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STRUCTURAL REFORMS AND THE ENLARGEMENT OF MONETARY UNION

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Abstract

The paper addresses the question what effects the enlargement of a monetary union will have on necessary structural reforms in the (low distortion) member countries and the (high distortion) candidate country. While monetary union lowers reforms in the candidate country, members of the monetary union will increase their reform efforts. The paper then proceeds to derive the conditions if and when the countries agree to an enlargement of the monetary union.

Keywords: Monetary union, asymmetric shocks, inflation, structural reforms, convergence

JEL Classification: E61, E63, F33

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1. Introduction

On January 1, 1999 monetary union in Europe commenced with only a subgroup of the members of the European Union. 11 of the 15 member states gave up independent monetary policy and the common central bank, the European Central Bank, assumed control over monetary aggregates. Having successfully started monetary union, one of the major issues and tasks for the near and intermediate future is the enlargement of the EMU. EU non-members to the EMU can be separated in two groups: those for the moment willingly abstaining from it (Sweden, Denmark and the UK), and those not fulfilling the entry criteria (Greece). While these cases are more or less unproblematic for the current members, this is less clear for the expected enlargement of the EU to the Middle and Eastern European countries. Candidates such as Estonia, Poland, Hungary, Cyprus, Slovenia and the Czech Republic are so-called fast track applicants, likely to join the EU in the next 5-7 years (see *The Economist's Survey on Europe*, October 23, 1999).¹ The question, then, will be whether these countries could be deemed sufficiently close in economic structure to join the EMU as well. Even among this group, there are countries that are quite a distance away from fulfilling the Maastricht criteria for joining EMU (for a general discussion of convergence, see Fischer et al. 1997). In particular, the requirements concerning inflation, interest rates and public deficits are not fulfilled by most of them (see Temprano-Arroyo and Feldman 1998, Masson 1999). But is it really necessary and desirable that these countries fulfill the criteria and what impact would it have if they did not?

Most of the literature on monetary unification stresses the importance of similarity of economic structures for the success of a monetary union (the huge literature is surveyed in Bayoumi and Eichengreen 1996, Gros and Thygesen 1998 among others). But this literature usually takes the economic structure of the countries under consideration as given, without addressing the fact that countries are changing their economic structures over time (see Frankel and Rose 1998 on the

¹ Formally, the EU, at its Helsinki summit in December 1999, has extended this group to another 7 countries: Latvia, Lithuania, Bulgaria, Romania, Slovak Republic, Malta and Turkey.

endogeneity of optimum currency areas). This obviously raises the question when a candidate country might be appropriately reformed to be admitted and willing to join an existing monetary union.

This issue has been addressed in a paper by Martin (1995) who, however, takes the convergence of an economy with high distortion, in that case a need for high seigniorage revenues, as given. The question addressed there is when is the earliest point in time that a low distortion monetary union would allow a converging economy to enter. This, obviously and deliberately, neglects many of the strategic aspects that are involved in such a decision as it takes convergence as given. Endogenous structural reform, in turn, has been analyzed in a paper by Beetsma and Jensen (1999). In that paper, the candidate country must decide upon the amount of reform that is undertaken, in addition to an exogenous component that evolves over time, like in Martin (1995). However, in this setup only the existing monetary union can decide whether the candidate should be admitted or not. By construction, the candidate country can only gain from joining and would thus always want to join. The main reason is that the candidate country has a serious time-consistency problem, due to the high level of distortions, that results in relatively high inflation. Monetary union is a convenient way to solve this problem. However, a fact that is also stressed in Martin (1995) is that independent monetary policy, for stabilization purposes, might have a positive value for the candidate as well and that therefore the country should decide if it is willing to join, even if invited to do so.

The present paper aims to bring these various aspects together. It allows for economic distortions in both countries, because it is by no means an uninteresting question which impact a possible enlargement has on the course of economic reforms within the monetary union. At least in the case of the EMU, the present members of the monetary union need to conduct structural adjustments themselves and the question is whether these are speeded up or slowed down by enlargement. The paper also allows for asymmetric shocks that constitute a potential reason for the

candidate country to rather stay outside the monetary union, even if joining would be possible. Hence, both countries have to agree to an enlargement.²

In focusing on the economic reforms interacting with the choice of the monetary regime, the present paper is also related to a literature that asks whether joining a monetary union is conducive to structural reforms within the member countries. Calmfors (1998) and Sibert and Sutherland (1997) have argued that labor market reforms are less likely to be pursued by member countries because these interact with the time-consistency problem. As the latter is automatically reduced by monetary union, there is less incentive for a government to implement structural reforms. This result is confirmed by Beetsma and Jensen (1999) who also distinguish between reversible and irreversible monetary union.³ This result, however, does not generally hold, as is shown below.

The paper is structured as follows: The next section presents the basic model and derives monetary policy decisions in the two countries, that is the members of the existing monetary union are treated as one country. Section 3 determines, depending on the monetary regime, the amount of structural reforms in the monetary union and the joining country. In this section, structural reforms are chosen every period and can thus be reversed by the then present government. This should allow to account for policy reversals within and outside the monetary union. It is also an important benchmark case for later discussion. Section 4 analyzes under what circumstances the enlargement of the monetary union is possible. Section 5 draws the conclusions of the model for the case of persistent economic reforms. Section 6 concludes.

² This aspect is very generally discussed by Alesina and Grilli (1993).

³ They show that with irreversible monetary union candidates reduce their reform efforts once they are members of the union. On cycles and reversals in economic reform in general, see Mondino et al. (1996).

2. Monetary Policy with and without Monetary Union

2.1. The Basic Model

Consider two countries, one in which the level of structural distortions is relatively high and that is labelled H. The other, the monetary union, labelled L, is characterized by structural distortions as well, but these are lower than in H. This should capture the presence of strong asymmetries between the existing monetary union and the candidate for enlargement. In reality, many of the candidates in Eastern Europe are still characterized by high unemployment, an insufficient tax system and distributional conflicts which give rise to a relatively high rate of inflation. Nevertheless, country L has its own distortions that should be dealt with. Here in particular distortions in the labor market, mainly held responsible for high unemployment in western European countries, come to mind (see OECD 1994, Siebert 1997). Thus in both countries structural reforms have to be undertaken to achieve full economic potential.

Each country has a government that determines the amount of structural reforms to be implemented in each period, and a monetary authority that determines the course of monetary policy. Both interact with a private sector that rationally forms expectations about the rate of inflation the central bank will set in response to the economic situation in period t . Both are interested in achieving full potential output and avoiding inflation. The government has in addition an interest in the extension of the monetary union, and is reluctant to implement structural reforms.

The timing in each period is as follows: (i) inflation expectations are formed and structural reforms are executed, (ii) the stochastic shocks occurs, (iii) monetary policy is set, and (iv) output is determined. This means that reforms will be implemented before monetary policy is set and before the economy is hit by exogenous events.

I now turn to the formal description of the economy. Initially, it is assumed that structural reforms are time independent, thus distortions in t are influenced by structural reform in t (see also Beetsma and Jensen 1999). This is not as unrealistic as it might seem at first sight. Unemployment benefits, minimum wages or tax rates are often adjusted by a government on a yearly basis. Moreover, changes in the governing party might involve changes in these areas too. Often, new

incoming governments turn back the reforms that the previous government has implemented. This has happened in countries in Eastern Europe and also in countries like Germany or France where a change in the government has implied that formerly implemented reforms have been taken back (see e.g. Saint-Paul 1996). In particular if the level of distortion is relatively low, nothing ensures that reforms follow a consistent path. Moreover, this simplification helps to focus more clearly on the issues involved. It will turn out, though, that the results derived in this setup will hold as well when allowing for reforms to be persistent, as will be shown in section 5.

With these assumption, output in country i is

$$y_t^i = \pi_t^i - E[\pi_t^i] - \bar{y}_t^i + \varepsilon_t^i \quad i=L,H. \quad (1)$$

The (log of) potential output is normalized to zero and $-\bar{y}_t^i < 0$ denotes the presence of distortions in economy i . As indicated above, this could be due to the presence of strong regulation of the economy in matters of employment and production, a strong presence of government in the economy (such as a large state owned sector), or an insufficient and distortive tax system. Hence, without positive shocks or active monetary policy, the actual output is below its potential because of these distortions. Distortions in period t are characterized by

$$\bar{y}_t^i = k^i - c_t^i \quad i=L,H. \quad (2)$$

There is a given level of structural distortions k^i which can, however, be reduced through (politically costly) structural reforms c in period t . The output (1) is furthermore affected by country specific exogenous shocks, ε_t^i , and by monetary surprises $\pi_t^i - E[\pi_t^i]$, with π denoting inflation and E the expectations operator. Shocks are assumed to have the following properties: $E[\varepsilon_t^i] = 0$, $E[(\varepsilon_t^i)^2] \equiv (\sigma^i)^2$, with a constant variance.

Government preferences are given over an infinite horizon. Utility is

$$V^i = \sum_{t=1}^{\infty} \delta^{t-1} (v_t^i) \quad i=L,H, \quad (3)$$

where δ is the common discount factor. Per period utility (in logs) for the government is

$$v_t^i = -\left\{ b(y_t^i)^2 + (\pi_t^i)^2 + \gamma(c_t^i)^2 \right\} + \lambda G^i \quad i=L,H. \quad (4)$$

Thus the government in country i aims to minimize differences between actual and potential output and also to minimize deviations of inflation from zero. Structural reforms are (politically) costly and are thus opposed. The more reforms are executed, the higher the costs for the government. Finally, G^i is the (political or otherwise) gain for country i from extending monetary union, λ is a dummy with $\lambda = 1$ when country H enters the union and $\lambda = 0$ otherwise.

Notice that all parameters in the utility function are set equal across L and H , with the exception of G . This is because I wish to abstract from gains or losses arising through monetary unification that are simply due to differences in preferences. All governments have the same strong interest to avoid inflation and are also equally reluctant to implement structural reforms. Hence, all aspects discussed below are due to structural differences in the two economies. Moreover, given the consensus that monetary policy is not a instrument that can persistently increase output and that therefore most governments around the world place increasingly high importance on avoiding inflation, it makes sense to assume that $b < 1$ for all countries. However, I allow for different G^i 's. Depending on the relative size of L and H , one might expect that the larger country has less to gain in political terms than the smaller partner. When considering for instance the countries of Central and Eastern Europe, the integration into the European Union might serve as an important signal of and commitment to democratic reforms, something that might not play such an important role for the current EU members. Political gains for the EU could, on the other hand, be the avoidance of a strong migratory pressure, the aim to reduce the danger of armed conflicts and the like. Thus, the two countries have probably very different political gains to expect from an extension, without being necessarily sure who gains more.

2.2. Monetary Policy without Monetary Union

Monetary policy is set by the central bank whose preferences are given as

$$U^i = \sum_{t=1}^{\infty} \delta^{t-1} (u_t^i) \quad i=L,H. \quad (5)$$

The central bank has preferences very similar to those of its government, but without being particularly interested in the achievement of monetary union⁴, nor being concerned with the implementation of structural reforms.⁵ Again, since conflicts between central bank and government in a given country are not focused upon, I set the utility weight parameters equal to those of the government. The period utility of central bank i is

$$u_t^i = -\left\{ b(y_t^i)^2 + (\pi_t^i)^2 \right\} \quad i=L,H. \quad (6)$$

Monetary policy is set after the government has decided upon structural reforms and after a possible shock to the output in country i has occurred. By assumption, the central bank has full control over the rate of inflation. Taking expected inflation as given and imposing rational expectations, the equilibrium rate of inflation is

$$\pi_t^i = b\bar{y}_t^i - \frac{b\varepsilon_t^i}{1+b} \quad i=L,H. \quad (7)$$

⁴ Actually, one would expect that central banks place a negative value on the achievement of monetary union. Bureaucracy theory at least would suggest that they are interested in maintaining their independence. This is neglected here.

⁵ Here as well, one might argue that the central bank has an opposite interest in structural reforms than the government has. In fact, central banks would probably argue that reform should be implemented because this relieves them from some of the pressure to achieve employment through active monetary policy. I abstract from this as well.

As wellknown in the literature, the central bank will compensate a high degree of structural distortion with increases in inflation. Given rational expectations, the public will expect inflation of this size so that this systematic component of monetary policy has no output effect (Barro and Gordon 1983). The bank will also partly stabilize exogenous shocks ε_t^i .

2.3. Monetary Policy in the Monetary Union

In a monetary union, monetary policy is determined by both formerly separated authorities. The common central bank's per period utility function is assumed to be

$$u_t^{CC} = u_t^L + \varphi u_t^H \quad (8)$$

where the joining candidate H has a lower weight than the monetary union, thus $\varphi < 1$. When dealing with the case of an existing monetary union and a new member, it is not very likely that the candidate will receive the same decision power as the current members.⁶ This is particularly true for the case of the EMU; new members will certainly have less voting power than the current members together.

Again, the central bank takes expectations as given when choosing the optimal rate of inflation. Taking rational expectations into account, it will be given as

$$\pi_t = b \left(\bar{y}_t^L + \varphi \bar{y}_t^H \right) - \frac{b (\varepsilon_t^L + \varphi \varepsilon_t^H)}{(1+b) + (\varphi + b)}. \quad (9)$$

Thus, the common central bank will care for structural distortions in both countries, where the relative weight φ determines by how much developments in H are taken into account.

⁶ Indeed, experiences with the extension of the German monetary union to the former Eastern Germany suggest that the influence of the newcomers will be reduced (see Hefeker 1999).

3. Structural Reforms under Autonomy and with Monetary Union

The central bank's reaction is taken into account by the government when it determines by how much structural distortion should be reduced in period t . The incentive for the government to lower the structural distortion is twofold. For one, this will increase output directly and thus increase political support (or utility) for the government. For another, this will reduce the central bank's incentive to increase output through inflation. Hence, lower inflation will result when reforms are implemented and this additionally benefits the inflation averse government. Clearly, absent any costs of reform, the government would therefore abolish distortions completely. But since these are politically costly, reforms will be limited.

3.1. Reforms under Autonomy

We begin with monetary autonomy in L and H. The government optimizes (4) with respect to c_t^i and subject to (7). This leads to

$$c_t^i = \frac{\beta k^i}{\gamma + \beta} \quad i=L,H, \quad (10)$$

with $\beta \equiv b(1+b) > 0$.

Because distortions are given as $\bar{y}_t^i = k^i - c_t^i$, under monetary autonomy a level of distortions in period t of

$$\bar{y}_t^i = \frac{\gamma k^i}{\gamma + \beta} \quad i=L,H \quad (11)$$

results. The level of distortions in every period t is increasing in the initial distortion k^i .

3.2. Monetary Union: Reforms in Country L

Structural reforms in the two countries are no longer similar for the case of monetary union, which is due to the fact that monetary policy reacts asymmetrically strong to the developments in the L and H. Subject to (9), government L optimizes (4) with respect to c_t^i . This yields

$$c_t^L = \frac{k^L \beta (\gamma + b) + \gamma \phi b^2 k^H}{B}, \quad (12)$$

with $\beta^H \equiv b(1 + \phi^2 b) > 0$ and $B \equiv \gamma(\gamma + \beta^H) + \beta(\gamma + b) > 0$. Notice that $\beta > \beta^H$ since $\phi < 1$.

This allows directly to calculate the degree of distortions in L in period t as

$$\bar{y}_t^L = \frac{\gamma}{B} \{ (\gamma + \beta^H) k^L - \phi b^2 k^H \}. \quad (13)$$

Equations (12) and (13) show that the introduction of monetary union between L and H creates spillovers of distortions between the two members. Country L is now, via the common monetary policy, affected by the economic situation in H. How, exactly, are economic policy and structural reform in L affected through monetary union? This is stated in Proposition 1.

Proposition 1:

The extension of monetary union to a high distortion country will induce more reform in the low distortion country.

Proof: Comparing (11) and (13) shows that $\bar{y}_t^L(A) > \bar{y}_t^L(MU)$ requires $\phi b^2 [k^H b (\gamma + \beta) - \phi \beta k^L] > 0$ which is fulfilled, given that $\phi < 1$ and $k^H > k^L$.

The intuition for this result is straightforward. Because country L is inflation averse it wants to avoid that high distortions in H increase common inflation. To lower the incentives for the common

central bank to increase inflation, distortions in L have to be reduced. Therefore, extension of the monetary union to H leads to more structural reforms in L. This result has so far been neglected in the literature because it was always assumed that L exhibits no distortions. Notice that this result reverses that found by Calmfors (1998) and Sibert and Sutherland (1997). In those papers (symmetric) countries can always export part of the inflationary consequences of distortions, which leads them to roll back structural reforms after monetary union. Here, however, some (asymmetric) countries import inflationary pressure and will increase structural reforms to counter this effect. Thus, extension will have positive effects for L's output and employment.

3.3. Monetary Union: Reforms in Country H

Turning to the high distortion economy H, joint monetary policy will result in the following level of reforms by government H

$$c_t^H = \frac{k^H(\gamma\beta^H + b\beta) + \gamma\phi b^2 k^L}{B}. \quad (14)$$

This leads directly to a level of distortion in H in period t of

$$\bar{y}_t^H = \frac{\gamma}{B} \{(\gamma + \beta)k^H - \phi b^2 k^L\}. \quad (15)$$

Thus, the decision of government H is as well affected by L's distortion. Proposition 2 addresses the sign of this externality.

Proposition 2:

By entering monetary union, distortions in country H will increase for moderate values of γ .

Proof: The condition for $\bar{y}_t^H(\text{MU}) > \bar{y}_t^H(\text{A})$ is $k^H \gamma (1 - \varphi^2) + \beta (k^H - \gamma \varphi k^L) > 0$ which is fulfilled, given $\varphi < 1$, $k^H > k^L$ and that γ is not too large.

This result, whose general content has already been established by Calmfors (1998), Sibert and Sutherland (1997) and Beetsma and Jensen (1999) in related contexts, follows the reverse logic of the above argument. Because inflation in H is automatically reduced when entering monetary union, there are less incentives for government H to reduce the structural distortions in the economy. This result can only be reversed if the new member has an overproportional impact on the common monetary policy ($\varphi > 1$). In this case, H would push up the common rate of inflation, and in order to avoid this happening, would increase its own reform efforts. This is, as indicated above, rather unlikely. A high γ in turn would imply that \bar{y}_t^L falls only relatively little so that the common rate of inflation would remain relatively high and H could not "export" the inflationary pressure stemming from its own distortions. Hence, \bar{y}_t^H could not increase.

4. Enlargement of the Monetary Union

4.1. The Consideration of Government L

Under which conditions will it be optimal for country L to admit country H to the monetary union? In general, there are two aspects that enter the considerations of government L. The negative aspects are clearly that the higher distortions in H will induce the common central bank to increase the rate of inflation, thus there is the danger of an import of inflation for L. Moreover, shocks will no longer be optimally stabilized. L might be faced with higher inflation due to large negative shocks on H. Depending on how these are correlated with shocks to the own economy, this can be more or less than adequate for the own needs of L. On the positive side, one could count the political gains from monetary union and the reduction of structural distortions in L. To counter inflationary impulses due to the integration of H in the monetary union, L has stronger incentives to conduct structural reforms when in a monetary union with L. While this is clearly beneficial from an economic point of

view, it is not all certain that the governments favors these additional reforms. Given that reforms are politically costly, it will oppose being forced to implement more reforms than in autonomy.

To keep matters simple, the considerations of shocks are restricted to one country only and thus $\varepsilon_t^L = 0$, $\varepsilon_t^H = \varepsilon_t$ in what follows. It is assumed that only country H is hit by an idiosyncratic shock but that L is not affected by it.⁷ For the present purpose, one only needs to be concerned by how much the optimal response to economic shocks in any country is compromised through monetary union. In as much as shocks are identical, monetary union does not distort the optimal response for country i. Problems do only arise if asymmetric shocks occur that are not appropriately countered because the common central bank will respond with a reduced policy reaction to the shock. This idea, and the qualitative implications of it, can already be captured by modelling only one shock. Without loss of generality, it is assumed that this shock affects country H. For L this implies that monetary policy will react to a shock that is of no concern for itself, while monetary union implies for H that the response of the common central bank will be weaker than that of the national central bank.

To be able to confirm that there is an incentive for L to admit H to the monetary union, one has to show that there are cases in which L profits from the enlargement of monetary union. To see this, we begin with government utility under monetary autonomy (A). It is

$$u_t^L(A) = - \left\{ b \left(-\bar{y}_t^L(A) \right)^2 + \left(b \bar{y}_t^L(A) \right)^2 + \gamma \left(c_t^L(A) \right)^2 \right\}, \quad (16)$$

whereas under monetary unification (MU) it is

⁷ For a general discussion of symmetric and asymmetric shocks in a monetary union, see Lane (1999).

$$\begin{aligned}
u_t^L(\text{MU}) = & - \left\{ b \left(- \frac{b\varepsilon_t}{(1+b)+(\varphi+b)} - \bar{y}_t^L(\text{MU}) \right)^2 \right. \\
& + \left[b(\bar{y}_t^L(\text{MU}) + \varphi\bar{y}_t^H(\text{MU})) - \frac{b\varepsilon_t}{(1+b)+(\varphi+b)} \right]^2 \cdot \\
& \left. + \gamma(c_t^L(\text{MU}))^2 \right\} + G^L
\end{aligned} \tag{17}$$

Comparing the utility levels, one has to concentrate on expected values because of the stochastic shock. The condition for $E[u_t^L(\text{MU})] > E[u_t^L(\text{A})]$ is

$$\begin{aligned}
b \left[(\bar{y}_t^L(\text{A}))^2 - (\bar{y}_t^L(\text{MU}))^2 \right] + G^L > \\
\left[b(\bar{y}_t^L(\text{MU}) + \varphi\bar{y}_t^H(\text{MU})) \right]^2 - \left[b(\bar{y}_t^L(\text{A})) \right]^2 \\
+ \gamma \left[(c_t^L(\text{MU}))^2 - (c_t^L(\text{A}))^2 \right] + \frac{\beta b \sigma^2}{((1+b)+(\varphi+b))^2}
\end{aligned} \tag{18}$$

with $\sigma^2 = E[\varepsilon_t^2]$. The interpretation of this condition is straightforward. On the LHS, expressing the gains from expanding monetary union, are the political gains G^L and the positive effects from more structural reforms on output. On the RHS the costs of monetary union for L are collected. The first term expresses the potential increase in inflation which is due to the fact that the common central bank will take care of the structural distortion in H and increase its rate of inflation accordingly. Whether the expression is overall positive depends upon the size of the distortion in H and by how much this influences the monetary policy of the common central bank. Because $\bar{y}_t^L(\text{MU}) < \bar{y}_t^L(\text{A})$ from proposition 1, it is actually possible that this term is negative. The second term compares this with the central bank reaction under autonomy. The third term on the RHS denotes the aversion of L to higher structural reforms, due to the political costs that government L has to bear when conducting more reforms. Finally, the last term expresses the losses from higher inflation due to the shocks to H.

4.2. The Consideration of Government H

By the same logic, one can compare utility under autonomy and monetary union for H. Using (1), (2) and (7) in (4), autonomy (A) gives government utility of

$$u_t^H(A) = - \left\{ b \left(-\bar{y}_t^H(A) + \frac{\varepsilon}{1+b} \right)^2 + \left[b \left(\bar{y}_t^H(A) - \frac{\varepsilon}{1+b} \right) \right]^2 + \gamma (c_t^H(A))^2 \right\} \quad (19)$$

whereas with monetary union (MU) it is

$$\begin{aligned} u_t^H(MU) = & - \left\{ b \left[\varepsilon_t \left(1 - \frac{b}{(1+b) + (\varphi + b)} \right) - \bar{y}_t^H(MU) \right]^2 \right. \\ & + \left[b (\bar{y}_t^L(MU) + \varphi \bar{y}_t^H(MU)) - \frac{b\varepsilon_t}{(1+b) + (\varphi + b)} \right]^2 \\ & \left. + \gamma (c_t^H(MU))^2 \right\} + G^H \end{aligned} \quad (20)$$

Thus, the condition for $E[u_t^H(MU)] > E[u_t^H(A)]$ is

$$\begin{aligned} & \left[b (\bar{y}_t^H(A)) \right]^2 - \left[b (\bar{y}_t^L(MU) + \varphi \bar{y}_t^H(MU)) \right]^2 + \gamma \left[(c_t^H(A))^2 - (c_t^H(MU))^2 \right] + G^H > \\ & b\sigma^2 \left[\frac{(\varphi + b)^2}{(1+b)((1+b) + (\varphi + b))^2} \right] + b \left[(\bar{y}_t^H(MU))^2 - (\bar{y}_t^H(A))^2 \right]. \end{aligned} \quad (21)$$

Again, the logic underlying this condition is straightforward. Country H profits from monetary union because the inflationary response to distortions in the economy should be lower under monetary union. This is the reduction in the time-consistency problem (the first two terms on the LHS). Depending on the level of distortions in L and the strength of the reaction of the common central bank to distortions in both countries, the difference could actually be negative. H also profits because structural reforms are lower and therefore lower political costs from structural reform have

to be borne (third term on the LHS), and because it realizes political gains from the union. Costs that are connected with monetary union are given through the fact that the idiosyncratic shock is not stabilized as much as under autonomy. Finally, H suffers as higher distortions under the monetary union lead to lower output (last term on the RHS).

4.3. How Likely is Extension? Some Comparative Statics

After the conditions under which each country would consent to the enlargement of monetary union have been derived, it is interesting to see how these conditions are affected by changes in the underlying parameter values. Therefore, the paper next proceeds to comparative statics on conditions (18) and (21). For this, it will be convenient to define a function ω_t^i which measures the gains from monetary union for government i . It is given as

$$E[\omega_t^i] = E[v_t^i(\text{MU})] - E[v_t^i(A)] \quad i=L,H. \quad (22)$$

Then net gain from monetary union over time is

$$E[\Omega^i] = E\left[\sum_{t=1}^{\infty} \delta^{t-1} (\omega_t^i)\right] \quad i=L,H \quad (23)$$

which expresses the expected discounted sum of gains from monetary union for country i . For monetary union to be possible, both countries must agree. Thus, $\Omega^i > 0 \forall i$ is the condition for a viable monetary union.

Since all periods are ex-ante identical, it suffices to concentrate on the per period net gain from monetary union ω_t^i . How is this gain for L and H influenced by parameter changes?

Proposition 3:

L's willingness to admit country H to the monetary union is

(i) increasing in L's political gain from unification,

- (ii) falling in the variance of the asymmetric shock to country H,*
- (iii) falling in the given distortion in H,*
- (iv) increasing in the relative weight of country H,*
- (v) ambiguous in variations in L's aversion to structural reforms, and*
- (vi) ambiguous in the distortion in L.*

Proof: See the appendix.

That L's willingness to admit H to the monetary union is increasing in the political gain from it needs no discussion. Also, the size of the idiosyncratic shock, as it implies more inflation, is weighing against monetary union. Moreover, when the distortion in H is large this has negative implications for L. It means that the common central bank will increase the rate of inflation to compensate for these distortions, and it therefore induces more reforms in L. For both reasons, L would oppose monetary union with H if its distortions are too high. Part (iv) of the proposition might be a bit surprising because it states that L gains from monetary union if H's weight in setting monetary policy rises. The counterintuitive result is due to the fact that although the inflationary pressure increases, both countries conduct more structural reforms when ϕ is high to avoid too high inflation. This has direct positive output effects. In addition, the equilibrium rate of inflation will fall due to these increased reform efforts. Hence both countries also enjoy lower inflation. The positive effects of higher output and lower inflation outweigh the negative effect stemming from L's aversion to reform. Part (v) states an ambiguous result. Due to L's aversion to reform, a high γ should imply that it rejects monetary union, given that it increases reform. However, more reforms also have positive effects for output and employment. Which of these effects is larger is not clear, because the marginal impact of a variation of γ on reforms and distortions under autonomy and monetary union respectively cannot unambiguously signed. If these are more or less equal, the overall effect of a higher γ is likely to be negative, as one might expect. Finally (part (vi)), the higher the distortion in L, all else equal, entering monetary union would imply that inflation increases even more in a situation where it is already high.

This additional import of inflation weighs more when inflation is high already, because disutility is convex in inflation. On the other hand, entering monetary union with H in such a situation would imply that reform efforts would additionally increase. This would have positive effects on output. If at the same time, aversion to reform is not too high, L might even profit from enlargement. Which of these effects is stronger is not clear a priori.

Next, I consider the case of country H and perform comparative statics on ω_t^H . This yields the following results:

Proposition 4:

H's willingness to enter the monetary union is

- (i) increasing in H's political gain from unification,*
- (ii) falling in the variance of the asymmetric shock to country H,*
- (iii) falling in the given distortion in L,*
- (iv) increasing in H's relative weight unless σ^2 is too large,*
- (v) ambiguous in H's aversion to structural reforms, and*
- (vi) ambiguous in the given distortion in H, k^H .*

Proof: See the appendix.

The intuition for these results is similar to those for L. Clearly, the higher the political gains from monetary union, the more support this idea will find. Since monetary union implies that common monetary policy will address the idiosyncratic shocks to H only very little, monetary union seems less advisable if these shocks have a high variance. Then, the value of an independent monetary policy is high. Country H will lose interest in monetary union as well if the distortion in L is high. Because a high value of \bar{y}_t^L implies a relatively high rate of inflation, H could not gain much in terms of credibility from entering a monetary union with L. In addition, the level of reforms would not fall by much so that this additionally benefit for the government from joining the monetary union could not be realized.

Therefore monetary union loses attraction for H. Part (iv) of the proposition states that H's gain in becoming a member of the monetary union increases in its relative weight. Clearly, it is more interesting to join if one has a high influence on the common policy. This is despite that fact that a high relative weight means that the credibility gain is relatively small. Since, at the same time, reform efforts remain strong, this has a positive output effect. Thus, overall country H gains more if it has a high influence on the common monetary policy. However, if the variance of the idiosyncratic shock becomes too high, the concern with inflation overcompensates the positive effects of a high φ . In this case, even H would be better off if its relative influence would be restricted. Part (v), addressing the impact of variations in γ is, as in the case of L, ambiguous. If the marginal impact of γ differs not too much under monetary union from that under autonomy, then it is likely that a higher γ makes enlargement less attractive for H. Although the reduction in reforms should benefit the government when its aversion to reform is high, the negative influence from lower output when γ is large outweighs this positive effect. A high γ means that distortions in H and L are high, implying also a high rate of inflation under monetary union. Finally, part (vi) states that whether monetary union is more attractive in a situation of high distortions is for H depends on the relative impact of k^H on output and inflation. H benefits because the reforms efforts can be reduced, and this is particularly interesting when k^H is high. Also, inflation under autonomy will be high, so monetary union is attractive. On the other hand, if the common rate of inflation increases by too much due to k^H , enlargement is not attractive. But given that φ is relatively small, inflation should clearly fall so that H would clearly benefit in inflation terms. On the other hand, since reforms efforts will be smaller, output will be lost and this counts more in a situation where it is already low. Depending which effect is stronger or more important for the government, a high k^H makes enlargement more or less attractive for government H. If it puts much emphasis on monetary credibility, enlargement becomes particularly interesting.

4.4. Discussion

After having derived the conditions that have to be fulfilled for each single country to be willing to enlarge the monetary union, it is time to see when both conditions are simultaneously fulfilled. In

both cases the political gain from the monetary union is a very strong argument for joining or extending the monetary union. The larger these are, the more attractive is enlargement for both. Also both countries gain if the newcomer has a relatively high weight, although one would probably expect that a higher influence of H would make it less attractive for L to agree to an enlargement. But at the same time, this ensures that the beneficial output effects due to more reform are particularly strong. And the same argument is behind the positive influence on H from a high relative influence. On the one hand, this deteriorates its credibility problem because not much can be gained when its influence on common monetary policy is still decisive. But on the other hand, a high ϕ ensures that reform will continue to be high in the monetary union. The calculations show that the positive effect outweighs the negative effects. In conclusion this implies that both countries would be better off if the newcomer would receive a relatively high voting power. On the other hand, increases σ^2 make the enlargement less attractive for both countries. For almost all other parameter values, no clear results could be derived, although it is likely that a high k^L makes it less attractive for both to enlarge the monetary union, while increases in k^H make it more attractive for a credibility concerned government in H, but less so for L. Although it was not possible to derive the influence of γ , it seems that both countries lose interest in enlargement if γ is high, provided the marginal impact of γ are not too different under the alternative monetary regimes. Nothing ensures that this is the case though. In conclusion, enlargement is more likely to find support from both sides if the political gains are high. On the other hand, large idiosyncratic shocks and too high levels of distortions imply that at least one country is opposed to enlargement.

5. Enlargement of Monetary Union with Persistent Reforms

The previous sections have considered the case where governments have to decide every period again whether they will implement structural reforms. Hence, when government's efforts at structural reforms decline, distortions return in full. This is obviously a simplification, although yielding sensible results. Of course, there are also reforms that have lasting effects, such as a reform of hiring and firing costs, the development of a better tax systems, that relies less on seigniorage revenue, the

reduction of labor union power and so on. The question then is by how much the results that have been derived are robust to changes in the initial assumption, and what can be said about the timing of the enlargement?

I begin with the course of structural convergence when reforms are persistent. The monetary policy course is changed in this case as well. The rate of inflation in country i follows $\pi_t^i = b\bar{y}_t^i - \frac{b\varepsilon_t^i}{1+b}$ (cf. equation (7)) which means that it is falling as \bar{y}_t^i decreases over time. As \bar{y}_t^i shrinks, so does the rate of inflation the public expects and therefore the time-consistent rate of inflation falls. This does not compromise the stabilizing role of monetary policy but improves on the credibility problem in monetary policy. It obviously also has implications for H's interest in the enlargement, which are addressed below.

From (10) we know that the amount of reforms is a function of k^i $c_t^i = \frac{\beta k^i}{\gamma + \beta}$ and that the same is true for distortions in period t $\bar{y}_t^i = \frac{\gamma k^i}{\gamma + \beta}$. Solving both for k^i and equating them allows to write $c_t^i = \frac{\beta}{\gamma} \bar{y}_t^i$, $i=L,H$, which relates current reform to the current level of distortions. Since these are falling over time, this implies that the pace of reforms is falling over time as well. As the marginal impact of reforms falls, it is less interesting for a government to implement them. This implies that in both countries, H and L, reform efforts are declining over time. Moreover, I have not assumed that distortions follow an exogenous process, as in Martin (1995) or Beetsma and Jensen (1999) which, in those papers, accounts for the fact that distortions will eventually completely disappear.⁸ As reform efforts shrink over time, distortions approach zero only in the limit. Because of their higher initial level, distortions in H are decreasing faster than in L. This logically implies that the difference in

⁸ This is actually not a very realistic assumption but used for analytical convenience only. Labor market institutions or tax systems do, in general, not improve autonomously but require political efforts by the government.

distortions will shrink over time.⁹ This again has an influence on both countries' interest in the enlargement.

Provided that the variability of idiosyncratic shocks is not too large, L and H might ultimately agree to an extension of monetary union. Under this condition, there exists a time, \tilde{T} , at which extension of monetary union is agreed upon by both countries. Provided that such a \tilde{T} exists, monetary union between H and L will commence. At the same time we know from Propositions 1 and 2 that monetary union has some influence on reform efforts in the participating countries. While it implies that in country H the efforts to reform the economy are falling, the opposite is true for L. In this sense, the introduction of monetary union has an asymmetric effect on reforms in H and L. For an illustration, see Figure 1, which illustrates how the reform efforts (and thus the remaining distortions) change after the extension of monetary union.

Insert Figure 1 around here

As already indicated, this gradual change in the size and the convergence in the degree of distortions has implications for the interest of the two countries in the enlargement of monetary union. As distortions in H decline, L is willing to let H enter. On the other hand, H has less incentive to join the monetary union because there the gains in terms of credibility and reduced structural reforms decline. If in this situation idiosyncratic shocks continue to be important, H is likely to stay outside even if invited to join. This means, the benefit of being able to conduct an independent monetary policy would outweigh the gains from monetary union. Moreover, one could expect that the political gains from joining monetary union might be reduced as time proceeds. While at an early stage the membership in the monetary union is presumably an important political signal, this is likely to lose importance over time. Hence, as time proceeds L unwillingness to let H enter the monetary union is

⁹ Notice that this paper excludes the possibility of cycles or a reversal of once undertaken reform steps. These issues are, e.g., discussed in Beetsma and Jensen (1999) and Mondino et al. (1996).

reduced, while H willingness to join is reduced as well. It is therefore conceivable that enlargement of monetary union might not happen at all if the offer to join is expressed "too" late.

These considerations are summarized in Proposition 5:

Proposition 5:

If structural reforms are persistent

(i) the pace of reform falls over time under autonomy, and so does the rate of inflation in country i ,

(ii) the speed of reform is changed in H and L with monetary union. L will increase the speed of reform, H will slow it down.

(iii) This implies that the interest in monetary union is changing over time for countries H and L . H 's interest in an enlargement is reduced, while that of L increases.

6. Conclusion

This paper has aimed to derive the influence of an extension of monetary union on the structural features in candidate (or joining) countries and on current members. One could expect that the extension of monetary union would result in more structural reforms being undertaken within the current member states. In this respect, an early extension of EMU to the Middle and Central European countries would clearly be desirable from a economic point of view and add to the expected gains from trade integration (see Baldwin et al. 1997). As the governments oppose structural reforms in as much as these are politically costly, however, this result could also be one explanation why the extension of the EU is made conditional on convergence of the candidates to the member states. Only then an extension will have little influence on developments in the current member states.

On the other hand, extension will most likely result in a slowing down of reform efforts in the joining countries. But regardless of this being the case, these countries are very likely to gain from extension, which explains the declared intentions of these countries to join at the earliest possible

date. It is also clear that the gains for these countries from joining are the largest as long as the structural distortions are high; in this case the gain in credibility and reduction in inflation will more than outweigh the negative output consequences of a slowdown in economic reforms. Note as well that a marginal increase in the relative power of the newcomer has a positive influence on both countries' willingness to agree to enlargement. In addition, one could reasonably expect that political gains are also larger in the beginning than later on. The only thing which would advise against an entry into monetary union would be too large an influence of idiosyncratic shocks.

One might therefore conclude that, contrary to the official EU position, an early extension of monetary union would be beneficial at least for the candidate countries. This need not necessarily mean full membership but could be a *de facto* monetary union in the form of a currency board or an "Eurozation" (analogue to Dollarization) of the candidates. But in this case, they would have no impact on the pace of reform in the current members. For this, membership including decision rights in the ECB are necessary.

Appendix

Proof of Proposition 3:

Parts (i-ii) are obvious from inspecting $E[\omega_t^L]$.

For (iii) derive $\partial E[\omega_t^L] / \partial k^H$. It is given as $-k^L[(\gamma + b)^2 + b(\beta - \beta^H) + \gamma(\beta - b)] - \phi k^H(\gamma + b)[b^2 + (\gamma + b)] < 0$.

For (iv) derive $\partial E[\omega_t^L] / \partial \phi$ which is $\phi[k^L(\gamma + b)(k^L + \phi k^H) + \phi b k^L k^H] + \sigma^2 \xi > 0$, where $\xi = \beta B^2 / \gamma^2 b^3 [(1 + b) + (\phi + b)]^3 > 0$.

For part (v) derive $\partial E[\omega_t^L] / \partial \gamma$. This derivative is

$$\begin{aligned}
& b \left[\bar{y}_t^L(A) \frac{\partial \bar{y}_t^L(A)}{\partial \gamma} - \bar{y}_t^L(\text{MU}) \frac{\partial \bar{y}_t^L(\text{MU})}{\partial \gamma} \right] + b^2 \left[\bar{y}_t^L(A) \frac{\partial \bar{y}_t^L(A)}{\partial \gamma} \right] \\
& - b^2 \left[\bar{y}_t^L(\text{MU}) + \varphi \bar{y}_t^H(\text{MU}) \right] \left[\frac{\partial \bar{y}_t^L(\text{MU})}{\partial \gamma} + \varphi \frac{\partial \bar{y}_t^H(\text{MU})}{\partial \gamma} \right] - \frac{1}{2} \left[c_t^L(\text{MU})^2 - c_t^L(A)^2 \right] \\
& - \gamma \left[c_t^L(\text{MU}) \frac{\partial c_t^L(\text{MU})}{\partial k^L} - c_t^L(A) \frac{\partial c_t^L(A)}{\partial k^L} \right]
\end{aligned}$$

Not much besides the relation of $\bar{y}_t^L(\text{MU}) < \bar{y}_t^L(A)$ and $c_t^L(\text{MU}) > c_t^L(A)$ can be said about the relative size of these terms. We only know that $\partial \bar{y}_t^L(A, \text{MU}) / \partial \gamma > 0$ and $\partial c_t^L(A, \text{MU}) / \partial \gamma < 0$, but it is not possible to unambiguously see whether the marginal impact of γ is larger under monetary autonomy or under monetary union. Thus the sign of the first and last term cannot be signed. It is only certain that the second term is positive, and that the third and fourth term are negative. If the marginal impact of γ under different monetary regimes would not differ too much, however, only terms 1 and 2 would be positive. Then, the overall influence of γ would probably be negative.

For (vi) finally derive $\partial E[\omega_t^L] / \partial k^L$, which is

$$\begin{aligned}
& b \left[\bar{y}_t^L(A) \frac{\partial \bar{y}_t^L(A)}{\partial k^L} - \bar{y}_t^L(\text{MU}) \frac{\partial \bar{y}_t^L(\text{MU})}{\partial k^L} \right] + b^2 \left[\bar{y}_t^L(A) \frac{\partial \bar{y}_t^L(A)}{\partial k^L} \right] \\
& - b^2 \left[\bar{y}_t^L(\text{MU}) + \varphi \bar{y}_t^H(\text{MU}) \right] \left[\frac{\partial \bar{y}_t^L(\text{MU})}{\partial k^L} + \varphi \frac{\partial \bar{y}_t^H(\text{MU})}{\partial k^L} \right] \\
& - \gamma \left[c_t^L(\text{MU}) \frac{\partial c_t^L(\text{MU})}{\partial k^L} - c_t^L(A) \frac{\partial c_t^L(A)}{\partial k^L} \right]
\end{aligned}$$

Notice that all partial derivatives except $\partial \bar{y}_t^H(\text{MU}) / \partial k^L$ are positive and that $\partial \bar{y}_t^L(\text{MU}) / \partial k^L > \partial \bar{y}_t^H(\text{MU}) / \partial k^L$. Also $\partial \bar{y}_t^L(\text{MU}) / \partial k^L > \partial \bar{y}_t^L(A) / \partial k^L$ but $\partial c_t^L(\text{MU}) / \partial k^L < \partial c_t^L(A) / \partial k^L$.

Hence the marginal of k^L on the level is distortions is higher under monetary union, but its impact on reforms is larger under monetary autonomy. Given these partial derivatives it is only possible to unambiguously sign the second and third terms (positive and negative respectively).

Proof of Proposition 4:

Parts (i-ii) are obvious from inspecting $E[\omega_t^H]$.

For (iii) derive $\partial E[\omega_t^H] / \partial k^L$ to have $-\phi k^H [\gamma(\beta^H - b) + (\gamma + b)^2] - k^L(\gamma + b)[\phi^2 b^2 + (\gamma + b)] < 0$.

Part (iv) can be seen from $\partial E[\omega_t^H] / \partial \phi > 0$ iff $(\gamma + b)k^H(k^L + \phi k^H) + \phi^2 b k^L k^H > \sigma^2 \chi$ with $\chi = (\phi + b)B^2 / \gamma^2 b^3 [(1 + b) + (\phi + b)]^3 > 0$.

For part (v) note that

$$\begin{aligned} & -b \left[\bar{y}_t^{-H}(\text{MU}) \frac{\partial \bar{y}_t^{-H}(\text{MU})}{\partial \gamma} - \bar{y}_t^{-H}(\text{A}) \frac{\partial \bar{y}_t^{-H}(\text{A})}{\partial \gamma} \right] + b^2 \left[\bar{y}_t^{-H}(\text{A}) \frac{\partial \bar{y}_t^{-H}(\text{A})}{\partial \gamma} \right] \\ & - b^2 \left[\bar{y}_t^{-L}(\text{MU}) + \phi \bar{y}_t^{-H}(\text{MU}) \right] \left[\frac{\partial \bar{y}_t^{-L}(\text{MU})}{\partial \gamma} + \phi \frac{\partial \bar{y}_t^{-H}(\text{MU})}{\partial \gamma} \right] + \frac{1}{2} [c_t^H(\text{A})^2 - c_t^H(\text{MU})^2] \\ & + \gamma \left[c_t^H(\text{A}) \frac{\partial c_t^H(\text{A})}{\partial \gamma} - c_t^H(\text{MU}) \frac{\partial c_t^H(\text{MU})}{\partial \gamma} \right] \end{aligned}$$

As in the case for L, only $\bar{y}_t^{-H}(\text{A}) < \bar{y}_t^{-H}(\text{MU})$, $c_t^H(\text{A}) > c_t^H(\text{MU})$, $\partial \bar{y}_t^{-i}(\text{A}, \text{MU}) / \partial \gamma > 0$ and $\partial c_t^i(\text{A}, \text{MU}) / \partial \gamma < 0$ are known, whereas the relative size of the partial derivatives cannot be determined. Thus, only the second and fourth term can be clearly positively signed, while the third is negative. If, again, the relative impact of γ under different monetary regimes is not too different, the first and the last term become negative as well. Then, it is likely that the overall influence of γ is negative.

Finally, derive $\partial E[\omega_t^H] / \partial k^H$ to get

$$\begin{aligned} & \gamma \left[c_t^H(\text{A}) \frac{\partial c_t^H(\text{A})}{\partial k^H} - c_t^H(\text{MU}) \frac{\partial c_t^H(\text{MU})}{\partial k^H} \right] + b^2 \left[\bar{y}_t^{-H}(\text{A}) \frac{\partial \bar{y}_t^{-L}(\text{A})}{\partial k^H} \right] \\ & - b \left[\bar{y}_t^{-H}(\text{MU}) \frac{\partial \bar{y}_t^{-H}(\text{MU})}{\partial k^H} - \bar{y}_t^{-H}(\text{A}) \frac{\partial \bar{y}_t^{-H}(\text{A})}{\partial k^H} \right] \\ & - b^2 (\bar{y}_t^{-L}(\text{MU}) + \phi \bar{y}_t^{-H}(\text{MU})) \left[\frac{\partial \bar{y}_t^{-L}(\text{MU})}{\partial k^H} + \phi \frac{\partial \bar{y}_t^{-H}(\text{MU})}{\partial k^H} \right] \end{aligned}$$

All partial derivatives except $\partial \bar{y}_t^{-L}(\text{MU}) / \partial k^H$ are positive, and $\phi \partial \bar{y}_t^{-H}(\text{MU}) / \partial k^H > \partial \bar{y}_t^{-L}(\text{MU}) / \partial k^H$. Notice that $c_t^H(\text{A}) > c_t^H(\text{EMU})$ and $\partial c_t^H(\text{A}) / \partial k^H > \partial c_t^H(\text{MU}) / \partial k^H$, and that

$\bar{y}_t^H(\text{MU}) > \bar{y}_t^H(A)$ and $\partial \bar{y}_t^H(\text{MU}) / \partial k^H > \partial \bar{y}_t^H(A) / \partial k^H$. This implies that the first two terms are positive, while the others are negative.

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Figure 1

