. If market imperfections, tax-benefit systems and legal arrangements prevent real wages from slipping, higher real interest rates are likely to depress the demand for labour. This point emerges with equal force if time has to elapse before the product of labour is sold: profit-maximization will then associate the real wage with the *discounted* value of labour's marginal revenue product. The higher the discount rate, the lower the demand for labour, and, if real wage rates are frozen, unemployment is likely to emerge. The significance of this point is underscored by the sharp increase in ex-ante real interest rates after 1983 to which the UK indexed bond yields illustrated in Fig 1 bear witness.

What caused ex-ante real interest rates to rise in the 1980's, and stay up in the 1990's, is an open question that space prevents us from considering in depth. President Reagan's fiscal policies, and the end of the Cold War revealing a large, previously suppressed hunger for capital in formerly Communist countries, are obvious possible culprits. So, too, is disinflation. When growth is endogenous, a decline in inflation is likely to increase real interest rates through a variety of mechanisms and in a wide class of models. Real interest rates could, therefore, provide an important link between falling inflation and rising unemployment, and help to tell us why the traditional Phillips Curve has apparently revived in so many countries.

4. Conclusion

We have found that the US short-run Phillips curve has sloped upwards since 1983. In the U.K., wage inflation has been independent of the level of unemployment, although it does respond significantly to its rate of change. Elsewhere, in a wide range of OECD countries, the traditional downward slope of the Phillips curve is well attested. For these other countries, it is usually some three times steeper in the long run than the short, but even in the long run it is apparently not vertical.

The rebirth of the negatively sloped Phillips curve may have a variety of causes. One possibility is that core inflation expectations have steadied somewhat. We find evidence in support of this. A second is that labour market menu costs should make monopolists' average employment levels an increasing function of the level of inflation. So the disinflation that has characterized the years since 1983 may have cut jobs in such sectors. We have also argued that, when inflation reductions are accompanied by higher income taxes as opposed to lower transfer payments, theory should lead us to expect higher unemployment. In the U.S., disinflation happens to have been accompanied by steep cuts in transfer payments, which should serve to lower unemployment. In most other countries, this did not happen, so higher tax/benefit-induced unemployment comes as no surprise. The theoretical model we set up to explore these ideas implies that conventional belief in a vertical long-run Phillips curve is quite baseless. We have also mentioned an important role for real interest rates. This paper has not attempted an adjudication between these arguments. We believe that each probably has something to contribute to the explanation of our findings.

References

Artis, M.J. and P. Sinclair (1996) "Labour Subsidies: a New Look", *Metroeconomica*

Bean, C.R. (1994) "European Unemployment: a Survey", *Journal of Economic Literature.*

Benabou, R. and J.D.Konieczny (1994) "On Inflation and Output with Costly Price Changes: a Simple Unifying Result", *American Economic Review.*

Brown, A.J. (1955) *The Great Inflation 1939-51*, Oxford University Press.

Champernowne, D.G. (1936) "Unemployment, Basic and Monetary: The Classical Analysis and the Keynesian", *Review of Economic Studies.*

Diamond, P.A. (1993) "Search, Sticky Prices and Inflation", *Review of Economic Studies.*

Dixit, A.K. and J.E. Stiglitz (1977) "Monopolistic Competition and Optimum Product Diversity", *American Economic Review.*

Friedman, M. (1968) "The Role of Monetary Policy", *American Economic Review.*

Lucas, R.E. (1972) "Expectations and the Neutrality of Money", *Journal of Economic Theory.*

Lucas, R.E. (1973) "Some International Evidence on Output Inflation Tradeoffs", *American Economic Review.*

Mirrlees, J.A. (1971) "An Exploration in the Theory of Optimal Income Tax," *Review of Economic Studies.*

Phelps, E. (1967) "Phillips Curves, Expectations of Inflation and Optimal Unemployment over Time", *Economica.*

Phillips, A.W. (1958) "The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the U.K.: 1861-1957", *Economica.*

Sinclair, P. (1996) Does Faster Inflation Raise or Lower the Rate of Growth? University of Birmingham, mimeo.

Tinbergen, J. (1951) "An Economic Policy for 1936" in J. Tinbergen, *Business Cycles in the United Kingdom, 1870-1914*, North Holland.

Table 1

Phillips' original specification: $\ln(\Delta_4 \ln W + 0.9) = \alpha + \beta \ln U$

Country	α	β	SEE	DW
Canada	-0.0065647	-0.026884	0.0157757	0.467
	(-0.199)	(-1.859)		
United States	-0.10754	0.018048	0.00819363	0.695
	(-8.450)	(2.649)		
Japan	-0.030828	-0.043666	0.0197602	0.823
	(-1.682)	(-2.263)		
Australia	0.094610	-0.072649	0.0217002	0.542
	(2.525)	(-4.169)		
Belgium	-0.051555	-0.0079337	0.0193856	0.321
	(-1.715)	(-0.614)		
Finland	0.017699	-0.025700	0.0412914	0.505
	(0.916)	(-2.889)		
France	0.34093	-0.17186	0.0163631	0.103
	(7.507)	(-8.810)		
Norway	0.056074	-0.070585	0.0236609	0.988
	(4.915)	(-8.728)		
Spain	0.20116	-0.074045	0.0394743	1.14
	(1.662)	(-1.819)		
Sweden	-0.0077809	-0.023128	0.0156721	0.503
	(-1.732)	(-6.892)		
United Kingdom	-0.032839	0.0017738	0.0182393	0.132
	(-1.333)	(0.165)		
Denmark	0.11163	-0.072107	0.0169272	0.793
	(3.581)	(-5.303)		
West Germany	0.056283	-0.057931	0.00841746	1.29
	(3.625)	(-7.496)		
Ireland	0.67572	-0.24736	0.0169304	0.580
	(6.636)	(-7.024)		
Italy	0.74693	-0.29365	0.0268745	0.501
	(6.091)	(-6.334)		
Netherlands	0.037265	-0.047613	0.0105181	0.544
	(2.028)	(-6.278)		

Table 2

Simple logarithmic specification: $\Delta_4 \ln W = \alpha + \beta \ln U$

Country	α	β	SEE	DW
Canada	0.091808 (2.980)	-0.025130 (-1.858)	0.0147546	0.474
United States	-0.0025908 (-0.220)	0.016840 (2.668)	0.00759075	0.696
Japan	0.069206 (4.078)	-0.040816 (-2.284)	0.0182965	0.823
Australia	0.18670 (5.256)	-0.067973 (-4.114)	0.0205753	0.552
Belgium	0.049456 (1.767)	-0.0072654 (-0.604)	0.0180467	0.319
Finland	0.11860 (6.340)	-0.025387 (-2.948)	0.0399804	0.508
France	0.42592 (9.680)	-0.16455 (-8.707)	0.0158523	0.105
Norway	0.15505 (13.775)	-0.068781 (-8.620)	0.0233436	0.975
Spain	0.30054 (2.410)	-0.073507 (-1.753)	0.0406727	1.14
Sweden	0.092067 (21.210)	-0.022298 (-6.877)	0.0151418	0.503
United Kingdom	0.068031 (2.860)	0.0016402 (0.158)	0.0176102	0.134
Denmark	0.20550 (6.896)	-0.068720 (-5.286)	0.0161821	0.781
West Germany	0.15176 (10.397)	-0.054761 (-7.538)	0.00791271	1.29
Ireland	0.75944 (7.699)	-0.24137 (-7.075)	0.0164013	0.591
Italy	0.84353 (6.944)	-0.29196 (-6.358)	0.02662	0.490
Netherlands	0.13191 (7.761)	-0.044139 (-6.293)	0.0097276	0.539

Table 3

Simple dynamic specification: $\Delta_4 lnW_t = \alpha_0 + \alpha_1 \Delta_4 lnW_{t-1} + \beta lnU_t$

Country	α_0	α_1	β	LR effect	SEE	DW
Canada	0.059289	0.68841	-0.021713	-0.06969	0.00869703	1.64
	(3.011)	(8.533)	(-2.601)			
United States	0.010863	0.68018	-0.0010014	-0.00313	0.00581152	2.11
	(1.102)	(6.117)	(-0.172)			
Japan	0.028609	0.56288	-0.016596	-0.03797	0.0153146	2.29
	(1.730)	(4.787)	(-1.050)			
Australia	0.085484	0.63340	-0.033511	-0.09141	0.0135868	1.97
	(3.019)	(7.004)	(-2.723)			
Belgium	0.023879	0.80112	-0.0079129	-0.03979	0.00968907	2.29
	(1.511)	(10.686)	(-1.191)			
Finland	0.024961	0.74709	-0.0042691	-0.01688	0.0280055	2.08
	(1.373)	(7.482)	(-0.640)			
France	0.075202	0.80171	-0.029328	-0.1479	0.00452461	2.15
	(3.924)	(22.952)	(-3.780)			
Norway	0.070463	0.53802	-0.031709	-0.06864	0.019062	2.06
	(3.504)	(4.676)	(-3.094)			
Spain	0.19146	0.42310	-0.048757	-0.08452	0.0373233	2.08
	(1.607)	(3.329)	(-1.240)			
Sweden	0.021974	0.74492	-0.0048603	-0.01905	0.0102045	1.75
	(2.257)	(7.498)	(-1.522)			
United Kingdom	0.0073060	0.95508	-0.0021219	-0.04724	0.00644378	2.43
	(0.771)	(18.138)	(-0.549)			
Denmark	0.097118	0.59539	-0.034472	-0.0852	0.0111661	1.85
	(3.311)	(5.648)	(-3.041)			
West Germany	0.074755	0.50894	-0.026928	-0.05484	0.00682253	2.42
	(3.804)	(4.340)	(-3.420)			
Ireland	0.13965	0.72382	-0.043156	-0.15626	0.00974813	2.08
	(1.561)	(8.418)	(-1.457)			
Italy	0.13244	0.79177	-0.045402	-0.21804	0.0141511	1.56
	(1.434)	(10.253)	(-1.357)			
Netherlands	0.062508	0.63007	-0.022171	-0.05993	0.00614764	1.78
	(4.124)	(7.263)	(-3.902)			

Table 4

Test for vertical Phillips curve

Country	
Canada	-1.858
United States	2.668
Japan	-2.284
Australia	-4.114
Belgium	-0.604
Finland	-2.948
France	-8.707
Norway	-8.620
Spain	-1.753
Sweden	-6.877
United Kingdom	0.8752
Denmark	-5.286
West Germany	-7.538
Ireland	-6.862
Italy	-5.745
Netherlands	-6.293

Table 5

Inflation adjusted specification: $\Delta_4 \ln W = \alpha + \beta \ln U + \gamma (R\text{-}RRuk)$

Country	α	β	γ	SEE	DW
Canada	0.062844 (2.388)	-0.029886 (-2.654)	0.0063888 (4.912)	0.0122451	0.652
United States	0.0049585 (0.444)	0.0071266 (1.098)	0.0021494 (3.677)	0.00683132	0.860
Belgium	0.10309 (7.699)	-0.058297 (-8.799)	0.012281 (13.801)	0.00827653	1.37
*	0.054030 (3.853)	-0.049564 (-7.175)	0.010501 (12.501)	0.00903892	1.06
France	0.071549 (1.712)	-0.037269 (-2.311)	0.010286 (9.990)	0.00893709	0.513
United Kingdom	0.00053470 (0.032)	-0.0089709 (-1.398)	0.015692 (9.220)	0.0105769	0.793
Germany	0.10578 (8.055)	-0.00779 (-6.249)	-0.0011067 (-0.740)	0.00831954	1.36
Ireland	0.13354 (3.863)	-0.0060032 (-3.546)	0.0053877 (5.590)	0.0111123	1.15
Netherlands	-0.065696 (6.577)	-0.0041156 (-6.546)	0.0016062 (1.058)	0.00926365	0.642

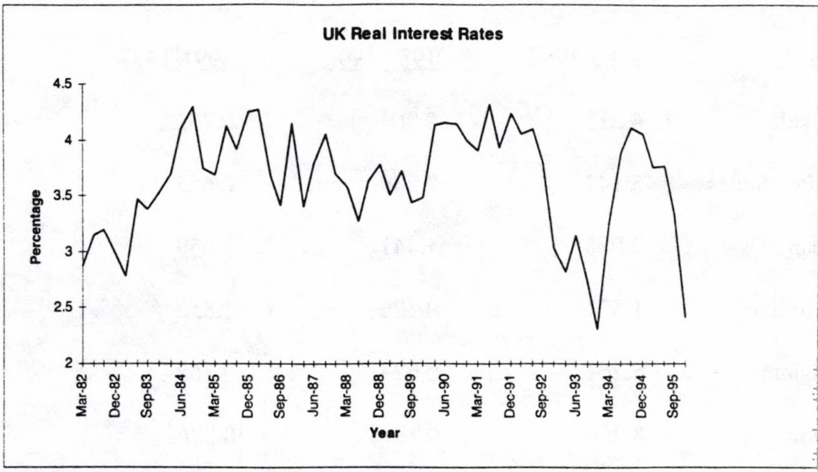
* denotes Belgium, with specification $\Delta_4 \ln W = \alpha + \beta \ln U + \gamma R$

Table 6

Variance of expected inflation

Country	1983-1986	1987-1990	1991-1995
Canada	4.213	0.203	0.733
United States	5.142	0.289	0.655
Japan	2.086	1.441	2.659
Australia	1.421	0.506	1.850
Belgium	5.261	0.673	0.868
France	8.200	0.197	0.376
United Kingdom	2.528	0.342	0.673
Denmark	7.253	0.668	1.142
West Germany	1.306	1.209	0.485
Ireland	3.452	1.007	0.434
Italy	12.317	0.525	1.234
Netherlands	1.518	0.892	0.268

Figure 1


UK Real Interest Rates
4.5
4
3.5
3
2.5
2
Percentage
Mar-82
Dec-82
Sep-83
Jun-84
Mar-85
Dec-85
Sep-86
Jun-87
Mar-88
Dec-88
Sep-89
Jun-90
Mar-91
Dec-91
Sep-92
Jun-93
Mar-94
Dec-94
Sep-95
Year

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