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ABSTRACT

Labour Market Reform and Monetary Policy in EMU: Do Asymmetries Matter?*

This Paper analyses the interaction between a common monetary policy and differentiated labour market institutions. We develop a model of a two-country monetary union. In each country, labour market institutions are distinguished by the degree of centralization in wage bargaining. In each country the government can also use an instrument (general taxation or payroll taxes) to influence their overall labour costs. Finally a common monetary policy is followed in a 'conservative' manner, as defined by Rogoff (1985). The results show that structural and preference asymmetries matter, both in the determination of economic policy and in performance. In particular, centralized labour market institutions confer a certain comparative advantage in policy-making which provides a natural incentive for the less flexible (or less reformed) to want to join a currency union; and for the more flexible to stay outside. This lowers the incentives for reform inside the union, as Calmfors and others have conjectured.

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"If, indeed, labour was always in a position to take action (and were to do so), whenever there was less than full employment, to reduce its money demands by concerted action to whatever point was required to make money so abundant relatively to the wage-unit that the rate of interest would fall to a level compatible with full employment, we should, in effect, have monetary management by the Trade Union, aimed at full employment, instead of the banking system". "Except in a socialised community where wage policy is settled by decree, there is no means of securing uniform wage reduction for every class of labour.{…}A change in the quantity of money, on the other hand is already within the power of most governments{…}. Having regard to human nature and our institutions, it can only be a foolish person who would prefer a flexible wage policy to a flexible money policy.."(pp 268-269). J.M. Keynes

1 - Introduction

The debate about European Monetary Union has been polarised between the desire to exploit the economies of greater integration as defined in the OCA literature; and the greater adjustment difficulties when there are significant differences in economic institutions and economic behaviour. These differences are important when it comes to assessing which policy framework will be more capable of providing macroeconomic stability in each member state.

This paper analyses the interaction between a common monetary policy and differentiated labour market institutions. This interaction is particularly important given that the policy framework established in EMU assigns a central role to labour markets for creating more flexible and responsive national economies at a microeconomic level. But because EMU will be characterised by a continued emphasis on fiscal discipline, and because the constraints at the national level have not been supplemented by an explicit system for co-ordinating national economic policies, the only "policy instrument" remaining at the national level is labour market policies.

Consequently, we have to ask which labour market structure could provide this role of economic stabiliser using nominal wages? How is that choice affected by the monetary policy framework and by the other players in the labour market ? Is the framework chosen able to overcome the relevant asymmetries; or is a more explicit coordination framework needed - either between the national labour markets, or between individual labour markets and their national governments?

These are the issues we want to address here. To do so we develop a model of a two country monetary union. In each country, different labour market institutions are distinguished by the degree of centralisation in wage bargaining. In each country the government can also use an instrument (general taxation or payroll taxes) to influence overall labour costs. Finally a common monetary policy is followed in a "conservative" manner, as defined by Rogoff (1985).

We then compare three regimes: in one of them the labour market is fully centralised in all countries. As in Calmfors and Driffill (1988), a fully centralised labour market raises the Trade Union stake in the overall policy mix. An increase in real wages would then trigger a reaction from the central bank which will produce a reduction in employment levels. On the other hand the Trade Union could have operated an expansionary (real) monetary policy by restraining

nominal wages. That would increase the competitiveness of the national economy versus the other member states. The results therefore depend heavily on the distance between trade unions, central bank and fiscal authorities in terms of their preferences.

In a fully decentralised labour market, by contrast, the responsibility for achieving national objectives will be shifted totally towards fiscal policy since wages will simply clear the market. This scenario therefore shows the possibility of conflict between, and the need for co-ordination between, monetary and fiscal policies. This is a scenario which has been analysed by Demertzis and al. (1999) among others.

In our third scenario we analyse a situation of asymmetric labour market structures. The analysis shows that a fully centralised labour market de-facto provides an extra instrument of economic policy for the country that has centralised wage bargaining. That extra instrument can be used to respond asymmetrically to symmetric or asymmetric shocks - in addition to whatever is being done with fiscal policy. Since that option is not open to the second country, the country with fully decentralised labour market will have to produce more active fiscal policies for its own domestic stabilisation, increasing the possibility of conflict with the monetary policy objectives. The result, one might suppose, would be worse outcomes for one, if not both countries.

In conclusion the analysis shows one way in which structural asymmetries matter; and that, especially in presence of such asymmetries, the co-ordination of economic policies maybe necessary if we are to achieve macroeconomic stability.

Others have looked at the question of how a monetary union might affect wage bargaining and hence market flexibility and performance. Recent papers of this kind include Cukierman and Lippi (2001), Sibert and Sutherland (2000), Grüner and Hefeker (1999), or Soskice and Iverson (1998). But in each case the market structures have been kept fixed.

In this paper we ask the opposite question: given monetary union, how might different market structures and/or different degrees of flexibility affect economic performance in the member countries? This has not been examined elsewhere. It is an important issue because it allows us to explore what incentives may (or may not) exist for undertaking structural reforms that might make Europe's labour markets more responsive to market pressures. There is some consensus that such reforms are necessary - but none, it seems, on whether it will happen and what the outcomes would be. Calmfors (1998, 2001) argues that such reforms are actually unlikely to happen; Sibert (1999) and Sibert and Sutherland (2000) suggest they are likely. To some extent, we can resolve that disagreement by focussing on the different incentives. We show that the former is more likely, at least if there are some asymmetries between labour market structures when you start. This applies irrespective of the fiscal and monetary policy arrangements, whatever the number of unions or the inflation aversion of those unions etc.; although the strength of the incentives for reform may vary with those factors. In that sense we generalise on earlier work.

2 - The Model

(a) Our Point of Departure

Structural asymmetries are only relevant if the currency union does not produce structural convergence at a reasonable speed. Some have argued that convergence may come about because economic structures are endogenous (Frankel and Rose, 1998). In that connection, Anderson et al (2000) have found that monetary integration in Europe has been changing labour market structures and inducing wage convergence, albeit on a fairly small scale.

On the other hand, the strategic arguments point the other way. Calmfors (1998, 2001) argues that, although money-wage flexibility may be greater within the union, labour market reforms are less likely to implemented if they are linked to a time consistency problem - especially if they remain in the hands of national governments now more limited than they were in the instruments they can use to stabilise the domestic economy. Since monetary union has been constructed as a vehicle for solving that kind of problem, the incentive for further reforms of this type will be reduced once in the union. Against that, Sibert (1999) and Sibert and Sutherland (2000) argue that the presence of asymmetric shocks could modify this conclusion since countries will have an incentive to develop new measures to counter such shocks once the ability to adjust exchange rates has been lost. We test a proposition of exactly that kind in this paper, and find that if the replacement mechanisms lead to an asymmetry in structures (as well they might if the shocks are asymmetric in size or frequency, instead of just asymmetries in terms of when they strike), then we can get the opposite result because there is a one-way incentive to pass the burden of adjustment over to the economy with more flexible markets and institutions. That then supports the Calmfors conjecture more than it does the Sibert-Sutherland one. And, in practice, it appears that labour market institutions do actually show a remarkable path dependence in the face of increased competition (Traxler et al (2001), Agell (1999)). That could imply significant institutional differences which persist: because of institutional lock-ins that resist market pressures; because of the need to provide social insurance to counter the consequences of market forces we can no longer control; and because of the institutional differences which allow different markets to adapt in different ways.

(b) Monetary Policy

The objective of this paper is to analyse how labour market asymmetries affect the design and conduct of economic policy in EMU. The model must therefore have a single monetary policy, which is set to fix the level of prices for the union as a whole. That policy will be derived by minimising a generic quadratic objective function, of the form:

$$\min_{\pi} L = \frac{1}{2}\left[(\pi)^2 + \gamma\left(y_a - k\right)^2\right] \qquad (1)$$

where $\gamma \geq 0$ is the relative importance, in the Central Bank's view, of stabilising output levels across the union as a whole. So y_a is the average level of output in the union, with target value k[1]. Aggregate supply in the two countries constrains the average level of output that can be achieved in the union:

$$y_a = \frac{1}{2}(y_1 + y_2) = \pi - \frac{1}{2}(w_1 + w_2) - \frac{1}{2}(t_1 + t_2) + \frac{1}{2}(e_1 + e_2) \qquad (2)$$

This relationship therefore constrains the minimisation of (1). We assume that the ECB's monetary policy controls inflation directly, and that wages (w_1, w_2) are set nationally on the basis of the domestic labour market institutions. Finally the fiscal policy variables, (t_1, t_2), are defined as net tax revenues in countries 1 and 2 respectively. So $t_j < 0$ means a fiscal deficit in country *j*. Likewise (e_1, e_2) represents the supply shocks to those two countries. Those shocks will have the usual properties of zero mean and constant variance.

This aggregate supply function is just a multicountry version of the supply function popularised in this literature by Barro and Gordon (1983), Rogoff (1985), or Alesina and Gatti (1995). Indeed since wages will be set as a function of expected inflation - the function itself depending on the labour market institutions at hand - equation (2) is simply a standard union-wide supply function, extended to include fiscal policy in the manner of Debelle and Fischer (1994). Hence $^1/_2(w_1+w_2)$ transmits the effects of expected inflation π^e. But, because of the timing issue described below, wages will actually be set ahead of the determination of y_a; i.e. π^e will be what the wage setters (or the private sector) expect, at the beginning of the period, to hold at the end of that period and start of the next: $\pi_t^e = E(\pi_{t+1} | I_t)$ where I_t is the information available at the start of period t. That means our supply function is, in fact, a simple variant of the New-Keynesian Phillips curve model which emphasises forward looking behaviour in wage and price setting (see Roberts, 1995). And, as such, it incorporates the microfoundations of monopolistic competition between firms, staggered wage-price setting of Calvo contracts, and quadratic adjustment costs. Optimal wage setting would then produce a relationship like (2); Rotemberg and Woodford (1998).[2]

(c) Wages and Fiscal Policy

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[1] For two different justifications for the presence of $k > 0$, see Persson and Tabellini (1990); and Woodford (1999). Blinder (2000), in particular, argues that k≥0 is a realistic interpretation of what Central Banks actually do. But notice that, if k=0, the problem just simplifies to one of resolving a conflict between output stabilisation and inflation stabilisation, driven now by the difference in priorities at the Central Bank and fiscal authorities. But all our other results go through unscathed. So k>0 is an unimportant assumption: removing it would not change the results. We do not consider the case of k<0.

[2] Note that the output variables y_a, and y_1 and y_2 in what follows, will be measured as deviations from their natural rates. Hence the signs in (2). The fiscal variables can be converted, at some complication to the algebra, to deviations from their expected values if fiscal policy is expected to have only temporary effects (Demertzis et al, 1999). And, finally, wages will be measured in terms of their growth rates net of the long run trend in productivity growth in order to match the measurement of y as a deviation from its natural rate.

Wage changes in this model represent the expected changes in production costs. We assume that wage bargainers determine their desired level of wage inflation in each of the three labour market regimes studied below; and that they do so on the basis of what they expect to be the outcomes (in terms of inflation and employment) of whatever monetary and fiscal policies the Central Bank and fiscal authorities can be expected to choose in their own interest. This means we have a hierarchical game in which independent monetary and fiscal authorities play a Nash game among themselves, while playing a Stackelberg game with respect to the wage setters. This step is necessary to ensure that the Central bank is fully independent in setting its policy (instrument independence). Target independence is also implied since the Bank sets its own objectives, including the relative priorities parameter γ.

The two governments however, and by extension their electorates, are likely to be interested in their own (domestic) output levels, and the differences between them[3]:

$$y_d = \frac{1}{2}(y_1 - y_2) = -\frac{1}{2}(w_1 - w_2) - \frac{1}{2}(t_1 - t_2) + \frac{1}{2}(e_1 - e_2) \qquad (3)$$

This expression for the difference in income levels makes clear that, if shocks are asymmetric, then asymmetries in the labour markets or in fiscal policy should be used to reduce the differences between countries.

(d) The Timing of Decisions

The moves of our game are as follows: first unions, or individuals, set wages; then shocks occur; and finally monetary and fiscal authorities set their instruments in a non cooperative manner. Consequently, the ECB maximises (1) subject to (2), while the two fiscal authorities maximise their own national objective functions[4] using their own fiscal instruments;

$$\min_{t_j} L_j = \frac{1}{2}\left[(\pi)^2 + (t_j)^2 + \beta(y_j - k)^2\right] \qquad (4)$$

for *j = 1 , 2* , subject to the same national supply functions that underlie (3). The parameter $\beta > 0$ determines the importance, as the governments see it, of output stabilisation relative to inflation control or deficit control. Minimising (1) and (4) for *j=1,2 conditional* on the wages set according to whichever labour market regime is in place, now yields a sequence of three optimal reaction functions - one for each player:

[3] This technique of dividing the analysis up between the sums and the differences of national outputs is due to Aoki (1976). In our context it has the advantage of distinguishing clearly the policy domains of the different actors (the ECB targets the European averages while the national governments and national unions target the national levels). This technique makes it easy to isolate asymmetric effects of different policies.

[4] Svenson (1997); see also footnote 5 below.

$$\pi = \frac{\gamma}{1+\gamma}\left[\frac{1}{2}(w_1 + w_2) - \frac{1}{2}(t_1 + t_2) + k - \frac{1}{2}(e_1 + e_2)\right], \text{and} \quad (5)$$

$$t_j = \frac{\beta}{1+\beta}\left[\pi - w_j - k - e_j\right] \qquad \text{for j=1,2.} \quad (6)$$

Solving this system of three equations in three unknowns, we have:

$$\pi = \frac{\gamma}{1+\gamma+\beta}\left[\frac{1}{2}(w_1 + w_2) + k - \frac{1}{2}(e_1 + e_2)\right] \quad (7)$$

$$t_1 = -\frac{\beta}{1+\beta+\gamma}\left[w_1 + k - e_1\right] + \frac{\beta}{1+\beta+\gamma}\left[\gamma\frac{(w_1 - w_2)}{2} + \gamma\frac{(e_1 - e_2)}{2}\right] \quad (8)$$

$$t_2 = -\frac{\beta}{1+\beta+\gamma}\left[w_2 + k - e_2\right] - \frac{\beta}{1+\beta+\gamma}\left[\gamma\frac{(w_1 - w_2)}{2} + \gamma\frac{(e_1 - e_2)}{2}\right] \quad (9)$$

The equilibrium which emerges from equations (7) - (9) therefore depends on the wage formation mechanism present in each country. We analyse our three labour market regimes next - two regimes are symmetric, with either full centralisation or complete decentralisation in the labour market. The third is asymmetric with wage bargaining centralised in one economy, but decentralised in the other. But like others working in this area, we do not include an explicit budget constraint in our model. Instead we constrain fiscal policy by placing explicit penalties on the use of fiscal policy, see (2.4). Standard theory would then produce a feedback rule, in the context of the sequential decision making of our model, which satisfies the sufficient conditions required for long term solvency and the "cash in advance" constraint (Canzoneri et al, 2000). That, in effect, endogenises expenditures and their financing costs. Consequently, we do not need to report the components of the budget constraint or financing costs in what follows: each t_j is simply the net revenue stream required to ensure solvency and the cash in advance constraint.

3- Regime One: Non Cooperation with decentralised labour markets

(a) The Optimal Policies: Absolute vs. Relative Stabilisation

In our model workers move first, setting a one period wage contract before any shocks appear and before fiscal and monetary policies are set. However, in this regime, the labour markets are identical in the two countries and atomistic. Therefore increases in nominal wages will be set such that they equal the inflation rate expected at the beginning of each period,

$$w_j = \pi^e \quad (10)$$

Assuming rational expectations, substituting equations (10) into (7), and solving out, we obtain the equilibrium rates of wage and price inflation:

$$w_j = \pi^e = \frac{\gamma}{1+\beta} k \tag{11}$$

Substituting this equilibrium value into the reaction functions of the policy authorities, we obtain the actual levels of inflation and taxation for the two countries, respectively:

$$\pi = \frac{\gamma}{1+\beta} k - \frac{\gamma}{1+\beta+\gamma} \frac{\left(e_1 + e_2\right)}{2} \tag{12}$$

$$t_j = -\frac{\beta}{1+\beta} k + \frac{\beta}{1+\beta+\gamma} e_j + \frac{\beta}{1+\beta+\gamma} \left[\gamma \frac{\left(e_j - e_i\right)}{2} \right] \tag{13}$$

This will give an average European income equal to:

$$y_a = \frac{\beta}{1+\beta} k + \frac{1}{1+\beta+\gamma} \left[\frac{\left(e_1 + e_2\right)}{2} \right] \tag{14}$$

This is the output level targeted by the Central Bank, and is a function of the average supply shocks. The difference in output levels, however, is given by

$$y_d = \frac{1+\gamma\left(1-\beta\right)}{1+\beta+\gamma} \left(\frac{e_1 - e_2}{2} \right). \tag{15}$$

(b) Overall Performance: the political implications

The characteristics described above are also reflected in the expected loss function (welfare indicator) of each country and for the Central bank. Considering first the Central bank, its expected loss function is given by (1). Thus

$$E\left(L\right) = \frac{\gamma\left(1+\gamma\right)}{2} \left[\frac{1}{\left(1+\beta\right)^2} \left(k\right)^2 + \frac{1}{4\left(1+\beta+\gamma\right)^2} \left(\sigma_1^2 + \sigma_2^2 + 2\rho\sigma_1\sigma_2\right) \right] \tag{16}$$

Meanwhile at the national level we have:

$$y_1 = y_a + y_d$$
$$y_2 = y_a - y_d$$

and hence:

$$y_1 = \frac{\beta}{1+\beta} k + \frac{1}{\left(1+\beta+\gamma\right)} e_1 + \frac{\gamma\left(1-\beta\right)}{\left(1+\beta+\gamma\right)} \left(\frac{e_1 - e_2}{2} \right) \tag{17}$$

$$y_2 = \frac{\beta}{1+\beta}k + \frac{1}{(1+\beta+\gamma)}e_2 + \frac{\gamma(1-\beta)}{(1+\beta+\gamma)}\left(\frac{e_2 - e_1}{2}\right) \tag{18}$$

Evaluation with a generic loss function representing the interests of the voters in country j[5]:

$$\mathrm{LP_j} = \frac{1}{2}\left[(\pi)^2 + (\mathrm{t_j})^2 + \lambda(\mathrm{y_j} - \mathrm{k})^2\right] \tag{19}$$

implies that the loss functions in each economy are:

$$\mathrm{E(LP_j)} = \frac{1}{2}\left[\frac{\gamma^2 + \beta^2 + \lambda}{(1+\beta)^2}\mathrm{k}^2 + \mathrm{A}\sigma_{\mathrm{j}}^2 + \mathrm{B}\sigma_{\mathrm{i}}^2 + 2\mathrm{C}\rho\sigma_{\mathrm{j}}\sigma_{\mathrm{i}}\right] \tag{20}$$

where

$$\mathrm{A} = \left(\frac{1}{1+\beta+\gamma}\right)^2\left[\frac{\gamma^2}{4} + \frac{\beta^2(2+\gamma)^2}{4} + \frac{\lambda(2+\gamma+\gamma\beta)^2}{4}\right]$$

$$\mathrm{B} = \left(\frac{1}{1+\beta+\gamma}\right)^2 \frac{\gamma^2}{4}\left[1 + \beta^2 - \lambda(1-\beta)^2\right]$$

$$\mathrm{C} = \left(\frac{1}{1+\beta+\gamma}\right)^2 \frac{\gamma}{2}\left[\gamma + \beta^2(\gamma+2) + 2\lambda(1-\beta)(1+\gamma(1-\beta))\right]$$

Inspection of equation (20) shows that being in a monetary union has worsened the overall performance of each individual economy to the extent that each has to absorb the disturbance caused by the transmission of foreign shocks (σ_i^2 in (20)), as well as the disturbances caused by their own shocks (σ_j^2 in (20)). Most of the cost is from domestic shocks since *A>B* in all cases. That is also a standard result from optimal currency area literature: one has to share in the macroeconomic pain of adjustment if one wants to share in the microeconomic gains of the union. But the extent to which one has to share in that pain depends critically on the

[5] In this formulation λ may be equal to β, the governments' relative priority. Or it may be equal the relative priority of the electorates median voter: λ . Demertzis et al (1999) emphasise the importance of this distinction for the way in which policy decisions are actually taken in practice. But, for our purposes, the importance is that (19) represents the loss functions that emerge when individual consumers maximise their intertemporal utility and then governments aggregate those utilities in order to determine their best policy choices. The difference is only that we allow β to differ from the median voters λ in order to reflect the possible differences between the governments immediate priorities and those implied by the smoothing and aggregation of consumers' utilities. In other words, through the electoral process, in which β is chosen as an optimal function of the individual consumers preferences. This is taken from Tirole's (1994) agency theory: a "multiheaded" government provided checks and balances to control the private interests of any one set of decision makers. It is also the approach taken in political science models: see Clark and Hallerberg (2000). Finally Demertzis et al (1999) show how the electoral mechanism is used to smooth and aggregate the utilities of individual consumers - to higher order functions.

correlation between shocks (ρ), on the monetary policy responses (γ), and on the degree of fiscal activism (β). Nevertheless foreign shocks, and their correlation with the domestic shocks, play a role only when monetary policy is stabilising (i.e. only when $\gamma \neq 0$).

Finally, the median voters preferences affect only the systematic part of (25). That means that monetary union brings no change in the way that public preferences influence the systematic components in the choice of policy; and hence no change in the way in which elections might determine β as the preference parameter actually in use - that is the value of β which minimises (25), for the median voters choice of λ, in a world of democratically elected governments.[6] But monetary union does affect the stochastic part of the problem. Here public preferences will matter since perceptions of how well different policies stabilise output (and the differences between national output levels) will clearly affect performance levels, and the value of β that would minimise the median voter's loss function, and hence the chances of getting a government of a particular type elected.

4 - Regime 2: Non Cooperation with two centralised unions

We now switch to our second regime. Monetary union is still in place, but we now assume that both countries have a single centralised union - and that national wages will be set according to the objectives of those unions. This is again a symmetric regime. Both countries have the same wage bargaining arrangement in which a single trade union set wages according to the conditions in their own labour market.

(a) Optimal Policies and Output Volatility

Because the hierarchical structure of the game has not changed, the Central Bank and governments have the same reaction functions as before:

$$\pi = \frac{\gamma}{1+\gamma+\beta}\left[\frac{1}{2}\left(w_1 + w_2\right) + k - \frac{1}{2}\left(e_1 + e_2\right)\right] \tag{21}$$

$$t_j = -\frac{\beta}{1+\beta+\gamma}\left[w_j + k - e_j\right] + \frac{\beta}{1+\beta+\gamma}\left[\frac{\gamma}{2}\left(e_j - e_i\right)\right] \tag{22}$$

However, wage bargainers still determine the wage rate at the beginning of each period. And each union aims for full employment and to preserve the growth of real wages in line with productivity, as set out in the following objective function:[7]

[6] Demertzis et al (1999).

[7] Holden (2000); Danthine and Hunt (1994). Recall that Section 2 defined (real) wages as a deviation from the long run trend in productivity growth. We could have included an additional linear term in real wages, $t2_q(w - \pi)$, in (23) as Cukierman and Lippi (2001) do. But it is easy to see that such an objective function can always be reformulated as (23) where the implicit target path for real wages becomes the trend productivity growth rate less q. So a linear penalty term is equivalent to increasing the target real wage above trend productivity by

$$\min_{w_j} L_{uj} = \frac{1}{2} E\left[\left(w_j - \pi\right)^2 + \delta\left(y_j - k\right)^2\right] \tag{23}$$

Employment objectives like these translate into output stabilisation in our framework.[8] So this regime is the first in which wages (or production costs, or interventions in the labour market) could become an additional policy instrument. Inserting the supply function equations, and solving conditional on expected values for taxes and inflation, we have the reaction functions for the unions[9]

$$w_j = \pi^e - \frac{\delta}{1+\delta}\left(t_j + k\right) \tag{24}$$

Next, substituting the three reaction functions (21) - (22) into (23) we obtain the equilibrium wage

$$\mathrm{w_j} = -\frac{\delta(1+\gamma)+\gamma(1+\delta)}{1+\delta+\beta}\mathrm{k} \tag{25}$$

That, in turn, gives the following equilibrium levels of inflation and taxation:

$$\pi^* = \frac{\gamma}{1+\gamma+\beta}\left[\left(1 - \frac{\delta(1+\gamma)+\gamma(1+\delta)}{1+\delta+\beta}\right)k - \frac{1}{2}\left(e_1 + e_2\right)\right] \tag{26}$$

$$t_j^* = -\frac{\beta}{1+\beta+\gamma}\left[\left(1 - \frac{\delta(1+\gamma)+\gamma(1+\delta)}{1+\delta+\beta}\right)k - e_j\right] + \frac{\beta}{1+\beta+\gamma}\left[\frac{\gamma}{2}\left(e_j - e_i\right)\right] \tag{27}$$

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a fixed amount (if q<0, as in Cukierman and Lippi). But whether this makes our trade unions more or less conservative with respect to inflation, depends on the value of δ. On the other hand (23) does include explicit penalties on large wage increases themselves (moderated by the presence of inflation). In that sense (23) generalises on the Cukierman-Lippi formulation.

[8] We do not consider the alternative formulation of (23) in which real wages are used as a supplementary form of monetary policy. This would involve giving the unions an explicit inflation objective; or giving them an explicit opportunity and framework within which they can coordinate with the Central Bank. That is a scenario for a subsequent paper. For now, we continue with the hierarchical form of our game, with a conventional objective function for the unions. That makes the wages a supplement to fiscal policy instead - and raises the possibility of greater coordination between the unions and their respective governments. As it stands, however, (6) penalises deviations from an equilibrium among wage bargainers where employees want to preserve the trend growth in real wages, and employers want to increase their output.

[9] This reaction function could be misleading, because it implies that a centralised union would always fix real wages below the level of a fragmented labour market. This is true only if we restrict the parameter δ to be greater than *0.* If we allow δ*<0* , we can consider the case in which the unions try to achieve an increase in real wage, i.e. they have a target nominal wage different from the expected inflation and are not inflation averse at all. Although not strictly rational (it violates the second order conditions for a minimum in the Trade Unions loss function), this extension does not change the basic implication of our results: that monetary union increases the power associated with a large, monopolistic union. How this monopoly will be used is an open question. Varying δ allows us to consider both the case where they try to increase the real wage extracted for the members, and the case where they stabilise employment at home at expense of employment abroad. That separates the cases where unions act with their own private interests at heart, i.e. $\delta \leq 0$, from the cases where they act more in the social interest: $\delta > 0$.

From these expressions it is clear that the labour market characteristics do not affect the way in which policies react to shocks. This is because wages are set before any shock occurs. Wages, in this framework therefore, represent a structural characteristic of the economy and can be used to influence economic policy only in so far as economic policy seeks to reach structural objectives (in this case represented by the parameter *k*).

As a result of this, the variances of the policies will be the same as in regime 1. And the impact of asymmetric shocks will also be the same. Similarly the same variance and covariance elements in (21) and (25) will continue to apply.

But the systematic part of the policy outcomes does change. If $\delta > 0$, which means the Trade Unions care about output stabilisation, it is easy to check that this regime will lead to lower inflation rates on average and smaller fiscal deficits on average[10]. This is because, with an extra "instrument" coming into play, output can be better stabilised with domestic policies. That means the central bank is free to devote more resources to inflation control, and the fiscal authorities more effort to deficit stabilisation. In other words, labour market interventions are being used to supplement, or substitute for, the other policy instruments.

(b) Social Contracts:

On the output side, there is again no systematic differences in national incomes. But substituting for w_j, t_j and π from (30), (31) and (32) in (2), we can write:

$$y_a = \left[\Omega(1-\Phi)+\Phi\right]k \qquad (28)$$

where

$$\Omega = \frac{\beta+\gamma}{1+\gamma+\beta}, \Phi = \frac{\delta(1+\gamma)+\gamma(1+\delta)}{1+\delta+\beta}$$

Aggregate income may therefore be larger or smaller on average than with decentralised bargaining, depending on the parameter values. For example, if γ is small and β fairly large (β>0.62), y_a will fall on average. That is the case of a conservative Central bank but liberal governments. Conversely, if β and γ are both small (both the policy authorities are conservative), then y_a will rise on average. Finally if δ is large enough[11], meaning that the unions are strongly committed to stabilising employment in their own economies rather than to the preservation of real wages, then y_a will again fall.

As far as fiscal policy is concerned, it is easy to see that $\partial E(t_j)/\partial\delta > 0$ holds for all values of the parameters. That means that a wages policy can always be used to

[10] Compare (31) with (12); (29) with (13); (30) with (11). This result holds for all values of the parameters.

[11] i.e. $\delta > \gamma\left(2\beta^2-\gamma-2\right)/\left[1+2\gamma\left(1-\gamma-2\beta(\gamma+\beta)\right)-\beta(1+\beta+2\gamma)\right]$ assuming the denominator of (28) to be positive.

substitute for fiscal deficits policy, although not necessarily always with the same degree of efficiency. This is our basis for arguing that a fiscally constrained governments will have an incentive to intervene in their labour markets when it comes to employment and output stabilisation. A wages policy can substitute for fiscal policy. Consequently governments may well have an incentive to move to a social contract: that is to a regime of centralised bargaining and less market flexibility, rather than the other way.

However, the use of wages policies does not guarantee greater fiscal discipline. More liberal governments will increase the average fiscal deficit, and make $E(t_j)$ more negative, if $\delta < (1+\beta)/(1+2\gamma)$. That will happen if there is a conflict between a conservative Central Bank and relatively liberal governments, so that fiscal policy has to bear the brunt of output stabilisation. But it wont happen if the Bank is also liberal; or if the unions care about employment. On the other hand, if the Central bank is already at least as conservative as the government ($\beta \geq \gamma$) - a condition we might expect - then increasing conservatism in monetary policy will increase the average deficit whatever the reactions of the unions.

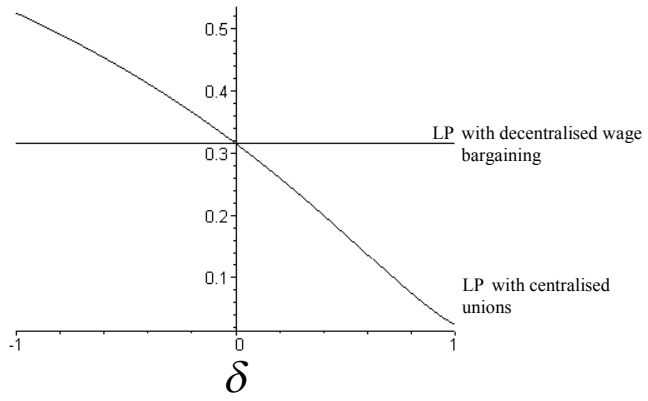
(c) Overall Performance Under This Regime

The objective function values are too complicated to analyse directly in this case. But we can evaluate them numerically. The welfare of the median voter can be obtained by substituting the three equilibrium expressions (30)-(32) into the loss function LP_j. This will therefore becomes a function only of the parameters of the model

$$\mathrm{LP_j} = \mathrm{LP_j}(\lambda, \beta, \gamma, \delta, \mathrm{k})$$

Numerical simulations then allow us to visualise how different parameter values affect the welfare of a representative individual, in comparison to the case of perfect decentralisation analysed before. Again we can abstract from the effects of shocks because, as noted above, the stochastic elements and shocks variances are the same in both regimes. The typical outcome of that comparison, as wage bargaining behaviour varies from the self-interested to the most socially beneficial, is given below:

Figure 1: The Welfare Effect of Having Centralised Trade Union



$LP_j(\lambda = 1, \beta = 1, \ \gamma \ = 0.5, \text{k} = 1)$

It is clear from this that centralisation produces a benefit, from welfare point of view, only if wages bargaining can be used to achieve aggregate output objectives $(\delta > 0)$. Otherwise, as conjectured by Calmfors and Driffill, its power will collide with the objectives of the economic policy maker, making everybody worse off (this is our δ<0 case where the unions are self-interested).

5 - Regime 3: Asymmetries in Labour Market Institutions or Practices - a parable of flexible vs. inflexible labour markets

In this regime we analyse a different kind of asymmetry. Suppose the two countries have two different wage bargaining structures. In Country 1, a total decentralisation of bargaining produces wages equal to expected inflation. This is the economy with flexible labour markets.[12] In Country 2, total centralisation in wage setting makes wages a policy instrument in the hands of the union and wages will be set according to the reaction function (25). This is the economy with more rigid markets.

(a) Fiscal Policy Off

We will develop the argument gradually. First we switch fiscal policy (t = 0) off to see the relationship between monetary policies and asymmetries. In the light of (13), the best way to switch the policy off is to set β=0. With β=0 in both countries, but <u>not</u> CB, the monetary policy reaction function becomes:

[12] In this section we identify market flexibility with the sensitivity (or responsiveness) of wages and nonwage costs to changes to market pressures - as measured by excess demand or supply. The relevant indicators here are π^e, unemployment or the output gap. Comparing (10) with (24), the decentralised labour market is clearly the more flexible in this sense. This definition of market flexibility appears to be the standard one: Calmfors (1994, 1998), Danthine and Hunt (1994), Blanchard and Katz (1999), Vinals and Jimeno (2000) all use the same definition.

$$\pi = \frac{\gamma}{1+\gamma+\beta}\left[\frac{1}{2}(w_1+w_2)+k-\frac{1}{2}(e_1+e_2)\right] \quad (29)$$

Substituting the wage formation rules (10) and (24) for countries 1 and 2 respectively, into (29) we obtain:

$$\pi = \frac{\gamma}{1+\gamma}\left[\frac{1}{2}\left(\pi^e+\pi^e-\frac{\delta}{1+\delta}k\right)+k-\frac{1}{2}(e_1+e_2)\right]$$

and simplifying

$$\pi = \frac{\gamma}{1+\gamma}\pi^e - \frac{\gamma(2+\delta)}{(1+\gamma)(2+2\delta)}k - \frac{\gamma}{1+\gamma}\frac{(e_1+e_2)}{2} \quad (30)$$

Assuming rational expectations and white noise properties for the shocks we have:

$$E\pi = \frac{\gamma}{1+\gamma}\pi^e + \frac{\gamma(2+\delta)}{(1+\gamma)(2+2\delta)}k \text{, or}$$

$$E\pi = \frac{\gamma(2+\delta)}{2(1+\delta)}k \quad (31)$$

Substituting (31) into (30) we obtain the level of inflation as determined by the Central Bank:

$$\pi = \frac{\gamma(2+\delta)}{(2+2\delta)}k - \frac{\gamma}{1+\gamma}\frac{(e_1+e_2)}{2} \quad (32)$$

From (32) one source of interaction between wage setting and monetary policies is clear. If wage setters in country 2 care about employment (δ is large), they help to reduce the political pressure on the Central Bank to satisfy the output target k. On the other hand this interdependence between Trade Union behaviour and monetary policy is not evenly distributed, given that centralised wage bargains are present in only half the Monetary Union. We look at that next.

Given (32) and the wage equations (10) and (25), the aggregate and national aggregate supply functions will be equal to:

$$y_a = \frac{\delta}{2(1+\delta)}k + \frac{1}{1+\gamma}\frac{(e_1+e_2)}{2} \quad (33)$$

$$y_d = \frac{\delta}{1+\delta}k + \frac{1}{2}(e_1-e_2), \quad (34)$$

implying

$$y_1 = \frac{2+\gamma}{2+2\gamma}e_1 - \frac{\gamma}{2+2\gamma}e_2 \quad (35)$$

and

$$y_2 = \frac{\delta}{1+\delta}k + \frac{2+\gamma}{2+2\gamma}e_2 - \frac{\gamma}{2+2\gamma}e_1 \qquad (36)$$

In this case aggregate output is affected by wage bargaining as long as the unions will accept that a reduction in real wages is a way to boost employment in their own country. But if they do that, both aggregate output and the differences between the national outputs will be systematically increased - that is before any shocks, country specific or otherwise. However, if they do not, y_a and y_2 will both be smaller. Hence, because of the asymmetric structures, the common monetary policy has created a permanent asymmetric shock throughout the currency union: country 2 benefits from a systematic output expansion when country 1 does not.

(b) Monetary Policy Off

Secondly we switch off monetary policy by setting γ=0, to see the interactions between fiscal policy and the labour market. But with $\gamma = 0$, the two fiscal policies will become:

$$t_1 = -\frac{\beta}{1+\beta}(k - e_1) \qquad (37)$$

in country one (the one with flexible labour market). And

$$t_2 = -\frac{\beta}{1+\beta+\delta}k + \frac{\beta}{1+\beta}e_2 \qquad (38)$$

in country 2 (the one with a less flexible labour market). Evidently the deficit will be larger in the country with the more flexible labour market: the deficit in (37) will typically be larger than that in (38), because of the term in δ, even if fiscal policies do not react to foreign shocks or spillovers from foreign shocks. Conversely, output will be lower in the country with larger deficits, and higher in the country with smaller deficits: i.e.

$$y_1 = \frac{\beta}{1+\beta}k + \frac{1}{1+\beta}e_1$$

$$y_2 = \frac{\beta+\delta}{1+\beta+\delta}k + \frac{1}{1+\beta}e_2$$

implies $Ey_2 > Ey_1$. Again there are systematic differences, even under a common monetary policy.

(c) All Policies Active

The reaction functions for the three policy authorities in this regime are as follows:

$$\pi = \frac{\gamma}{1+\gamma+\beta}\left[\frac{1}{2}(w_1 + w_2) + k\right] \tag{39}$$

$$t_1 = -\frac{\beta}{1+\beta+\gamma}\left[w_1 + k - e_1\right] + \frac{\beta}{1+\beta+\gamma}\left[\gamma\frac{(w_1 - w_2)}{2}\right] \tag{40}$$

$$t_2 = -\frac{\beta}{1+\beta+\gamma}\left[w_2 + k - e_2\right] - \frac{\beta}{1+\beta+\gamma}\left[\gamma\frac{(w_1 - w_2)}{2}\right] \tag{41}$$

in which we have set the shocks to be equal to zero, for simplicity. Substituting (39) - (41) into the wage rule for each market:[13]

$$w_1 = \pi^e$$

$$w_2 = \pi^e - \frac{\delta}{1+\delta}(t_1 + k)$$

and solving the resulting equations simultaneously, we have:

$$w_1 = -\frac{\Omega(\Theta + \Theta\Psi - 2)}{2(1-\Omega-\Theta) + \Theta\Omega\Psi}k \tag{42}$$

$$w_2 = -\frac{2(\Theta - \Theta\Psi - \Omega) + \Omega\Theta(\Psi - 1)}{2(1-\Omega-\Theta) + \Theta\Omega\Psi}k \tag{43}$$

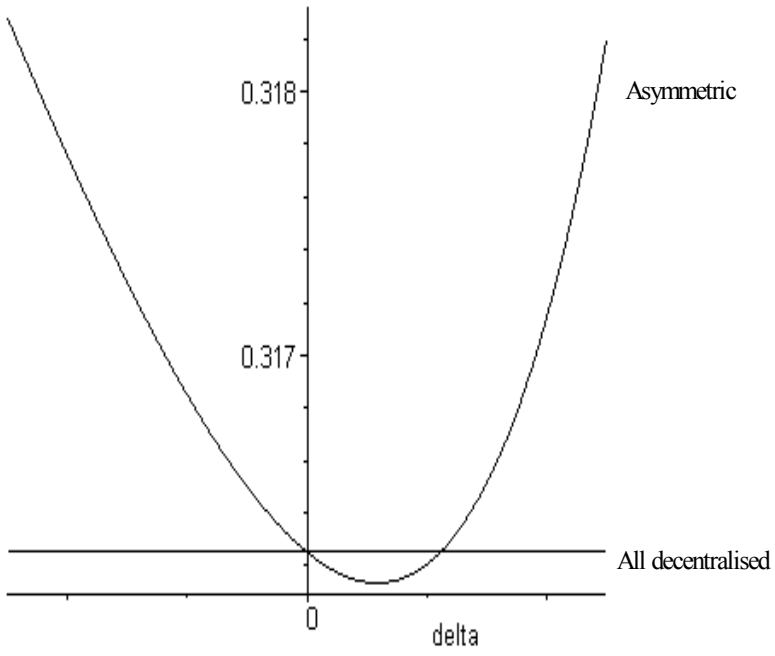
$$\Omega = \frac{\gamma}{1+\gamma+\beta}, \Psi = \frac{\beta}{1+\gamma+\beta}, \Theta = \frac{\delta}{1+\delta}$$

Then substituting (42) and (43) into the reaction functions of the policy makers and solving simultaneously, would give us the equilibrium levels of inflation, taxation and output. But looking at the complexity of expressions (42) - (43), it is clear that none of those results would give us any clear indication of what is going on. We therefore prefer to analyse the relationships numerically, looking at the effect on public welfare of having asymmetric structures in the labour market, and comparing these results to the regimes analysed previously.

As before, we analyse the effect of asymmetries, given a certain set of typical parameters: we choose $\lambda = 1, \beta = 1, \gamma = 0.5, k = 1$ and allow δ to vary to show the effect (on the outcomes in both countries) of different union behaviour. Figure 2 presents the welfare implications for Country 1, with flexible markets, when it has to share a monetary union with a country which has a centralised labour market and markets less flexible than its own.

[13] Recall that the wage setters are the "followers" in our hierarchical game.

Figure 2 - Country 1: the flexible market economy. A Comparison of the Welfare Effects of Having to Share a Monetary Union with a less Flexible Economy (β=λ)



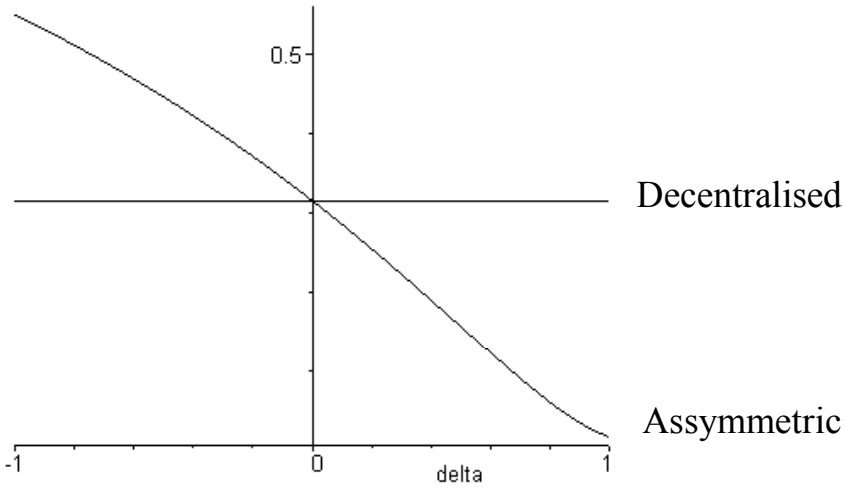
What is striking in figure 2 is that for a country with decentralised labour market, it is almost always more costly to have to share a monetary union with a country that has more centralised wage bargaining structure, independently of the preferences of the Trade Unions in the centralised economy.[14] This is because the common monetary policy reacts to this asymmetry by shifting the cost of adjustment onto the country with more flexible markets and without a centralised wage bargaining structure. Only when the wage setters in the centralised economy choose to behave like the wage setters in the decentralised one, by trying only to preserve the value of their real wage (i.e. when $\delta \to 0$), does the more flexible economy become indifferent to joining a monetary union of countries less flexible than itself. In all other circumstances its welfare would be higher outside the union.

What we have here is a second "Groucho Marx theorem" for currency unions. The first version, based on a traditional analysis of inflation control, says that a country would only want to join a monetary union consisting of countries with greater monetary credibility than itself; but that those already in the union would only accept new members who had at least as much credibility as they had (Hughes Hallett, 1998). But the second theorem comes from figure 2, and shows that, given differences in market flexibility, a country with flexible markets would only want to

[14] Notice the vertical scale in figure 2. If the asymmetric regime produces any gains at all, they are vanishingly small (less than $^1/_3$%) over regime 1. But losses are much more likely and very much larger. The reasoning is as follows. If β<λ you never get any gains over regime 1, not even the vanishingly small element in figure 2, because fiscal policy does not react to stabilise output as much as people would like - which is especially damaging at small values of δ where unions don't care about employment/output stabilisation either. That lifts U curve as a whole above - line. Hence regime 1 looks better all the time. However as δ increases country 1 gets ripped off more and more as shown below (38) and below (36): $Ey_2 > Ey_1$ and $Et_1 < Et_2 < 0$. But if β>λ, you get the opposite result, and for that reason gains do show up for small values of δ.

join a monetary union that consists of countries whose markets are at least as flexible as its own. And, to get the converse, we plot the corresponding welfare function values for the more centralised economy (country 2):

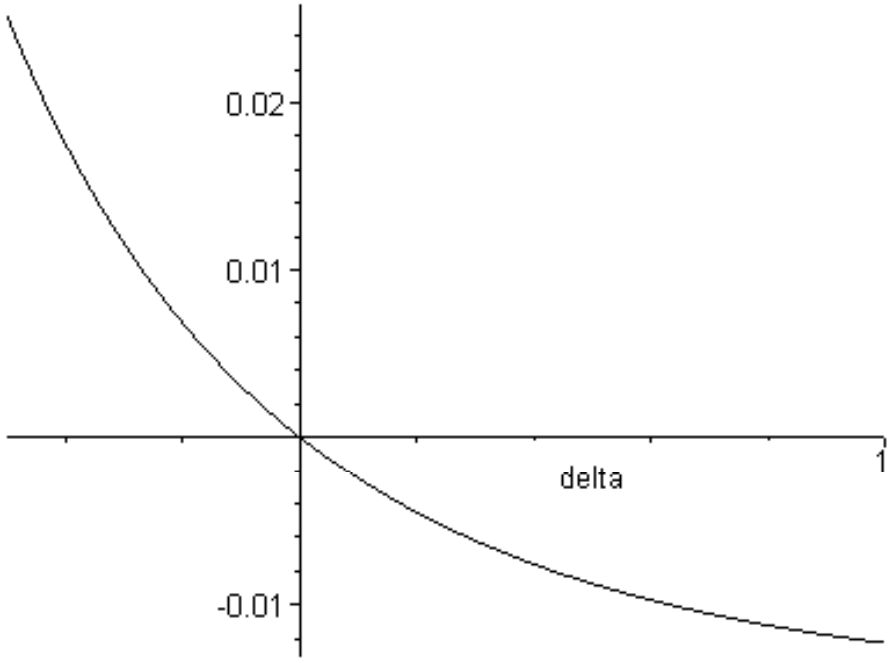
Figure 3 - Country 2, the rigid market economy. A comparison of the welfare implications of having to share a monetary union with a more flexible economy.



This figure shows that country 2 would be indifferent to having a more flexible country join the union only if the wage bargainers in country 2 did not care about output and employment objectives. If they do care about those targets $(\delta \to 1)$, then they would actually like country 1 to join. In other words, a country with less flexible markets would only be prepared to accept new members with more flexibility than themselves, not those with less. Thus those "eligible" to join, wont want to. This completes the theorem.

This theorem has the following awkward implication. If a monetary union is nevertheless formed, a joining country with decentralised or flexible markets has no incentive to retain those characteristics once it is a member. If we compare country 1's expected losses if it is centralised as well (regime 2), with its expected losses if it remains decentralised in an asymmetric union (regime 3), we find that its welfare improves if it moves to centralised, less flexible markets. This is shown in figure 4 below for all values of $\delta > 0$: (a similar story also holds for country 2, as can be inferred from figure 1)

Figure 4. The loss, for country 1, in having to share an asymmetric union with a less flexible market economy compared to becoming equally centralised/inflexible as its partners. The vertical axis measures the expected loss function value, for country 1 under regime 2, less that in regime 3 - so that a negative value implies an increase in welfare for regime 2.



Consequently

- Asymmetries matter. Countries with more flexible labour markets will face costs in joining a union with less flexible markets.
- Countries with less flexible markets face a positive incentive to form unions with, or accept new members from, those who have more flexible markets than themselves. This is because they can shift some of the costs of macroeconomic adjustment onto the countries with more flexible markets
- But once in the union, there is no incentive to make the labour market more flexible. In fact the incentive is to make them less flexible, up to the level of the least flexible in the union, since this allows national policy makers to bring in labour market policies an extra policy instrument to replace that lost to the common monetary policy. As Krueger (2000) says, countries will maintain distinct labour practices when they can bear the costs of those practices.

If there is no incentive to decentralise, it is doubtful that a dynamic analysis would show anything different - except to highlight this tendency to converge towards centralisation.[15] This result may explain the reluctance of some countries to liberalise their markets despite the competitive pressures generated by a common currency regime. These results therefore demonstrate:

(i) that Calmfors's (1998) conjecture, that EMU is unlikely to increase labour market reform in Europe, is actually correct. And

(ii) that may explain why the more flexible economies, such as the UK or Denmark, have been reluctant to join.

6 - Conclusions

This paper has established three things about asymmetries in the operation of a monetary union

- Asymmetries are important, both in structures and in shocks. And they are important when there are differences in preferences between the different sets of policy makers who operate their own policy instruments.
- Asymmetries may arise when there are differences in institutional practices, even when everything else is symmetric and there are no shocks.
- But the main problem caused by asymmetries stems from differences in market structures and institutions. We found that countries with flexible markets will not wish to join an union of economies with markets less flexible than their own, because that allows the less flexible economies to shift their adjustment burdens onto the more flexible. By the same token, the less flexible will prefer only the more flexible to join. These results imply there is actually little incentive to decentralise and make markets more flexible once countries have joined. Indeed, if anything the incentive is to centralise because, to the extent that wage setters already can be persuaded to share targets with their governments, employment conditions can be used as an extra policy instrument to improve national welfare.

[15] The reason for this is that dynamic analyses have already shown, in a two period problem for example, that the second period is effectively tied down by the need to assume an equilibrium outcome for the terminal conditions. All the trade-offs and policy conflicts therefore have to happen in the first period. That effectively reduces the problem to one of comparative statics between the start of the first period and the start of the second: see Jensen (2000). But, given the sequential nature of the decisions in our model, that is exactly the same as the comparative static result in our paper. Since we already have a dynamic process in the structure of our game, nothing is actually added if we further embed it in an explicit dynamic setting (Hughes Hallett and Viegi, 2000).

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