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UNEMPLOYMENT, LABOUR-MARKET REFORM AND MONETARY UNION

by

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Monetary union, such as the EMU, may affect the incentives for labour-market reform and thus equilibrium unemployment through several mechanisms. If there exists an inflation bias, there tends to be a stronger incentive to reduce equilibrium unemployment through national reform outside than inside the EMU. Absent such a bias, EMU membership could lead to more reform. One reason is that reform may increase wage flexibility, which can be a substitute for monetary policy in the EMU. Another reason could be a precautionary motive for low equilibrium unemployment to reduce the utility cost of increased macroeconomic variability in the EMU.

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For nearly two decades Western Europe has been plagued by high unemployment. Against this background it is natural that one of the key concerns in the discussion on the Economic and Monetary Union (EMU) in Europe is how unemployment will be affected. The aim of this paper is to help bring more structure to this discussion.

The conventional wisdom is that asymmetric shocks in a monetary union may lead to cyclical unemployment, because real exchange-rate changes become more difficult to achieve when there are no nominal exchange rates that can vary. This is not the main focus here. Instead, I concentrate on the relationship between monetary union and structural (equilibrium) unemployment.

The motivation for my focus is the consensus that European unemployment is not mainly cyclical, but reflects important structural rigidities. This has lead to the conclusion that labour-market reforms are required (OECD, 1994; Alogoskoufis et al, 1995; Lindbeck, 1996; Calmfors et al., 1998; Modigliani et al., 1998). Many measures have been proposed: less generous unemployment insurance, less stringent employment-protection legislation; less of minimum-wage regulations; changes in the legal framework for wage bargaining with the aim of increasing the bargaining strength of employers vis-à-vis unions; a larger scope for individual wage contracts as opposed to collective agreements; and more effective active labour-market programmes in order to increase competition for jobs. I analyse the *political-economy* question of how the incentive for such reform may be affected by monetary union. As the EU treaty does not provide for a common employment policy, my starting point is that labour-market institutions continue to be determined nationally, even though monetary policy has been centralised (Calmfors, 1998).

A common argument in policy circles is that the EMU will strengthen the incentive for labour-market reform (e.g. Bean, 1998a). The presumption is that the adjustments needed to reduce unemployment in a country will not be accepted until the escape route of depreciating the country's own currency is definitely closed. The main conclusion here is that this intuition is only partly correct, and that incentives for reform could very well be stronger outside than inside the EMU.

The outline is as follows. Section 1 gives an analytical background. The following sections identify several possible mechanisms. The main conclusion is that to the extent that countries would suffer from an inflation bias outside the EMU, then EMU membership tends to weaken the incentive for labour-market reform. But if there is no such inflation bias, the incentive for reform is stronger inside than outside the EMU.

Section 2 sets out a baseline model, which builds on the Barro-Gordon (1983a, b) analysis of inflation. The main argument is the following. If a country outside the EMU chooses a more sclerotic labour-market policy, it faces the direct cost of a higher equilibrium rate of unemployment. But if the central bank uses monetary policy to fight all forms of unemployment so that there is an inflation bias, there is also an indirect cost, because higher equilibrium unemployment creates a stronger temptation to inflate. Outside the EMU there are thus two costs of a sclerotic labour-market policy: higher unemployment and higher inflation. If the country is inside the monetary union, the second effect is absent. Inflation is set by the European Central Bank, ECB, and does not respond to unemployment in a single country. So the country faces a lower marginal cost of sclerotic labour-market policy and will thus choose less of labour-market reform inside than outside the EMU.

Sections 3 and 4 extend the baseline module by analysing possible links between cyclical variability and reform. Section 3 assumes that reform affects not only equilibrium unemployment, but also money-wage flexibility, and hence the *sensitivity* of the economy to shocks. This adds two effects to the inflation bias-effect analysed in Section 2. On one hand, the loss of domestic monetary policy as a means to offset asymmetric shocks in a monetary union strengthens the incentive for labour-market reform in order to increase money-wage flexibility. But on the other hand, there is an additional inflation-bias effect working in the opposite direction. The reason is that the temptation to inflate depends positively on how effective surprise inflation is as a means to reduce unemployment. Because unexpected inflation reduces unemployment more the less flexible money wages are, there is thus an incentive for national labour-market reform outside the EMU also in order to increase money-wage flexibility: this, too, helps reduce the inflation bias. This incentive is absent in the EMU, because the monetary policy of the ECB in unaffected by conditions in a single country. It follows that the effect of the EMU on national labour-market reform is ambiguous

under these assumptions. However, if there exists no inflation bias, the money-wage-flexibility motive leads to unambiguously more reform inside the EMU than outside.

Section 4 analyses another mechanism through which cyclical variability might affect equilibrium unemployment. The assumption here is that the utility cost of variations in unemployment and inflation are higher, the higher the average (equilibrium) rates of unemployment and inflation around which these variations take place. This introduces a *precautionary motive* for labour-market reform in much the same way as income uncertainty may give rise to precautionary savings. If there is no inflation bias, this mechanism provides a stronger incentive for reform inside than outside a monetary union: the optimal response to the increase in employment variability when asymmetric shocks can no longer be stabilised through monetary policy in the EMU is to reduce equilibrium unemployment. If there is an inflation bias, the effect of the EMU turns out again to be ambiguous: then there also exists a precautionary motive for national reform outside the EMU because lower equilibrium unemployment reduces average inflation and hence the utility costs of variations in inflation. Inside the EMU, this motive is absent because the common rate of inflation does not respond to unemployment in an individual member country.

Section 5 discusses the relevance of the main assumptions and suggests future areas for research.

1. Starting points for the analysis

Although there has been little research on the effects of monetary union on labour-market institutions, there exist two strands of literature that form relevant starting points.

The first literature deals with the time-inconsistency problem of monetary policy. Following Kydland and Prescott (1977), and Barro and Gordon (1983a,b), this research analyses the temptation to inflate that may exist in a discretionary policy setting. An inflation bias arises when policy-makers try to achieve an employment goal in excess of the equilibrium rate. An

important limitation of this literature is that it does not address the question of how equilibrium unemployment is determined.

The determination of equilibrium unemployment is, however, the topic of some recent political-economy research. The key hypothesis is that labour-market rigidities are the outcome of rational choices by the political majority. It may be in the interest of labour to design labour-market institutions in such a way that wages can be raised at the expense of profits, even though this leads to unemployment (Saint-Paul 1996; DiTella and MacCulloch, 1996; Fredriksson 1997). Moreover, the interests of employed insiders and unemployed outsiders are likely to diverge (Saint-Paul 1993, 1995). The former group, which constitutes the political majority, may design labour-market institutions mainly with the aim of achieving high real wages for itself also when this hurts the employment prospects of outsiders. So labour-market reform to reduce unemployment may not be politically viable, because it would reduce the welfare of the employed majority.

The political-economy literature has usually not dealt with the relationship between demand-management policies and labour-market rigidities. The models are real models, where monetary policy and inflation play no role.

To analyse the links between monetary union and equilibrium unemployment, it is natural to combine these two strands of literature. Attempts at this have been made by Sibert and Sutherland (1998), Calmfors (1997) and Hefeker (1998). A similar analysis is developed in Section 2. One important difference between my analysis in this section and the other work is that I develop a clearer notion of labour-market reform. This is helpful both for understanding the political incentives and for analysing the relationship between equilibrium unemployment and the sensitivity of the economy to shocks in later sections.

2. A baseline model

A baseline model is obtained by extending the Barro-Gordon model of inflation. As in this model I assume a “surprise unemployment” equation for the representative economy:

$$u = u^* - b(p - p^e) + e, \qquad (1)$$

where u = the actual unemployment rate, u^* = the equilibrium unemployment rate, p = actual inflation, p^e = expected inflation, b = the responsiveness of unemployment to unanticipated inflation (defined positive as all parameters below), and e = an economy-wide stochastic shock. The unemployment equation can be thought of as the outcome of money-wage contracts that are concluded on the basis of price expectations before shocks have been realised and monetary policy (inflation) decided. Unanticipated inflation thus reduces unemployment by reducing the actual real wage.

The stochastic shock can be decomposed into two parts: an asymmetric shock, v, which is specific to the country in question, and a symmetric shock, m, which is common to all the potential members of the monetary union, so that

$$e = v + m. \qquad (2)$$

v and m are independent, symmetrically distributed, and have zero means.

Equilibrium unemployment in a representative country depends negatively on the amount of structural reform, so that

$$u^* = \tilde{u} - ds, \qquad (3)$$

where $0 \leq s \leq 1$ is an index of the amount of labour-market reform, d is the responsiveness of equilibrium unemployment to reform and $\tilde{u}$ is equilibrium unemployment in the absence of reform (s = 0).

Although labour-market reform could concern many areas, as discussed in the introduction, it is here captured by a composite variable. This could be rationalised by viewing reforms as measures that reduce the real wage and therefore move the economy along an aggregate labour-demand curve. A more specific interpretation is to assume that there are two types of sectors in the representative economy: those that are subject to labour-market regulations and those that are unregulated. Reform could then be viewed as an increase in the fraction of unregulated sectors. More precisely, the assumptions would be that wage setters aim for a

higher real wage (resulting in higher sectoral unemployment) in regulated sectors than in unregulated sectors, and that wages are set in order to reach the unemployment rates $\tilde{u}$ in regulated sectors and $\tilde{u} - d$ in unregulated sectors. If s denotes the fraction of unregulated sectors, then (3) follows. This is explained in greater detail in the Appendix.

The government in a representative country cares about inflation and unemployment, but also about labour-market institutions (the amount of reform) according to the following loss function:

$$L = \frac{1}{2}p^2 + \frac{l}{2}u^2 + gs, \qquad (4)$$

where in addition to earlier symbols L = the disutility of the government, and λ and g indicate the relative weights attached to unemployment and reform, respectively. As is conventional in the monetary policy literature, the deviations of inflation and unemployment from their goals are entered in quadratic form. To simplify, s is entered linearly (but could just as well have been entered in quadratic form). A plausible reason why the government would attach a cost to reform is that it reduces the aggregate real wage (see the Appendix). A complementary explanation might be that employees value labour-market institutions in themselves, for instance unemployment compensation (because it offers insurance) or employment protection legislation (because it limits the exposure of employees to shocks).[1]

I assume that the same goods are produced in all countries. Determining inflation is an individual country outside the monetary union in thus equivalent to determining the path of the exchange rate.

2.1. Labour-market reform outside the EMU

[1] The separability assumption in (4) could be discussed. For instance, it could be argued that the marginal disutility of lowering unemployment benefits should depend upon the amount of unemployment. On one hand, with higher unemployment, policy makers might consider lower incomes for the unemployed to have higher marginal disutility. On the other hand, the marginal disutility of reducing unemployment benefits could be considered lower in this situation, because the tax costs of the employed then fall by more (Wright, 1986; Saint-Paul, 1996). I disregard such complications.

I study a one-shot game where both labour-market institutions and monetary policy are determined. I first look at a country that does not participate in the EMU. The government is assumed to decide on labour-market institutions. Monetary policy is delegated to a central bank, which acts in a discretionary way. The bank has the same loss function as the government.[2] I assume the following sequence of decisions: (1) labour-market institutions are determined; (2) expectations are formed and money wages are set; (3) shocks occur; and (4) monetary policy is decided.

The model is solved through backward induction. Given the amount of reform (and thus equilibrium unemployment), inflationary expectations and the realised shock, the central bank chooses inflation so as to minimise the loss function (4) subject to (3). With rational expectations, the well-known outcome is[3]

$$p = b\,\lambda u^{*} + \frac{b\,\lambda}{1+b^{2}\lambda}e. \qquad (5)$$

The central bank stabilises the economy by adjusting inflation so that unemployment shocks are partly offset (the second term). But there is also inflation on average (the first term). The reason is that the central bank has an incentive to reduce unemployment by creating unanticipated inflation. In a rational-expectations equilibrium, the bank chooses the inflation rate so that the marginal gain from lower unemployment is exactly balanced by the marginal loss of higher inflation. The inflation bias is increasing in: (1) equilibrium unemployment, u^{*}, because higher equilibrium unemployment means a larger marginal gain of unemployment reductions through unanticipated inflation; (2) the responsiveness of unemployment to unanticipated inflation, b, because a higher responsiveness means that a given unemployment reduction can be achieved at a lower cost in terms of unanticipated inflation; and (3) the unemployment-aversion parameter, λ, because a higher aversion to unemployment means that a given unemployment reduction is valued more highly.

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[2] An alternative assumption would have been that the central bank is more conservative in the Rogoff (1985) sense, i.e. that it has a lower unemployment aversion parameter. This would not change the qualitative conclusions. Note also that because of the separability assumption, I could just as well assume that the amount of reform does not enter the central bank´s loss function.

When deciding on labour-market institutions, the government takes the dependence of inflation on equilibrium unemployment into account. Thus, s is chosen so as to minimise the expectation of (4) subject to (1), (3) and (5). The optimisation gives

$$\frac{\partial E[L_n]}{\partial s} = -d\lambda u^* - db^2\lambda^2 u^* + \gamma = 0, \qquad (6)$$

where the n index denotes non-participation in the monetary union. The amount of labour-market reform is such that the marginal gain balances the marginal loss. The marginal gain arises for two reasons. Reform lowers equilibrium unemployment and hence expected unemployment (the first term). Reform also lowers expected inflation, because lower equilibrium unemployment reduces the inflation bias (the second term). The marginal loss arises from the direct utility cost of reform itself (the third term).

Solving (6) for equilibrium unemployment, I obtain

$$u_n^* = \tilde{u} - ds_n = \frac{\gamma}{d\lambda(1+b^2\lambda)}. \qquad (7)$$

Equilibrium unemployment depends positively on the aversion to reform, γ, because a stronger aversion increases the marginal disutility from reform. Equilibrium unemployment depends negatively on: (1) the responsiveness of unemployment to reform, d, because a higher responsiveness means that a given amount of reform results in lower unemployment; (2) the aversion to unemployment, λ, because a higher aversion means a larger utility gain from a given reduction of equilibrium unemployment; and (3) the responsiveness of unemployment to unanticipated inflation, b, because a higher responsiveness means that a given reduction of equilibrium unemployment leads to a larger reduction of the inflation bias.

2.2 Labour-market reform inside the EMU

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[3] See e.g. Barro & Gordon (1983a, b), Walsh (1995) or Svensson (1997).

This section analyses labour-market reform in the case of participation in the EMU. Then, a common inflation rate, for all the participating countries is determined by the monetary policy of the European Central Bank, ECB. Because the EU treaty does not foresee centralisation of employment policy, I continue to assume that labour-market institutions are determined by national governments.

The monetary union is made up of n symmetric countries. I assume that the ECB has a loss function that looks exactly like the loss functions of the national governments and central banks, but where the variables refer to averages for the whole monetary union. It follows that the ECB will set the inflation rate

$$p = b\,l u_u^* + \frac{b\,l}{1+b^2\,l}\frac{1}{n}\sum_{i=1}^{n} e_i\,, \tag{8}$$

where i is the country subscript (which I write out only when it is necessary to avoid misunderstandings) and $u_u^* = \sum_{i=1}^{n} u_i^* / n$ is the aggregate equilibrium rate of unemployment for the monetary union as a whole. The ECB thus suffers from the same type of inflation bias as a national central bank (the first term) and stabilises the economy in response to shocks to the average European unemployment rate (the second term).

In deciding on the amount of labour-market reform, the government in a representative country now takes the reaction function of the ECB into account. The expectation of (4) is minimised with respect to s subject to (1), (3) and (8). This gives

$$\frac{\partial L_p}{\partial s} = -d\,l u^* - \frac{d}{n} b^2 l^2 u^* + g = 0\,. \tag{9}$$

The terms in the optimisation condition for the participation case have a similar interpretation as in the non-participation case. The difference is that the marginal gain from reform when that the inflation bias is reduced is smaller (the second term). Because the ECB reacts only to aggregate unemployment in the monetary union, labour-market reform in an individual country reduces inflation only to the extent that aggregate equilibrium unemployment is

reduced. It follows that the incentive for reform is weaker inside the EMU than outside. Solving for *u**, I obtain

$$u_p^* = \tilde{u} - \delta s_p = \frac{g}{\delta\lambda(1+\beta^2\lambda/n)}. \qquad (10)$$

In the limit when *n* becomes very large – which could be interpreted as an analysis of the effects for a small member state – inflation can be taken as exogenous in the optimisation problem of the individual government. Then (9) and (10) simplify to

$$\frac{\partial L_p}{\partial s} = -\delta\lambda u^* + g = 0 \qquad (9a)$$

$$u_p^* = \frac{g}{\delta\lambda}. \qquad (10a)$$

A comparison of (10) and (10a) with (7) shows that equilibrium unemployment is higher inside the EMU than outside.[4] The reason is that the marginal benefit from national reform is smaller inside the EMU than outside because the effect on the inflation bias is diluted. In the limit when *n* is very large, the reduction of the inflation bias is of negligible size.

Another way of explaining the result of more reform outside the EMU than inside is that national governments fail to internalise the positive externalities on other member states that occur when a fall in domestic equilibrium unemployment helps reduce the common inflation rate. This failure means that participation in the EMU reduces welfare. This welfare loss comes in addition to the loss caused by increased unemployment variability when monetary policy no longer stabilises asymmetric shocks inside the monetary union.[5]

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[4] This result was first pointed out by Sibert & Sutherland (1998) and Calmfors (1997) in independent contributions. The Sibert and Sutherland analysis differs from the one here, because they also let foreign inflation surprises affect domestic unemployment by lowering foreign real wages and hence triggering a relocation of firms' activities.

[5] If *n* is large, symmetry allows me to write the expected loss function on the general form $E(L) = f(s) + g(\sigma_v^2, \sigma_m^2)$, where $f(s) = \left[\lambda(1+\beta^2\lambda)(\tilde{u}-\delta s)^2 + 2gs + m(\sigma_v^2 + \sigma_m^2)\right]/2$ and $m = \lambda/(1+\beta^2\lambda)$. It is easy to show that $E(L_n) = f(s_n)$ and $E(L_p) = f(s_p) + (1-m)\sigma_v^2/2$.

The crucial assumption for the result of more reform outside than inside the EMU is that there exists a *national* inflation bias. It is well-known that if the national central bank can be instructed to minimise a loss function where cyclical unemployment (the deviation of actual from equilibrium unemployment) is substituted for actual unemployment, i.e. in my case

$$L = \frac{1}{2}p^2 + \frac{l}{2}(u - u^*)^2 + gs, \tag{4a}$$

then the inflation bias is eliminated. This changes (5) to:

$$p = \frac{b\,l}{1 + b^2 l}e, \tag{5a}$$

i.e. monetary policy is used only to stabilise the economy.[6] If there is no national inflation bias, national labour-market reform thus has no effect on inflation. Then the second term drops out of the optimisation condition (6) and equilibrium unemployment in the non-participation case becomes determined by the same condition (10a) as in the participation case with a large *n*.

Sometimes entry into the EMU has been seen as a device to reduce or eliminate a national inflation bias that would prevail outside (e.g. Alesina & Grilli, 1993; De Grauwe, 1997). The result of more reform outside than inside the EMU is consistent also with this view. Assume, for example, that there is a national inflation bias, so that inflation outside the EMU is given by (5), but no such bias in the EMU, which means that the first term drops out (8). This means that inflation is exogenous to the national government when it chooses the amount of reform inside the EMU, just as in the previous case with an inflation bias for the ECB and a

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Hence, $E\{L_p(s)\} - E\{L_n(s)\} = f\{s_p(s)\} - f\{s_n(s)\} + (l - m)s_v^2/2$. The FOCs (6) and (9) imply that $f\{s_n(s)\}$ is a minimum of $f(s)$, whereas $f\{s_p(s)\}$ is not. Thus, $f\{s_p(s)\} - f\{s_n(s)\} > 0$. It also follows that $(l - m)s_v^2 = b^2 l^2 s_v^2 / \{1 + b^2 l\} > 0$.

[6] See Persson & Tabellini (1993) or Svensson (1997). Other methods to eliminate the inflation bias is an optimal linear contract punishing the central banker for inflation (Walsh, 1995; Persson & Tabellini, 1993) or the choice of an appropriate inflation target (Svensson, 1997).

large number of member states. Hence the same optimisation condition (9a) holds and the same equilibrium unemployment is chosen (10a).

2.3. An alternative interpretation

The model has analysed the *political* incentives for legislated labour-market reform. An alternative interpretation would be to let *s* represent the target (expected) real wage that wage setters aim for (a higher *s* meaning a lower real wage). The unemployment equation (3) could then be seen as an equation, which relates target unemployment to the target real wage. Equation (1) would show how actual unemployment deviates from target unemployment when there are unanticipated inflation and shocks. Finally, equation (4) could be reinterpreted as a trade-union preference function, according to which the representative trade union cares not only about the real wage and (un)employment, but also about inflation.

With this interpretation, the minimisation of the expectation of (4) could be taken to represent the representative trade union's choice of an expected real wage before shocks are realised and monetary policy decided. The optimisation condition may be different depending on whether or not the county participates in the monetary union. With participation, one can safely assume that the wage decision of a trade union in an individual country has such a small effect on aggregate equilibrium unemployment in the EMU that the effect on the inflation bias can be neglected.

But if wage setting in the representative country is fairly centralised, the wage decision of an individual trade union could have a non-negligible effect on national equilibrium unemployment in the case of non-membership. Then, there will also be a non-negligible effect on the inflation bias. To reduce this, it will pay for the representative trade union to hold back real wages. If so, the wage-setting logic of trade unions tends to cause lower equilibrium unemployment with non-participation than with participation in the monetary union. This point has been made by Cukierman & Lippi (1998), and Grüner & Hefeker (1998). The conclusion hinges on the assumption of a high degree of centralisation: with

decentralised wage setting in the individual country, the effect on the inflation bias is negligible both inside and outside the monetary union.

3. Structural reform and labour-market flexibility

In Section 2, the increase in cyclical variability that is likely to occur in the EMU, when monetary policy can no longer stabilise asymmetric shocks, did not play any role. Still, this issue has been very important in the EMU discussion (see e.g. Bean, 1998b; or Eichengreen, 1998). I shall bring in this aspect by analysing possible links between cyclical variability, the incentive for reform and equilibrium unemployment.

A key assumption in Section 2 was that labour-market reform affects only equilibrium unemployment, but not the sensitivity of unemployment to shocks and monetary policy. This assumption is not self-evident. Much of the discussion on structural reform has been cast in terms of the need to increase labour-market *flexibility* so as to improve the ability to cope with macroeconomic shocks (e.g. OECD, 1994). Indeed, it would seem to be a common view that labour-market reform serves not only to reduce equilibrium real wages but also to increase the flexibility of real and money wages. This view could be rationalised on the ground that reforms bring labour markets closer to perfectly competitive ones. If asymmetric shocks can no longer be stabilised through monetary policy in the EMU, one should expect a stronger incentive for labour-market reform that makes money wages more flexible, as has been claimed by e.g. Sibert & Sutherland (1998).

My interpretation of labour-market reform as determining the balance between unregulated and regulated sectors offers a simple way of modelling the flexibility aspect. Assume that unregulated labour markets are competitive ones with perfect wage flexibility (or at least ones with short contract periods), so that wages there are set on the basis of *realised* prices and shocks, and that regulated sectors are characterised by long-term collective agreements, so that wages there are set on the basis of expectations (just as in Section 2). As shown in the Appendix, it is then straightforward to derive the following unemployment equation for a representative economy:

$$u = (\tilde{u} - ds) - b(1-s)(p - p^e) + (1-s)e. \qquad (1a)$$

More reform, i.e. a higher *s*, now has three effects: (1) equilibrium unemployment is reduced just as before (the first term); (2) unanticipated inflation will have a smaller unemployment-reducing effect (the second term); and (3) an exogenous shock will have a smaller unemployment-increasing effect (the third term). The last two effects are easy to understand. The larger the number of unregulated sectors, the more flexible is the aggregate money wage, and hence, the more will wage adjustments dampen the employment impact of an unanticipated shock. This applies to both aggregate supply shocks and inflation shocks.[7] More precisely, the impact of these shocks now have to be weighted by the fraction, $1-s$, of regulated sectors.

Below, I rework the government's optimisation problem with respect to the amount of labour-market reform, now replacing (1) and (3) with (1a).

3.1 Non-participation in the EMU

When the national central bank solves its optimisation problem in this case, it will take into account that both exogenous shocks and unanticipated inflation have smaller effects on unemployment than in Section 2.

The optimal rate of inflation now becomes

$$p = b(1-s)\,l\,u^* + \frac{b(1-s)^2\,l}{1+b^2(1-s)^2\,l}\,e. \qquad (5b)$$

When choosing *s* outside the EMU the government now minimises the expectation of (4) subject to (1a) and (5b).

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[7] Sibert & Sutherland (1998) analyse the possibility that the impact of supply shocks depends on the amount of reform, but they do not consider that the impact of unanticipated inflation then ought to be affected as well. Nor do they consider any link between equilibrium unemployment and the cyclical sensivity of the economy.

$$\frac{\partial E(L_n)}{\partial s} = -d\lambda u^* - db^2(1-s)^2\lambda^2 u^* + \gamma - \frac{\lambda(1-s)}{\left[1+b^2(1-s)^2\lambda\right]^2}\left(\sigma_v^2 + \sigma_m^2\right) - \tag{6a}$$

$$-b^2(1-s)\lambda^2 u^{*2} = 0,$$

where, in addition to earlier symbols, σ_v^2 and σ_m^2 are the variances of the asymmetric and symmetric shocks, respectively.

The first three terms in (6a) have the same interpretation as in (6). They represent the direct reduction of expected unemployment due to lower equilibrium unemployment, the reduction of the inflation bias due to lower equilibrium unemployment, and the direct utility cost of labour-market reform, respectively. The other two terms are new.

The fourth term captures the impact of larger wage flexibility on the variability of unemployment. The term expresses the net of two opposing effects. On one hand, there is a direct effect of more reform, which tends to reduce the unemployment impact of an exogenous shock, as is clear from (1a). On the other hand, there is a counteracting effect, because reform reduces the effectiveness of monetary policy as a stabilisation tool in the case of shocks, as can be seen from (1a) and (5b) together. This effect tends to increase unemployment variability. But as monetary policy offsets shocks only partially, the latter effect is smaller than the first. So the net effect of reform is a reduction of unemployment variability. This also represents a marginal gain of reform.

The fifth term represents an additional marginal gain from reform because there is now an additional reduction of the inflation bias, $b^2(1-s)\lambda^2 u^{*2}$, over and above the reduction following from lower equilibrium unemployment. This occurs because reform, i.e. a higher s, reduces the responsiveness of unemployment to unanticipated inflation, $b(1-s)$. So the incentive to inflate is now lowered not only because equilibrium unemployment is reduced, but also because the effectiveness of monetary policy is reduced when a given amount of surprise inflation leads to a smaller fall in unemployment.

3.2 Participation in the EMU

As in Section 2.2, the ECB sets the common inflation rate so as to maximise a loss function that looks exactly as (4), but with aggregate union variables instead of national ones. To simplify the algebra, I assume from now on that the number of member countries in the monetary union is large. Then the country-specific shocks cancel out in the expression for the aggregate unemployment rate in the monetary union, u_u, which can be written

$$u_u = \frac{1}{n}\sum_{i=1}^{n} u_i^* = u_u^* - b(1-s_u)(p-p^e) + (1-s_u)m, \qquad (11)$$

where, in addition to earlier symbols, $s_u = \sum_{i=1}^{n} s_i / n$ is the aggregate level of reform. Minimisation of the ECB's loss function subject to (11) now gives inflation as

$$p = b(1-s_u)\,l\,u_u^* + \frac{b(1-s_u)^2\,l}{1+b^2(1-s_u^2)\,l}m. \qquad (8a)$$

As before, there is an inflation bias for the ECB, which depends on the aggregate equilibrium rate of unemployment in the EMU (the first term). In addition, the ECB stabilises common shocks, but not country-specific shocks, partially (the second term).

The amount of national labour-market reform is now derived by minimising the expectation of (4) subject to (1a), (2) and (8a) and treating s_u as exogenous. In a symmetric equilibrium, where $u_u^* = u^*$ and $s_u = s$, the FOC is

$$\frac{\partial E[L_p]}{\partial s} = -d\,l\,u^* + g - l(1-s)s\,\sigma_v^2 - \frac{l(1-s)}{\left[1+b^2(1-s)^2\,l\right]^2}s\,\sigma_m^2 = 0. \qquad (9b)$$

The first two terms are the marginal gain from reform because of lower expected unemployment and the direct utility cost, respectively, just as in equation (9a). The third and fourth terms are the gains that occur because reform increases wage responsiveness and hence reduces the unemployment variations that arise from asymmetric and symmetric shocks, respectively. With equal variances, the gain is larger with asymmetric shocks than

with symmetric shocks, because there is no monetary policy stabilisation that dampens the shocks in the former case.

It is difficult to solve (6a) and (9b) explicitly for *s*. Instead I derive the relative amount of reform by comparing the two FOCs. The comparison shows that it is now unclear how the EMU affects labour-market reform.[8] On one hand, the incentive for reform tends to be stronger inside the EMU than outside, because the gain from wage flexibility is larger when monetary policy is no longer used to stabilise asymmetric shocks. This follows because $l(1-s)s_v^2 + l(1-s)s_m^2 / \left[1+b^2(1-s)^2 l\right]^2$ in (9b) is larger than $l(1-s)(s_v^2 + s_m^2) / \left[1+b^2(1-s)^2 l\right]^2$ in (6a). But on the other hand, the incentive for reform tends to be stronger outside the EMU, because reform then, besides reducing expected unemployment, has the additional benefit of reducing the inflation bias. However, the reduction of inflation now arises for *two* reasons. First, it follows from the reduction of equilibrium unemployment, just as in Section 2 (the second term in (6a), which is missing in (9b)). Second, the inflation bias tends also to be reduced because the pay-off to unanticipated inflation in terms of lower unemployment is reduced (the fifth term in (6a), which is also missing in (9b)).

My analysis thus confirms partly the common intuition that relinquishing monetary policy independence strengthens the incentive for labour-market reform to increase wage flexibility. But the analysis also points to the less obvious existence of an additional incentive for reform outside the monetary union, because more wage flexibility means a smaller effect of unanticipated inflation on employment and hence a weaker temptation to inflate. So, provided that there is a national inflation bias, it is not in general clear whether or not a relationship between labour-market reform and wage flexibility tends to give rise to a stronger incentive for reform inside the monetary union than outside. However, if there is no

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[8] I evaluate $\partial E(L_p)/\partial s$ at the level of reform with non-participation given by (6a). The SOC for a minimum of the loss function is $\partial^2 E(L_p)/\partial s^2 = ld^2 + l s_v^2 + l\left(1-3b^2(1-s)^2 l\right) s_m^2 \Big/ \left(1+b^2(1-s)^2 l\right)^3 > 0$. If $\partial E(L_p)/\partial s < 0$ at this level of reform, it follows that more reform is chosen inside the EMU than outside.

inflation bias, for example because the national central bank minimises the loss function (4a) instead of (4), then reform has no effect on inflation in the non-participation case. Because the second and fifth terms then drop out of (6a), it follows that there will in this case be unambiguously more reform inside the EMU than outside.

4. A precautionary motive for labour-market reform

This section analyses another way through which increased variability of employment in the EMU might affect the incentive for labour-market reform. The starting point is an assumption that policy makers may be primarily interested in avoiding *very bad* macroeconomic outcomes like the Great Depression or the world-wide inflation of the 1970s, rather than fine-tuning the business cycle (Lindbeck, 1992). So an extra value is assumed to be attached to reducing the risks of such economic "disasters". One can interpret some of the worries about the employment consequences of the EMU in this way: access to domestic monetary policy as a stabilisation-policy instrument has been discussed as a way of *insuring* against very unfavourable macroeconomic outcomes, which is lost in a monetary union (Mélitz, 1997; Calmfors et al., 1997). The logic is similar to the analysis of precautionary savings in the theory of consumption (Leland, 1968). Just as increased uncertainty may lead households to save more to reduce the utility costs of variations in consumption, there may be a *precautionary motive* for labour-market reform to reduce the utility costs of macroeconomic instability.

The crucial assumption in the theory of precautionary savings is that the marginal utility of consumption is convex. I shall therefore in this section abandon the earlier quadratic preference function, which implies linear marginal disutilities of unemployment and inflation, and instead assume that the marginal disutilities are convex. The implication is thus that increases in unemployment and inflation give rise to larger utility reductions than according to a quadratic loss function. It also follows that the utility costs of variations in unemployment and inflation are higher, the higher the average levels of unemployment and inflation around which these variations take place. A simple loss function for the government and the central bank in a representative country with these properties is:

$$L = \frac{1}{4}p^4 + \frac{l}{4}u^4 + gs. \qquad (4c)$$

The ECB is assumed to have the same loss function, but with aggregate union variables as arguments. To highlight the precautionary motive for reform, I shall in this section rework the analysis of the baseline model in Section 2 substituting the loss function (4c) for (4.) As in Section 2, I neglect the possibility that the sensitivity of unemployment to shocks may be affected by reform.

4.1 Non-participation in the EMU

To solve the government's optimisation problem with respect to s in the case of non-participation in the EMU, I again first derive the national central bank's inflation rule. It is obtained by minimising the loss function (4c) subject to (1). The outcome is

$$p = \sqrt[3]{b\,l u^*} + \frac{\sqrt[3]{b\,l}}{1+\sqrt[3]{b^4 l}}e\,. \qquad (5b)$$

As in the quadratic case, there is an inflation bias, which is increasing in equilibrium unemployment (the first term). Variations in inflation stabilise shocks partially here, too (the second term).

The optimisation condition for labour-market reform is obtained by minimising the expectation of (4c) subject to (1), (3) and (5b). It is

$$\frac{\partial E[L_n]}{\partial s} = -d\,l\,u^{*3} - d f^4 u^{*3} + g - 3d\,l\,\ell^2 u^* s_e^2 - 3d f^2 k^2 u^* s_e^2 = 0, \qquad (6b)$$

where $\ell = 1/\left(1+\sqrt[3]{b^4 l}\right)$ is the fraction of the initial unemployment shock that remains after monetary policy stabilisation, $f = \sqrt[3]{b\,l}$ and $k = \sqrt[3]{b\,l}/\left(1+\sqrt[3]{b^4 l}\right)$.[9]

The first three terms in (6b) capture the same effects of reform as in equation (6): the marginal gain from lower expected unemployment, the marginal gain from lower expected inflation, and the direct marginal loss from reform itself, respectively. The last two terms are new and represent additional gains. The fourth term captures that lower equilibrium unemployment reduces the utility cost of variations in unemployment due to both symmetric and asymmetric shocks. The fifth term reflects that lower equilibrium unemployment reduces the inflation bias and hence the utility costs of variations in inflation when monetary policy is used to stabilise shocks.

4.2 Participation in the EMU

If I continue to assume a large number of countries in the monetary union, it follows that the common inflation rate is determined by an equation that looks exactly as (5b) except that union equilibrium unemployment, u_u^*, and the common shock, m, are substituted for u and e, respectively. This means that inflation is taken as exogenous when the national government decides on reform.

The optimisation condition is derived by minimising the expectation of (4b) subject to (1), (2), (3) and the ECB's inflation equation. It is

$$\frac{\partial E(L_p)}{\partial s} = -d\,l\,u^{*3} + g - 3d\,l\,u^{*}\,s_v^2 - 3d\,l\,\ell^2 u^{*}\,s_m^2 = 0. \qquad (9c)$$

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[9] In the derivation, it should be noted that the assumption of symmetric distributions ensures that $E(v^3) = E(m^3) = 0$, and the assumption of independence that $E(v^2 m) = E(m)E(v^2) = 0$ and $E(m^2 v) = E(v)E(m^2) = 0$.

Compared to the quadratic case (9a), the last two terms are new. They capture the additional marginal gains from reform that arise because lower equilibrium unemployment reduces the utility cost of variations in unemployment. The third term captures the gain associated with asymmetric shocks and the fourth term the gain associated with symmetric shocks. The reduction in utility cost is larger for asymmetric than for symmetric shocks with the same variance, because the latter are partially stabilised by the common monetary policy. Unlike in the non-participation case, reform does not affect inflation and hence not the utility cost of variations in it.

The consequences for labour-market reform of participation in the EMU can be derived from a comparison of (6b) and (9c). As in Section 3, I do this by evaluating $\partial E\{L_p\}/\partial s$ at the level of reform given by (6b) and noting that $\partial^2 E\{L_p\}/\partial s^2 = 3\delta^2\lambda\left[u^{*2} + \sigma_\nu^2 + \ell^2\sigma_m^2\right] > 0$. It is immediately clear that the impact of monetary union on reform is ambiguous. On one hand, the second and fifth terms in (6b) are missing in (9c). They capture the direct gain from lower expected inflation and the indirect gain from a lower utility cost of variations in inflation when expected inflation is reduced. The absence of these two terms in (9c) tends to make $\partial E\{L_p\}/\partial s > 0$ for the s giving $\partial E\{L_n\}/\partial s = 0$ in (6b). Hence, they tend to give a stronger incentive for reform outside than inside the EMU. But on the other hand, since $0 < \ell < 1$, the sum of the third and fourth terms in (9c) is larger in absolute value than the fourth term in (6b), which tends to make $\partial E\{L_p\}/\partial s < 0$ in (9c) for the s giving $\partial E\{L_n\}/\partial s = 0$. These terms measure the gains from a lower utility cost of variations in unemployment when equilibrium unemployment is reduced. This gain is larger in the participation case than in the non-participation case, because unemployment fluctuations are larger in the former case when asymmetric shocks are not stabilised. This tends to give a stronger incentive for reform inside the EMU than outside.

If there is a national inflation bias, the precautionary motive thus works both ways: on one hand, there is an incentive for reform outside the monetary union in order to reduce the utility costs of variations in inflation when monetary policy stabilises employment. On the other

hand, there is a stronger precautionary motive for reform inside the union in order to reduce the cost of the larger variations in employment when monetary policy does not stabilise asymmetric shocks. It can be shown that the net precautionary motive for reform is stronger in the non-participation than in the participation case if

$$\frac{1}{\left(\sqrt[3]{b^4 l} + 2\right)^2} > \frac{\sigma_v^2}{\sigma_v^2 + \sigma_m^2}. \qquad (12)$$

This is more likely: (i) the smaller the variance of asymmetric shocks relative to the variance of common shocks (which reduces the difference in cyclical variability between participation and non-participation); and (ii) the smaller the unemployment aversion, l (which reduces the relative importance attached to variations in unemployment).

As in the earlier sections, the analysis changes fundamentally if there is no inflation bias. This would, for example, be the case if the central banks care only about the deviations of actual unemployment from equilibrium unemployment. The national central bank would then minimise the loss function $p^4/4 + (l/4)(u - u^*)^4 + \gamma\sigma$ instead of (4b). Then the first term in (5b) drops out and inflation is set only so as to counteract shocks. As a consequence, expected inflation outside the EMU becomes zero and independent of equilibrium unemployment. Therefore, the second and fifth terms in (6b), which capture the gains from lower expected inflation, drop out. The only difference between (9c) and (6b) becomes the larger reduction of the utility cost of variations in unemployment in the EMU case. So, without an inflation bias, EMU membership leads to unambiguously more reform than non-membership.

The argument in the case without an inflation bias is illustrated in Figure 1, where the marginal disutility of unemployment has been drawn. Assume that a country outside the EMU finds itself at the equilibrium rate of unemployment u_0^*. Assume also that $\sigma_m^2 = 0$, i.e. that there is only an asymmetric shock, and this can take on only two values, both occurring with probability 0,5. When monetary policy stabilises the asymmetric shock, actual unemployment is either u_1 or u_2. Hence the expected marginal disutility of u_0^* is E_A. E_A is

also the expected gain of reform that lowers u^* with one unit. u_0^* is a political equilibrium because the expected marginal gain E_A is equal to the (certain) marginal political loss of reducing equilibrium unemployment, which is $-(\partial L/\partial s)/(\partial u^*/\partial s) = g/d$. EMU membership means that domestic monetary policy is no longer available for stabilisation. This can be illustrated as larger unemployment variations: between u_3 and u_4 instead of between u_1 and u_2. Hence, the expected marginal gain of reducing equilibrium unemployment u_0^* rises to E_B. To restore equality between the expected marginal gain of reform and the marginal cost, the larger variability of unemployment requires that equilibrium unemployment is reduced to u_I^*.

5. Discussion

My analysis has highlighted how the political incentives for labour-market reform to reduce equilibrium unemployment are likely to be affected by monetary union. There are several possible mechanisms which work in different directions. The conclusions can be summarised as follows.

(i) The existence of a national inflation bias works in the direction of more labour-market reform outside than inside the EMU. The argument is that reform in an individual country would reduce the national inflation bias significantly outside the monetary union, whereas there would be only a small effect on the aggregate inflation bias in the case of EMU membership (or no effect at all if the ECB does not suffer from an inflation bias). Several mechanisms have been identified. A reduction in equilibrium unemployment outside the monetary union tends by itself to reduce the temptation to inflate. If reform increases wage flexibility, the employment pay-off of unanticipated inflation is also reduced. And there could be a precautionary motive for lowering equilibrium unemployment outside the monetary union, because this reduces inflation on average and under certain assumptions then also utility cost of inflation variability.

(ii) If there is no inflation bias, one should expect a stronger incentive for reform inside than outside the monetary union. This occurs because monetary policy can no longer stabilise

asymmetric shocks inside the monetary union. There are two possible mechanisms. If reform increases wage flexibility, there is an incentive to offset the tendency to greater employment fluctuations through more reform. In addition, there could be a precautionary motive for reducing the utility costs of employment variability by lowering the equilibrium rate of unemployment around which these occur.

It is not obvious how important the inflation bias arguments for more reform outside than inside the monetary union is. The recent low inflation rates and the move towards more independent central banks in EU countries could be taken to reflect that ways have been found to handle the inflation problem on a permanent basis. But it is also possible that the recent low inflation is a temporary phenomenon associated with favourable macroeconomic conditions and the impact of the convergence criteria for joining the EMU. If a country chooses to stay outside the EMU, it might be tempted to allow higher inflation again. Already the potential risk of this might provide an incentive for labour-market reform.

It is also important to point out the crucial assumptions which my conclusions rest on.

(i) A first assumption is that *net* shocks after monetary stabilisation are indeed larger inside than outside the EMU. This has been questioned (see e.g. Fatás, 1997; and Hamilton, 1997). The argument is that shocks could to a large extent be policy-induced and that the EMU would impose more discipline on policy makers. If this were to be the case, all the mechanisms in my analysis would work in the direction of more reform outside than inside the monetary union. So my reasoning suggests that participation in the EMU can lead to more labour-market reform only if employment variations then increase. Joining the EMU cannot lead to both more reform and less employment variability.

(ii) A second crucial assumption is that labour-market reforms are made nationally and are not co-ordinated between member states in the monetary union. If there were such co-ordination, the inflation bias arguments for more reform outside than inside the monetary union no longer apply. With co-ordinated reform, policy makers in the EMU would fully internalise the effects on inflation (incidentally this also provides an argument for why the EMU could lead to more co-ordination of employment policy). But the wage-flexibility and precautionary-motive arguments for more reform inside the monetary union if cyclical variability increases would continue to hold. So with co-ordinated employment policies, one

would expect more reform inside than outside the EMU (unless there would be a much weaker inflation bias inside than outside the EMU). It is true that the new Amsterdam Treaty of 1999 does provide for more co-operation on employment policy in the EU, but it is also made clear there that labour-market institutions do remain a matter of national competence (Calmfors, 1998).

(iii) The assumption in Section 3 that the same labour-market reforms lead both to lower equilibrium unemployment (a lower aggregate real wage) and a smaller sensitivity of unemployment to shocks (more real and nominal wage flexibility) is in need of better theoretical underpinning. One should try to model carefully how specific labour-market institutions affect both the incentives for real wage restraint and the duration of wage contracts. This would require an integration of models of equilibrium unemployment and money-wage rigidity.

(iv) Finally, my analysis treats the choice of labour-market institutions as a one-off optimisation decision. I have not modelled the transition from one regime to another. In a model that distinguishes between domestic and foreign goods, one should expect national labour-market reform inside the EMU, which brings about a larger supply of domestically produced goods, to reduce the rate of domestic price increase temporarily. With downward money-wage rigidity, such a reduction in inflation could make it impossible to reduce real wages by much in the short run. So it could take a long time before reform leads to a substantial fall in actual unemployment. Outside the EMU, the national central bank could facilitate the domestic downward adjustment of real wages by preventing inflation from falling, as would be natural in an inflation-target regime. But inside the EMU, such a fall in domestic inflation in connection with national reform would not change the monetary policy of the ECB. So the larger possibility of co-ordinating monetary policy and labour-market reform outside the EMU represents an additional argument why there could be less reform inside the EMU than outside (Calmfors, 1998; Bean, 1998a).

Appendix

Assume that the representative economy consists of a large number, m, of symmetric production sectors. In each sector, a large number of perfectly competitive firms produce a tradable good. The economy is small, so the foreign-currency price of each good is given from the world market. A fixed pool of workers is attached to each sector. Hence, the labour-demand equation for sector j can be written as an equation for the unemployment rate:

$$u_j = b(w_j - p_j) + h_j + e, \qquad \text{(A1)}$$

where $u_j =$ the sectoral unemployment rate, b = the labour-demand elasticity, $w_j =$ the sectoral money wage, $p_j =$ the sectoral output price, $h_j =$ a sector-specific stochastic shock and $e =$ an economy-wide stochastic shock. h_j is generated by the same stochastic process in all sectors. All the shocks are independent, symmetrically distributed and have zero means.

Production sectors may be regulated or unregulated. I first assume that wages in both types of sectors are determined on the basis of expectations before shocks and prices are known. Wages are then set so that $E(u_j) = \tilde{u}$ in regulated sectors and $E(u_j) = \tilde{u} - d$ in unregulated sectors, where E is the expectations operator and $d > 0$ is a constant. It follows from (A1) that the money wage is set as $w_r = \tilde{u}/b + p_r^e$ in a regulated sector (indexed by r) and $w_c = (\tilde{u} - d)/b + p_c^e$ in an unregulated sector (indexed by c), where the e superscript denotes an expected value. Hence the actual unemployment rates can be expressed as $u_r = \tilde{u} - b(p_r - p_r^e) + h_r + e$ in regulated sectors and $u_c = \tilde{u} - d - b(p_c - p_c^e) + h_c + e$ in unregulated sectors.

The relative prices between sectors are given by a stochastic process. More specifically, $p_j = a_j + f_j + p$, where a_j is a fixed constant for each sector, f_j is an independent stochastic shock, and $p = \frac{1}{m}\sum_{j=1}^{m} p_j$ is the aggregate price index. I let $\sum_{j=1}^{m} a_j = 0$ and

$\sum_{j=1}^{m} f_j = 0$. It follows that for all j, $p_j - p_j^e = f_j + p - p^e = f_j + p - p^e$, where p = the rate of inflation (the rate of change of the price index).[10] When unemployment is aggregated over all sectors, both sector-specific supply shocks and relative-price shocks cancel out. Letting *s* denote the fraction of unregulated sectors, I obtain aggregate unemployment, *u*, as

$$u = \frac{1}{m}\sum_{j=1}^{m} u_j = s(\tilde{u} - d) + (1-s)\tilde{u} - \frac{b}{m}\sum_{j=1}^{m}(f_j + p - p^e) + \frac{1}{m}\sum_{j=1}^{m} h_j + e =$$
$$= \tilde{u} - ds - b(p - p^e) + e, \qquad \text{(A2)}$$

which corresponds to equations (1) and (3) in the text.

In section 3 in the text, the assumption is that $E(u_r) = \tilde{u}$ in regulated sectors and $u_c = \tilde{u} - d$ in unregulated sectors. Hence w_r and u_r are the same as above, whereas $w_c = (\tilde{u} - d)/b + p_c - e/b$. To simplify the algebra, I disregard, without loss of generality, both sector-specific shocks and relative-price shocks, i.e. I let $h_j = f_j = 0$. Aggregating over sectors as above, I obtain

$$u = \frac{1}{m}\sum_{j=1}^{m} u_j = s(\tilde{u} - d) + (1-s)[\tilde{u} - b(p - p^e) + e] =$$
$$= \tilde{u} - ds - b(1-s)(p - p^e) + (1-s)e, \qquad \text{(A3)}$$

which is equation (1a) in the text.

[10] As is well-known, the second equality follows because $p = p_{-1} + p$ and $p^e = p_{-1} + p^e$.

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Figure 1. The determination of equilibrium unemployment