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Olli Castrén

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SUOMEN PANKIN KESKUSTELUALOITTEITA X **FINLANDS BANKS DISKUSSIONSUNDERLAG**

Suomen Pankki
Bank of Finland
P.O.Box 160, FIN-00101 HELSINKI, Finland
Φ + 358 9 1831

Olli Castrén

Monetary Policy Department
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Accountability of the ECB and a Government's Incentives to Rebel against the Common Monetary Policy in EMU

Olli Castrén[1]
Monetary Policy Department
Bank of Finland
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Abstract: This paper considers how the "true" common monetary policy that is conducted by the ECB under various sources of uncertainty will differ from the policy that was agreed in the Maastricht Treaty, and how the uncertainties may induce a representative government to criticise the common monetary policy. Acquiring information about the transmission mechanism, and revealing that information as well as information about the ECB reaction function, is incentive compatible for the ECB both directly and indirectly. The direct effect means that the ECB's own welfare is decreasing in uncertainties. The indirect effect arises because less uncertainty reduces the risk of criticism from the individual governments' side. The risk of criticism is the larger, and consequently the indirect incentive to reduce uncertainty is the higher, the larger are the leftward shifts in national political preferences from those that prevailed when the Maastricht Treaty was signed. The model also provides an explanation for the ECB's choice of monetary policy strategy that incorporates elements of both monetary targeting and inflation targeting.
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[1] Corresponding address: Monetary Policy Department, Bank of Finland, P-O Box 160, 00101 Helsinki, Finland. E-mail: olli.castren@bof.fi. The opinions presented in the paper are those of the author and do not necessarily reflect the views of the Bank of Finland. I am grateful to Jarmo Kontulainen, David Mayes, Juha Tarkka and Jouko Vilmunen for useful comments. Remaining errors are all mine.

1 Introduction

The last months before the introduction of the EMU third stage witnessed some public debate and controversy about the operational mode and openness of the European Central Bank. In particular, following the victory of the left in the German elections, there have been demands that the ECB should shift towards a more employment-oriented policy. Moreover, several observers have argued that the ECB should be made more accountable and that it should reveal information about its forecasts and meetings, including the voting record. Finally, the ECB's choice of a monetary policy strategy has attracted criticism. The ECB decided to opt for a strategy that constitutes a mixture between pure monetary targeting and direct inflation targeting strategies, in order to minimise the uncertainty in conduct of monetary policy. However, such a strategy has been considered as blurred from the public's point of view, making it harder to monitor the actions of the ECB.

In this paper we try to analyse whether uncertainty about the ECB's policy, and/or a shift in the political preferences in a representative country that participates in EMU, may act as a catalyst for the representative government to criticise the ECB and to take initiatives to change its policies. More specifically, we look at the representative government's problem when it considers the prospective gains and losses from the future EMU and derive first an incentive compatibility condition that must have been met in order to make signing the Maastricht Treaty possible. We then consider how the "true" policy that is conducted by the ECB under various sources of uncertainty will differ from the policy that was agreed in the Treaty, and how these uncertainties affect the representative government's incentive compatibility constraint. It turns out, that if the wage setters in the EMU area are uncertain about the extent to which the ECB's preferences between inflation and output will deviate from those implicitly stated in the Maastricht Treaty, the representative government's welfare in EMU may easily turn negative. The same result applies if there is uncertainty about the monetary transmission mechanism in EMU that was not fully anticipated at the time when the Treaty was signed. Most interestingly, however, the distortions from the different sources of uncertainty are exaggerated if there is a shift in the representative

government's preferences towards more output and employment friendly policies between the date when the Treaty was signed and the date when the EMU third stage begins. Including two sources of uncertainty also allows us to find a possible explanation for the ECB's choice of a "mixed" monetary policy strategy. Under plausible parameter values, the ECB is more sensitive to uncertainty in the transmission mechanism relative to the effects that arise from preference uncertainty, than is the representative government. Because the ECB was allowed to choose its own strategy it clearly preferred a strategy that provides more information about the transmission mechanism and was willing to sacrifice some accountability in exchange to that gain.

The model leads to two tentative policy recommendations. If the ECB wants to avoid criticism from the individual governments' side, it should 1) continue to invest in good forecasts and improve its knowledge about the transmission mechanism 2) reveal information about its view on the features of the transmission mechanism as well as other information that can be used by the private sector to determine the ECB's reaction function (such as the minutes of the meetings of the ECB council). These actions seem to be even more urgent in situations where there has been a shift to the left in the political balance in the participating countries. Of course, these conclusions only consider the case of eliminating incentives to rebel against the common monetary policy. There may be other reasons why forecasts and minutes should not be fully disclosed.

This paper will proceed as follows. Section 2 derives the equilibrium policy outcome for the representative government outside EMU. Section 3 analyses the conditions that made it incentive compatible for the government to sign the Maastricht Treaty. Section 4 studies how the "true" policy under the ECB differs from the predicted "Maastricht policy", and how different sources of uncertainty affect the ECB's and the representative government's incentives. Section 5 concludes.

2 Outcome under National Monetary Policy

We start with deriving a representative country's equilibrium welfare under purely national monetary policy. This standard outcome will serve as the benchmark the representative government uses when it evaluates the welfare consequences of joining EMU and delegating monetary policy to the ECB.

The macroeconomic equilibrium is described by means of a Barro and Gordon (1983) -type game between the wage-setting private sector and the government who acts as a monetary authority. We abstract here from policy delegation issues on the national level, and do not consider the design of optimal national central bank institutions. In other words, we assume that under national policymaking the best possible equilibrium is characterised by equations (1)-(6) below. The representative economy's output is generated according to the following Lucas supply function:

$$y = \pi - \pi^e + z_N \tag{1}$$

In (1), y denotes output, π is the inflation rate, π^e is expected inflation (formed by the private sector one period earlier and defined as $\pi^e = E_{t-1}(\pi)$), and z_N is a stochastic national output shock with $E(z_N)=0$ and $VAR(z_N)=\sigma_{ZN}^2$. In the absence of shocks and policy surprises, *i.e.* when $\pi=\pi^e$, output is at the natural rate which for simplicity is set equal to zero.

Given the supply function, the government intends to choose the money supply m in order to minimise a standard loss function that is quadratic in both output and inflation. We assume that the economy's transmission mechanism is fully known and such that government can directly control the inflation rate by changing money supply. Therefore, $m=\pi$ for the representative government outside EMU, and the loss is given by:

$$L_N = \frac{1}{2}\{\pi^2 + \lambda(y - \bar{y})^2\}. \quad (2)$$

In (2), the parameter λ illustrates the relative weight assigned by the government on the respective policy objectives. The private sector knows the government's preferences, *i.e.* there is no uncertainty about λ. Together with the assumption that the transmission mechanism is known, this could reflect a situation where the economy's political and economic features have become familiar to the different parties of the economy, perhaps over a longer period of time. The standard time-inconsistency problem is here captured by the fact that $\bar{y}$, government's target level of output, is higher than the natural rate and therefore whenever λ>0, government has an incentive to generate policy surprises.

Under discretionary monetary policy, the timing of events is as follows. (i) The private sector rationally forms inflationary expectations. (ii) The output shock is realised. (iii) Government chooses the money growth rate (inflation rate), after observing the shock and taking the expectations as given. Minimising (2) with respect to π and subject to (1) gives the following first-order condition:

$$\pi + \lambda(\pi - \pi^e + z_N - \bar{y}) = 0 \quad (3)$$

Under rational expectations, $\pi^e = \pi$. Using this condition, and remembering that the private sector does not observe z_N, we get the following expression for expected inflation:

$$\pi^e = \lambda\bar{y} \quad (4)$$

Substituting (4) back into (3), and rearranging, gives the equilibrium inflation rate under national monetary policy. Using this expression, and equation (4), in (1), gives the equilibrium output under national policy:

$$a)\pi = \lambda\bar{y} - \frac{\lambda}{1+\lambda} z_N$$
$$b)y = \frac{1}{1+\lambda} z_N \qquad (5)$$

The optimal inflation rate consists of an average inflation part, which reflects inflationary expectations under discretion, and a stochastic part that shows how government partially stabilises the output shock. Output deviates from the natural rate only because the shock is not fully stabilised. Therefore, the positive *average* inflation rate, or the inflation bias, is purely distortionary in that it does not generate any increase in the average output. In the absence of a commitment technology, government is not able to avoid this problem in so far as it has a positive output target and the private sector is rational.

Substituting (5a,b) into (2) finally gives the government's equilibrium welfare loss under discretion:

$$L_N = \frac{1}{2}\lambda\left[(1+\lambda)\bar{y}^2 + \frac{1}{1+\lambda}\sigma_{ZN}^2\right] \qquad (6)$$

Clearly, when λ=0, the government's loss is equal to zero. Whenever λ>0, the government faces a trade-off between the two objectives it is trying to control simultaneously with its single instrument, the money growth rate. We now turn to analyse the issues the representative government needs to take into account when it considers its welfare in EMU.

3 European Monetary Union According to the Maastricht Treaty

When signing the Maastricht Treaty, the governments of the European Union confirmed the agreement about the rules and the framework for the common monetary policy (CMP) and the tasks and priorities of the European Central Bank (ECB). In this section we follow the model of Alesina and Grilli (1993) and analyse the gain from EMU the representative country was expecting to achieve when it was to sign the Treaty. Clearly, this expected gain was based on the design of EMU as it is stated in the Treaty. In the following section, we study how this hypothetical gain is likely to differ from the "true" gain that can be achieved when the ECB takes over the CMP.

The Maastricht Treaty states that the CMP must be set according to average economic developments in the EMU area as a whole. Therefore, the Treaty assumes that the CMP is set subject to the following "European" output function:

$$y_E = \pi_E - \pi_E^e + z_E \tag{7}$$

In (7), π_E is the inflation rate chosen in EMU and z_E is a "European" output shock that can be characterised as a weighed average of all national output disturbances. We assume that when signing the Treaty the governments expected the future ECB to have full control of monetary policy, *i.e.* that by changing money supply the ECB would be able to directly control the inflation rate. Finally, because it defines the statute of the ECB, we can say that the Treaty implicitly draws the following "European" objective function the ECB is supposed to minimise:

$$L_E = \frac{1}{2}\{\pi_E^2 + \mu(y_E - \bar{y})^2\} \tag{8}$$

For simplicity, the common output target is assumed to be identical to $\bar{y}$, the output target of the individual government in (2). The parameter μ illustrates the weight the Treaty assigns on the output objective relative to the inflation objective. By the time of signing the Treaty the participating countries had agreed upon the ECB's statute which implicitly determines the value of μ. Alesina and Grilli (1993) analysed this bargaining process and found that in order to make EMU incentive compatible to the country with most credible national low-inflation policy, the preferences of the ECB should be at least as conservative as those of that particular country.[2] The ECB statute reflects this interpretation rather well. While attempting to make EMU incentive compatible for Germany, it states that the ECB shall be highly independent and that its primary objective is price stability, which formulations closely follow the spirit of the Bundesbank law. In terms of equation (8), the Maastricht Treaty would thus set parameter μ close to zero.

Following the same steps than under national monetary policy above the equilibrium inflation and output rates that, according to the Treaty, are expected to result in EMU are given as follows:

$$\begin{aligned} a)\pi_E &= \mu\bar{y} - \frac{\mu}{1+\mu} z_E \\ b)y_E &= \frac{1}{1+\mu} z_E \end{aligned} \tag{9}$$

The Community's equilibrium welfare loss in EMU can be achieved by substituting (9a,b) into (8):

[2] In the context of policy delegation games, "conservative" preferences amount to putting a low relative weight on output.

$$L_E = \frac{1}{2}\mu\left[(1+\mu)\bar{y}^2 + \frac{1}{1+\mu}\sigma_{ZE}^2\right] \tag{10}$$

On the other hand, the equilibrium welfare loss the Treaty should deliver to the representative country can be obtained by first substituting the common inflation rate (9a) into the national output function (1) and then substituting the resulting expression together with (9a) into equation (2):

$$L_{N,E} = \frac{1}{2}\left[\bar{y}^2(\lambda+\mu^2) + \frac{(1+\lambda)\mu^2}{(1+\mu)^2}\sigma_{ZE}^2 + \lambda\sigma_{ZN}^2 - \frac{2\lambda\mu}{1+\mu}\rho\sigma_{ZE}\sigma_{ZN}\right] - K \tag{11}$$

In (11), ρ is the correlation coefficient between the national shock and the European shock. In addition, we have included a constant parameter *K* that roughly captures all the indisputable microeconomic gains and political ego-rents the representative government expects to receive when joining EMU. We argue that including these effects, even in a very abstract manner, is an important component of the analysis of the welfare effects from a monetary union between politically and economically asymmetric countries who do not necessarily form an optimal currency area. Finally, the expected *gain* for the representative country from signing the Maastricht Treaty can be obtained as the difference between the equilibrium welfare losses outside and inside the EMU (equations (6) and (11)):

$$G_{N,E} = \frac{1}{2}\left\{\left[\lambda^2 - \mu^2\right]\bar{y}^2 - \frac{\mu^2(1+\lambda)}{(1+\mu)^2}\sigma_{ZE}^2 - \frac{\lambda^2}{1+\lambda}\sigma_{ZN}^2 + \frac{2\mu\lambda}{1+\mu}\rho\sigma_{ZE}\sigma_{ZN}\right\} + K \tag{12}$$

From the term inside the first squared brackets of (12) it can be seen that in terms of average welfare, the representative country is the better off the more conservative the Treaty makes the ECB to be (*i.e.* the lower is μ relative to λ). However, a lower μ also leads to insufficient stabilisation of the common output shock z_E, and therefore the model gives rise to the familiar trade-off between credibility and flexibility (as in Rogoff, 1985). From the representative government's point of view, the optimal de-

gree of ECB conservativeness, μ^*, can therefore be defined as a solution to the following equality, which follows from the first derivative of (12) wrt. μ:

$$\mu\bar{y}^2 + \frac{\mu(1+\lambda)}{(1+\mu)^3}\sigma_{ZE}^2 = \frac{\lambda}{(1+\mu)^2}\rho\sigma_{ZE}\sigma_{ZN} \tag{13}$$

If replacing μ with λ in (13) renders the LHS larger than the RHS, then the representative government wants that the CMP is conducted by a ECB with more conservative, but not infinitely more conservative, preferences than those of the government itself. Because $\frac{\partial LHS}{\partial \mu} > 0$ and $\frac{\partial RHS}{\partial \mu} < 0$, and because $\lambda > \mu$ by definition, it holds that μ^*, the optimal ECB preferences, should satisfy $0 < \mu^* < \lambda$.

The question clearly arises how the most conservative of the participating countries can be made to sign the Treaty (assuming that the ECB cannot be more conservative than the most conservative participating government). Indeed, if we set $\mu=\lambda=\lambda_m$, where λ_m denotes the preferences of the most conservative government, it follows that the most conservative government's gain from EMU is always negative except in the case where $z_N=z_E$ and $\rho=1$ (in which case $G_{N,E}=0$). Therefore, whenever the variances of the output shocks are different and /or there is incomplete correlation between the shocks, the most conservative country is better off by staying outside the EMU even if the ECB adopted that country's own political preferences. However, if the additional gains captured by K are sufficiently large the country may still find it incentive compatible to sign the Treaty and join EMU under economic and political asymmetries.

After rearranging equation (12) we find that for the representative country with $\lambda > \mu$, the incentive compatibility constraint that must have been met before it was possible to sign the Treaty is given as follows:

$$\left[\lambda^2 - \mu^2\right]\bar{y}^2 + 2K > \frac{\mu^2(1+\lambda)}{(1+\mu)^2}\sigma_{ZE}^2 + \frac{\lambda^2}{1+\lambda}\sigma_{ZN}^2 - \frac{2\mu\lambda}{1+\mu}\rho\sigma_{ZE}\sigma_{ZN} \qquad (14)$$

We call (14) the *no-rebelling constraint.* The reason is as follows. If the political or economic conditions in the representative country change after it signed the Maastricht Treaty (*i.e.,* λ or z_N change), inequality (14) may no longer hold. Assuming that leaving EMU is too costly an option, the government then has an incentive to push for changes in the CMP so that the policy would better reflect the new circumstances in the representative country. From (14) it can be seen that an increase in λ, reflecting a shift in government preferences from a low inflation policy towards more efficient output and employment stabilisation, increases the first two terms in the RHS, making it more likely that the no-rebelling constraint is violated. Of course, such a shift in preferences simultaneously increases the gain from the credible low inflation policy (by increasing the LHS of (14)). However, for sufficiently high values of λ the loss from too little stabilisation outweighs the gain from lower average inflation (as was shown by Rogoff), and the government prefers a higher μ that makes the CMP more accommodative. In addition, increased variance of the shocks (and/or a reduction in their correlation) from the time when the Treaty was signed may bring around additional losses that make the RHS of (14) larger than the LHS. In that case the representative government clearly wants the definition of z_E to be changed so that it better reflects the characteristics of z_N.

We now turn to analyse how the no-rebelling constraint is affected by the fact that the "true" EMU can not necessarily be described as equations (7)-(14) above. More specifically, we analyse the effects of uncertainties about the preferences of the ECB as well as about the link between money supply and inflation in the EMU.

4 Uncertainty and Incentives to Rebel against the ECB

In reality, monetary policy is always conducted under various degrees of uncertainty. This is especially the case after regime shifts, for example when policy has been delegated to a new institution whose preferences and operational environment is not yet completely known.

We assume that the "true" monetary policy under the ECB differs from the policy agreed in the Maastricht Treaty in two important respects. First, it is assumed that the ECB has only incomplete control of the inflation rate through its monetary instrument. This may be because there is incomplete knowledge about the EMU -wide monetary policy transmission mechanism. Second, we incorporate the fact that the ECB's preferences are not completely known to the public. The public observes the parameter μ that is implicitly given in the Maastricht Treaty, but because the Treaty is an incomplete contract there exists uncertainty about the extent to which the ECB's real preferences may deviate from the agreed preferences. Such uncertainty is likely to be particularly significant in the early stages of EMU. The modifications we make to the previous subsection (the Maastricht case) can be described as follows:

$$\pi_E = \hat{m} + x, E(x) = 0, VAR(x) = \sigma_X^2, \qquad (15)$$
$$\mu = \hat{\mu} + \varepsilon, E(\varepsilon) = 0, VAR(\varepsilon) = \sigma_\varepsilon^2$$

In (15), *x* is a stochastic shock that is realised after the inflationary expectations are formed and is therefore known to the ECB at the time when policy is set (like the output shocks z_N and z_E). On the other hand, ε shows that at any particular point in time, the ECB may either be too conservative or advocate a too loose monetary stance compared to the average preferences $\hat{\mu}$. Nolan and Schaling (1996) interpret σ_ε^2 as measuring the inverse of central bank accountability since a low σ_ε^2 reduces

uncertainty about monetary policy outcomes. We assume that there is no correlation between x and ε.

The ECB confronts the "European" output function (7), and its objective function is the same than (8), except to the modifications which are illustrated in (15). The ECB's first order condition is now given by:

$$\hat{m} + x + \mu(\hat{m} + x - \pi_E^e + z_E - \bar{y}) = 0\,. \tag{16}$$

Taking expectations across (16) is slightly more complicated than in the standard case, due to the multiplicative uncertainty that is brought around by μ. As in Nolan and Schaling, by using a Taylor series expansion and applying rational expectations we can obtain an approximation for the private sector's inflationary expectations:

$$\pi^e = \frac{\hat{\mu}((1+\hat{\mu})^2 + \sigma_\varepsilon^2)}{(1+\hat{\mu})^2 - \sigma_\varepsilon^2}\bar{y}\,, \qquad \frac{\partial \pi^e}{\partial \sigma_\varepsilon^2} > 0\,. \tag{17}$$

Substituting (17) back into (16), and rearranging, yields the "true" equilibrium money growth rate, the ECB's policy instrument. Using this and (17) in (7) gives the expression for the "true" equilibrium output under ECB:

$$\left.\begin{aligned} a)\, m_E &= \frac{1}{1+\mu}\left[\mu(1+F)\bar{y} - \mu z_E\right] - x \\ b)\, y_E &= \frac{\mu - F}{1+\mu}\bar{y} + \frac{1}{1+\mu}z_E - x \end{aligned}\right\} F \equiv \frac{\hat{\mu}\left[(1+\hat{\mu})^2 + \sigma_\varepsilon^2\right]}{(1+\hat{\mu})^2 - \sigma_\varepsilon^2} \tag{18}$$

When there is no uncertainty about the ECB's preferences ($\sigma_\varepsilon^2 \to 0$) it follows that $F \to \mu$. Substituting (18a,b) into (8) gives the ECB's welfare loss when the public does not know the ECB's preferences for sure and there is uncertainty about the transmission mechanism:

$$L_{ECB} = \frac{\mu}{2(1+\mu)}\left[(1+F)^2\bar{y}^2 + \frac{(1+\mu)^2}{\mu}\sigma_X^2 + \sigma_{ZE}^2\right], \tag{19}$$

$$\frac{\partial L_{ECB}}{\partial \sigma_\varepsilon^2} = \frac{\mu}{2(1+\mu)}\frac{\partial (F^2)}{\partial \sigma_\varepsilon^2} + \frac{\mu}{1+\mu}\frac{\partial F}{\partial \sigma_\varepsilon^2} > 0\,, \frac{\partial L_{ECB}}{\partial \sigma_X^2} = \frac{1}{2}(1+\mu) > 0\,.$$

Equation (19) gives the interesting result that in equilibrium, the ECB's welfare loss is increasing in σ_ε^2. Therefore, it is in the ECB's own interest to reveal information about the factors that help to reduce σ_ε^2, the public's uncertainty about the ECB's preferences. In that sense equation (19) also provides some intuition for the arguments that the ECB should have closely mimicked the functions and procedures of the Bundesbank. That would have been one way to reduce the distortions caused by preference uncertainty σ_ε^2 and thereby improve ECB's own welfare. Moreover, the ECB also has an interest to improve its ability to control the inflation rate (which amounts to reducing σ_x^2).

However, we are more interested in the welfare results that concern the representative government. The representative country's welfare loss under "true" ECB policy can be obtained in the similar way than equation (11) above:

$$\begin{aligned} L_{N,ECB} = \frac{1}{2}\Bigg\{ & \frac{\mu^2(1+F)^2 + \lambda((\mu - F)^2 + (1+\mu)^2)}{(1+\mu)^2}\bar{y}^2 + (1+\lambda)\sigma_X^2 \\ & + \frac{\mu^2(1+\lambda)}{(1+\mu)^2}\sigma_{ZE}^2 + \lambda\sigma_{ZN}^2 - \frac{2\lambda\mu}{1+\mu}\rho\sigma_{ZE}\sigma_{ZN}\Bigg\} - K, \end{aligned} \tag{20}$$

$$\frac{\partial L_{N,ECB}}{\partial \sigma_\varepsilon^2} = \frac{\mu^2 + \lambda}{2(1+\mu)^2}\frac{\partial (F^2)}{\partial \sigma_\varepsilon^2} + \frac{\mu(\mu - \lambda)}{(1+\lambda)^2}\frac{\partial F}{\partial \sigma_\varepsilon^2} > 0\,, \frac{\partial L_{N,ECB}}{\partial \sigma_X^2} = \frac{1}{2}(1+\lambda) > 0\,.$$

Clearly, the loss of the representative government is also increasing in uncertainty about both the ECB preferences and the transmission mechanism. Comparing equations (19) and (20) gives the following results:

a) $$\frac{\frac{\partial L_{ECB}}{\partial \sigma_X^2}}{\frac{\partial L_{ECB}}{\partial \sigma_\varepsilon^2}} > 1 \Leftrightarrow \frac{(1+\mu)^2}{\mu} > \frac{\partial (F^2)}{\partial \sigma_\varepsilon^2} + \frac{2\partial F}{\partial \sigma_\varepsilon^2}$$

b)

$$\frac{\frac{\partial L_{N,ECB}}{\partial \sigma_\varepsilon^2}}{\frac{\partial L_{N,ECB}}{\partial \sigma_X^2}} > 1 \Leftrightarrow \frac{(1+\mu)^2}{\mu}(1-\mu(1+\mu)(1+\lambda)) < \frac{\partial (F^2)}{\partial \sigma_\varepsilon^2}(1+\lambda-\mu^2) + \frac{2\partial F}{\partial \sigma_\varepsilon^2}(1+\mu(\lambda-\mu))$$

(21)

c) $$\frac{\frac{\partial L_{ECB}}{\partial \sigma_X^2}}{\frac{\partial L_{ECB}}{\partial \sigma_\varepsilon^2}} > \frac{\frac{\partial L_{N,ECB}}{\partial \sigma_X^2}}{\frac{\partial L_{N,ECB}}{\partial \sigma_\varepsilon^2}} \Leftrightarrow$$

$$(1+\mu)^2 \frac{1-\mu(1+\mu)(1+\lambda)}{\mu} > (1+\lambda-\mu^2)\frac{\partial (F^2)}{\partial \sigma_\varepsilon^2} + 2(1+\mu(\lambda-\mu))\frac{\partial F}{\partial \sigma_\varepsilon^2}$$

When (21a) holds, transmission uncertainty (*x*-uncertainty) increases ECB's loss more than preference uncertainty (ε-uncertainty). On the other hand, when (21b) holds, preference uncertainty is more damaging for the representative government than transmission uncertainty. Finally, under the parameter values shown in condition (21c) the ECB is more sensitive to transmission uncertainty relative to preference uncertainty than the representative government. This result is more likely to hold if λ is not too large. Therefore, when (21a) holds, the ECB is more eager to choose a monetary policy strategy that is effective to reduce σ_x^2. In order to achieve that goal it may even be willing to sacrifice some accountability in terms of allowing a higher σ_ε^2, even if the representative government would have preferred a strategy that puts more weight on reducing σ_ε^2 (condition 21c). This result is because transmission uncertainty has a greater impact on the part of the loss that arises from inflation being off its target than the loss from too low output. In contrast, preference uncertainty increases the output part of the loss relatively more than the inflation part. Since the ECB puts more weight on the inflation objective than the representative

government, it suffers more from distortions to the equilibrium inflation rate. The wish to acquire as much information as possible about the EMU-wide transmission mechanism could explain why the ECB decided to adopt a strategy that constitutes a mixture between a monetary targeting strategy and an inflation targeting strategy. According to many critics, even though a mixed strategy may provide more information about the trends and developments of the economy, a single policy target could have been a more effective way of reducing the public's uncertainty about the ECB's preferences.

Finally, by calculating the difference between (6) and (20) we get the representative government's "true" gain in EMU:

$$G_{N,E} = \frac{1}{2}\left\{\left[\lambda^2 - \frac{\mu^2(1+F)^2 + \lambda((\mu-F)^2 + (1+\mu)^2)}{(1+\mu)^2}\right]\bar{y}^2 - \frac{\mu^2(1+\lambda)}{(1+\mu)^2}\sigma_{ZE}^2 - \frac{\lambda^2}{1+\lambda}\sigma_{ZN}^2 + \frac{2\mu\lambda}{1+\mu}\rho\sigma_{ZE}\sigma_{ZN}\right\} + K \tag{22}$$

From (22), we can calculate how the optimal degree of ECB conservativeness changes due to the various sources of uncertainties:

$$\frac{(1+F)^2 + \lambda(\mu-F)}{(1+\mu)^3}\mu\bar{y}^2 + \frac{\mu(1+\lambda)}{(1+\mu)^3}\sigma_{ZE}^2 = \frac{\lambda}{(1+\mu)^2}\rho\sigma_{ZE}\sigma_{ZN} \tag{23}$$

It turns out, that transmission uncertainty does not affect the optimal choice of μ. However, increased preference uncertainty increases the LHS of (23). Therefore, in order to offset the additional bias in inflation expectations which results from the preference uncertainty, for a given λ the representative government would like to appoint a more conservative ECB than what was agreed in the absence of uncertainty. Finally, the no-rebelling constraint under "true" ECB policy is given as follows:

$$\left[\lambda^2 - \frac{\mu^2(1+F)^2 + \lambda(\mu - F)^2}{(1+\mu)^2}\right]\bar{y}^2 + 2K > (1+\lambda)\sigma_X^2 + \left[\frac{\mu^2(1+\lambda)}{(1+\mu)^2}\sigma_{ZE}^2 + \frac{\lambda^2}{1+\lambda}\sigma_{ZN}^2\right] - \frac{2\mu\lambda}{1+\mu}\rho\sigma_{ZE}\sigma_{ZN} \quad (24)$$

The effects of uncertainty on the no-rebelling constraint can be summarised as follows. The higher is uncertainty about the monetary transmission mechanism (as captured by σ_X^2), the more likely it is that the government wants a change in the ECB policy. In addition, since the second term in the squared brackets in the LHS of (24) is greater than μ^2 whenever $F>\mu$, it follows that increased uncertainty about the ECB's preferences also encourages the government to rebel against the Maastricht rules (see equation 23 as well). Most interestingly, however, *the negative effects caused by uncertainties are the stronger the higher is the weight assigned by the representative government on the output objective.* A shift in political preferences towards a more output and employment oriented policy therefore exaggerates the problems arising from uncertainty in the common monetary policy, making rebelling a more tempting option.

The effects of changes in the representative government's preferences and in uncertainty about the ECB's preferences are illustrated in Figure 1. There we use numerical simulation to plot the no-rebelling constraint (24). The solid curve illustrates the LHS of equation 24, and the dashed curve shows the RHS. Both curves are increasing in λ, the government's weight on output. Whenever the dashed curve lies above the solid curve, the representative government does best by trying to act for changes in ECB's policy. When uncertainty increases, meaning that σ_ε^2 and σ_X^2 go up, the intercept of the two curves shifts to the left like in Figure 1b. Hence, the critical level of λ where criticising the common monetary policy becomes optimal is decreasing in uncertainty.

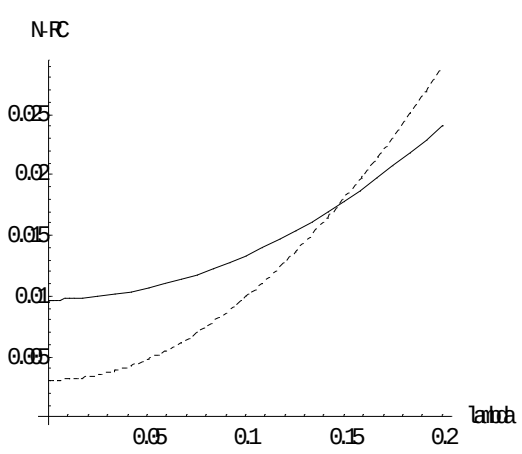

Figure 1a: σ_ε^2, σ_X^2 low

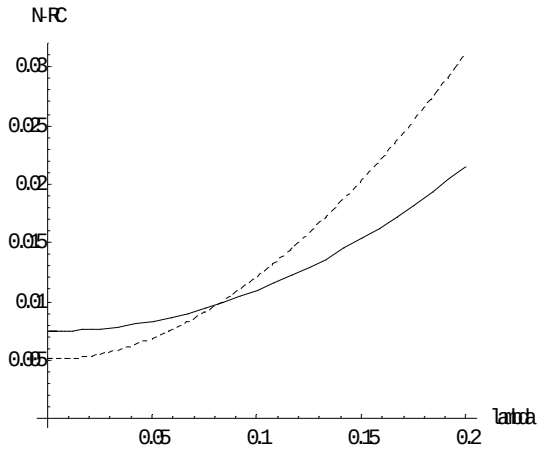

Figure 1b: σ_ε^2, σ_X^2 high

5 Conclusions

This paper used the methods of time-consistent monetary policy games to illustrate the potential losses for a representative government from monetary policy uncertainty in EMU. Our results showed that acquiring information about the transmission mechanism, and revealing that information as well as information about the "true" ECB reaction function, is incentive compatible for the ECB both directly and indirectly. The direct effect is due to the fact that the ECB's own welfare loss in increasing in uncertainties. The indirect effect arises because less uncertainty reduces the risk of criticism from the individual governments' side. The risk of criticism is the larger, and consequently the indirect incentive to reduce uncertainty is the higher, the larger are the leftward shifts in national political preferences from those that prevailed when the Maastricht Treaty was agreed. Our model also gives a possible explanation to why the ECB decided to adopt a strategy that is more effective from the point of view of providing information about the transmission mechanism than a strategy that would have been more effective in terms of reducing uncertainty about the ECB's preferences.

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