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ABSTRACT

Credibility, Transparency and Asymmetric Information in Monetary Policy

The literature has often commented on, but seldom explicitly analysed, the effects of a lack of transparency in monetary policy. Using a standard theoretical model where there are also opportunities for fiscal intervention, we argue that the effects of a lack of transparency will be very different depending on whether they reflect preference or goal uncertainties: that is, whether they represent a lack of political transparency or a lack of economic transparency. The former allows the central bank to create and exploit a 'strategic' reputation to its own advantage; the latter does not. The test that distinguishes the two cases is whether inflation forecasts are published or not. We also find that transparency is a partial, but strictly limited, substitute for accountability.

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NON-TECHNICAL SUMMARY

Much of the recent literature on the institutional design of monetary policy and the operating procedures of central banks has concentrated on credibility and independence, accountability, conflicts with fiscal policies and transparency. Of these few topics, transparency has received the least analysis. Indeed economics has had little to say about the consequences of a lack of transparency in monetary policy, or about what might be done to increase the public understanding and predictability of monetary policy. And, among policy makers, these are still very controversial issues – as the dispute between Buiter (1999) and Issing (1999) makes clear.

In this Paper we set out to throw some light on the possible consequences of a lack of transparency in monetary policy when it interacts with fiscal policy and when the central bank is independent of other policy makers. Extending the approach of Svensson and Faust we draw a sharp distinction between political transparency (where policy priorities have to be made clear in the sense of defining how fast, at the margin, policy makers will trade off the failure to meet their targets against the opportunity to improve on their other targets); and economic transparency (where policy makers have to make clear their external information, target values and control errors). This, we argue, is an important distinction because the different types of transparency generate quite different outcomes and behaviour.

With a failure of political transparency, the central bank has a positive incentive to misrepresent the preferences as being more conservative (inflation averse) than they really are. Manipulating its reputation in this way reduces inflationary expectations in the private sector, and hence makes inflation easier to control. But the downside of this behaviour is that it creates greater conflicts with other (fiscal) policy makers who are not quite so inflation averse. The result is more unstable outcomes for the economy as a whole. The key point is that this happens because this form of transparency failure enters the optimal decision rules multiplicatively, so it is not possible for the private sector to deduce the bank's true preferences from its decisions – separately from other sources of uncertainty or exogenous factors. This case will therefore be distinguished from other transparency problems by the bank's reluctance to publish any inflation forecasts.

A lack of economic transparency produces no such complications because the uncertainty about the bank's true preferences now enters the various decision rules linearly, which allows the private sector to filter out the lack of transparency effects from other factors, using the usual separation properties of certainty equivalence. There is no incentive to misrepresent or manipulate reputations, or to withhold inflation forecasts.

Having got this far, it is then easy to use these results to establish explanations for several other features which are commonly observed in central bank behaviour:

- why conservative central banks, and those with strong reputations, frequently do not see a lack of transparency as a problem (for themselves, or for society at large)

- why central banks are often at pains to stress that conservative policies are in the population's own interest

- why transparency alone will not be enough to guarantee accountability or political legitimacy.

Finally we are able to extend this analysis to give an idea of the likely political responses, as opposed to the responses of other policy makers, to transparency failures. It appears that the attempt to lead the private sector to suppose that the bank is more conservative than it really is would produce more liberal (i.e. output stabilizing) governments in response – in part as a counterbalance to the extra monetary tightening which the bank's *expected* preferences would produce; and, more importantly, to put a 'risk aversion bias' in the other policy decisions in order to counter the uncertainties about the bank's actual policy decisions which a lack of transparency creates – and to produce outcomes more suited to the electorate's wishes. This political reaction then explains why many previously secretive central banks have opted for more transparency in recent years. Under these circumstances, a lack of transparency turns out to be counterproductive from the point of view of inflation control and stabilization.

1. INTRODUCTION

In the literature on Central Bank independence four themes always reappear: transparency, credibility, accountability and the possibility of conflict with fiscal or employment policies. A lack of transparency arises when the public is uncertain how monetary policy is conducted. In a sense, therefore, it precedes the other three problems. But, that said, there is very little direct analysis of the effects of incomplete transparency in the literature.

Svenson and Faust (1998), for example, examine the effects of transparency on monetary policy effectiveness. In their study, a lack of transparency is modelled as a Central Bank whose goals are random and unobservable. Increased transparency then improves the precision of private sector expectations, while making central bank's reputation more sensitive to the central bank's actions. This has a moderating influence on the bank's policy. While this solution is generally socially beneficial, it is not always in the interest of the bank. An independent Central Bank would therefore have little incentive to provide transparency.

That analysis however examines just one dimension of transparency, whereas asymmetric information about any aspect of monetary policy could reflect a transparency failure. A lack of transparency could arise because the Central Bank has private information about the nature of the shocks and the way policy affects the economy (Cuckierman 1992, 1999); or because the Central Bank has not stated its objectives clearly enough (Cukierman and Meltzer 1986); or because the public is uncertain about the preferences of the Central Bank (Nolan and Schaling 1996, Muscatelli 1998). In each of these cases, a lack of transparency introduces a disturbance which distorts the private sectors expectations of inflation. That suggests greater transparency would make an independent central bank more accountable and more consistent with democracy, while also improving the stabilisation properties of monetary policy because it permits other agents to make better and better informed decisions (Blinder, 1998).

However propositions of that kind have created a great deal of doubt and confusion. An illustration of this example is the dispute between Buiter (1999) and Issing (1999). Buiter argues for transparency as a form of accountability; citing better policy coordination, clearer objectives and priorities for future policy, and the publication of inflation forecasts, as the main issues for monetary policy. Issing counters with the need to reinforce credibility. He argues that we need to separate transparency from accountability (the "need to understand" from the "need to know"), and that we should concentrate on achieving price stability rather than analyse the policy decisions and inflation forecasts. The markets, meanwhile, find these arguments tend to muddy the waters rather than clarify them. Asked to rank their understanding of their own Central Bank's monetary decisions on a scale of 1 to 5, Goldman Sach's clients recently gave the Federal Reserve a score of 4.3, the Bundesbank and the Bank of England 3.5 and 3.3 respectively, and the ECB 2.2. (with 60% giving it a score of 2 or less).[1]

Our aim, in this paper, is to throw some light on the consequences of a lack of transparency when monetary policy interacts with fiscal policy. But unlike previous papers in this area, we draw a sharp distinction between political transparency (where policy preferences, or priorities, are clearly articulated for all to see) and economic transparency (where the external information, control errors or target values are made clear).[2] This is an important distinction because these different types of transparency failure generate quite different results, not least because the former gives the Central Bank a reason to manipulate its reputation - and that

[1] Financial Times, 7 March 2000.
[2] Cuckierman (1999).

creates greater conflicts with the other policy makers and hence more unstable outcomes for the economy as a whole. These differences appear because the effects of a lack of transparency enter policy decisions nonlinearly in the first case, but linearly in the second. Certain standard responses of Central Bank behaviour follow from this, such as their reluctance to publish forecasts.

However, we also get some results which are familiar from other studies. We can distinguish strong Central Banks, for whom the whole issue of transparency will seem rather unimportant, from weak Central Banks who may want to increase the transparency in their system. This is consistent with Jensen's (2000) results, and follows from the fact that transparency and credibility turn out to be strategic substitutes. But, by the same token, transparency will also increase the incentive to invest in gaining a reputation since there is less opportunity to create it as part of their strategy (Gerrats, 2000). Finally we are able to give an idea of the likely political responses to imperfect transparency. That, in turn, provides one explanation for why many previously secretive Central Banks have become more transparent.

For the purposes of this paper we have taken Central Bank independence to mean target and instrument independence as defined by Fischer (1995). The alternative is a negotiated

solution in which each player is an independent party with full instrument independence and a certain share of target independence. We operate with a standard Barro-Gordon type of model, extended to include fiscal policy,[3] and show that economic and political stability can be very different depending on the type of transparency failure encountered.

2. FISCAL AND MONETARY POLICIES UNDER FULL TRANSPARENCY: THE CONVENTIONAL CASE

2.A Independent Policy Making When Preferences Differ:

To examine transparency, we adapt the standard analysis of Barro and Gordon (1983), Rogoff (1985), Debelle and Fischer (1994), and Alesina and Gatti (1995).

Following the Rogoff paper, suppose that the Government delegates the conduct of monetary policy to a Central Bank with more conservative preferences than society. Suppose also that the Government is able to keep control of its fiscal instrument. The Central Bank's problem is then to minimise the loss function:

$$L_{CB} = \frac{1}{2}\left[\pi^2 + \tau^2 + \gamma(y-k)^2\right] \tag{2.1}$$

subject to

[3] As in Debelle and Fischer (1994), Nordhaus (1994). The differentiates our conclusions from the standard Barro-Gordon results. However we do not consider the level of public debt in our work (Beetsma and Bovenberg 1997, or Beetsma and Uhlig 1999) for three reasons: a) our focus is elected governments, where the electoral process naturally implies a shorter decision horizon; b) because the impact of fiscal policy works via inflation surprises whereas, in a long run debt problem, inflation changes are fully anticipated; and c) because we want to keep open the possibility of interpreting our second policy instrument as some kind of nonwage cost, or supply side or structural reform instrument. For that the level of debt is irrelevant. Our point is a different one: if the independent Central Bank fails to maximise social welfare, then voters and governments will surely react to redress the balance.

$$y = \pi - \pi^e - \tau + \varepsilon \tag{2.2}$$

where y = output (with target level k>0),[4] π = inflation (with expected value π^e, but target level of zero), τ = tax revenues net of expenditures, and ε is a random shock with zero mean. The Bank's policy instrument is its choice of π. In reality the Bank would use interest rates. But since the standard theoretical models assume that nominal interest rates have no systematic long run influence on output, we may as well use π. Finally γ is the relative priority placed on the output target. It is therefore an index of conservatism (smaller γ values) or liberalism (larger γ values).

The Central Bank's optimal reaction function is now obtained by inserting (2.2) into (2.1) and optimising with respect to π. We get

$$\pi = \frac{\gamma}{1+\gamma}\left[\pi^e + \tau + k - \varepsilon\right] \tag{2.3}$$

The fiscal authorities, meanwhile, aim to minimise the government's loss function

$$L_{FA} = \frac{1}{2}\left[\pi^2 + \tau^2 + \beta(y-k)^2\right] \tag{2.4}$$

subject to (2.2). If, following Rogoff's arguments, the Central Bank should be at least as conservative as the government, then $\gamma \leq \beta$. We do not impose this restriction, but derive it from our voting model in Section 4. The government's instrument is τ, with optimal reaction function

[4] Output is measured in deviations from its long run, full capacity level: y_c. It is important to note that the inclusion of τ in (2.1) will have no influence on the Central Bank's first order conditions or optimal reaction functions. We have included τ here only because many Central Banks, and the ECB in particular, appear to be very concerned about the fiscal stance of their governments - even though they cannot directly affect fiscal policy themselves. That is what minimising (2.1) by choice of π says.

$$\tau = \frac{\beta}{1+\beta}\left[\pi - \pi^e + \varepsilon - k\right] \qquad (2.5)^5$$

Substituting (2.5) into (2.3) and taking expectations reveals expected inflation to be

$$\pi^e = \frac{\gamma}{1+\beta}k \qquad (2.6)$$

Consequently the optimal choices of inflation (monetary policy) and net tax revenues are:

$$\pi^* = \frac{\gamma}{1+\beta}k - \frac{\gamma\varepsilon}{1+\beta+\gamma}, \text{ and } \tau^* = \frac{-\beta}{1+\beta}k + \frac{\beta\varepsilon}{1+\beta+\gamma}. \qquad (2.7a, b)$$

Thus $E\pi^*>0$ and $E\tau^*<0$. (2.8)

Notice, however, that the reaction functions themselves have slopes $(1+\gamma)/\gamma$ and $\beta/(1+\beta)$ in (π, τ) space. That means the Central Bank's reaction function is always steeper than that of the fiscal authorities, since $\beta, \gamma>0$ implies $(1+\gamma)/\gamma>\beta/(1+\beta)$. But they are both upward sloping for all values of $\beta, \gamma>0$. They therefore form an acute angle[6] which does not vanish even when $\beta\rightarrow\gamma$. We can summarise all these results in a Hamada style diagram, Figure 1.

[5] Note that (2.5) is invariant to changes in the parameter (of unity) on τ in (2.4).

[6] This means the two policy instruments are strategic complements, in that restricting the use of one would damage the ability of the other to reach its preferred objective. That is the reason why "one sided" alternatives, such as the Stability Pact, or fiscal dominance, will produce inferior outcomes: see Demertzis et al (1999b) for an example.

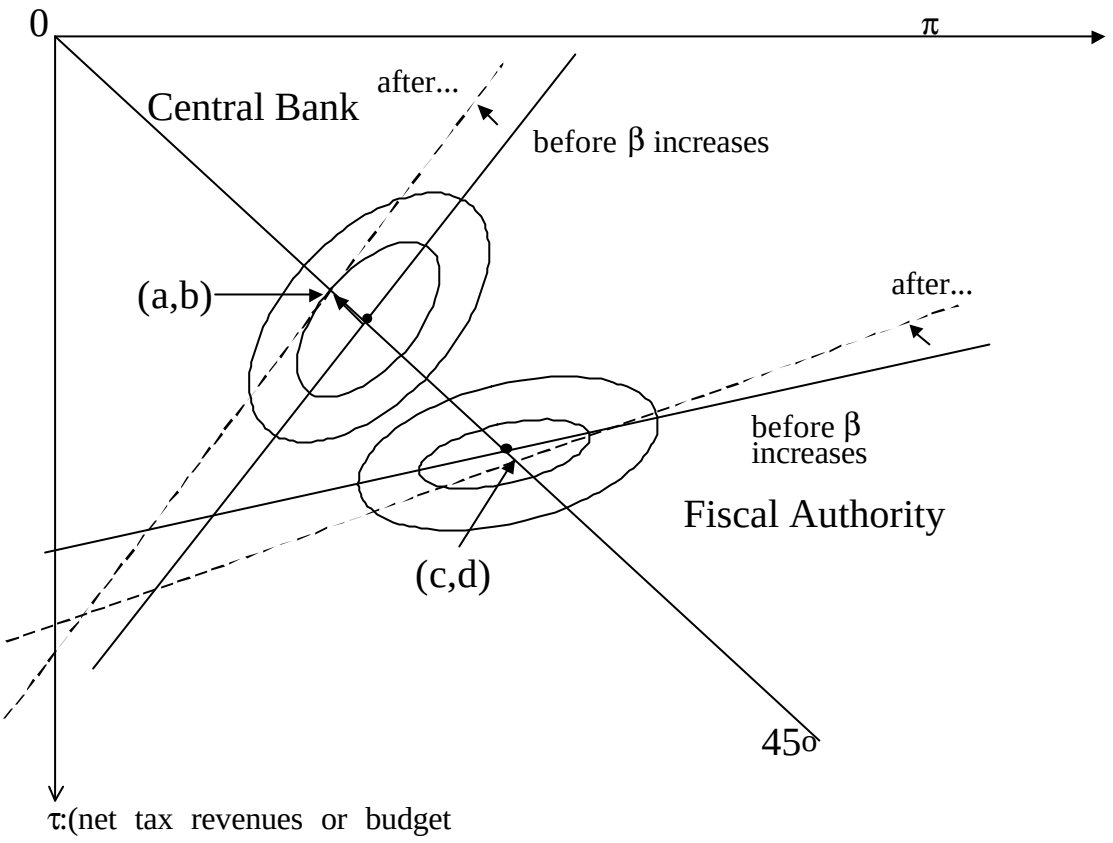


Figure One. Fiscal and Monetary Conflicts with an Independent Central Bank

Finally the slope of the fiscal reaction function increases as β increases, $\partial(\beta/(1+\beta))/\partial\beta>0$, which means that the acute angle between the two reaction functions gets smaller - but does not vanish - as the policy priorities diverge from one another. On the other hand, (2.7) also implies that an increasingly liberal government, relative to a consistently conservative Central Bank, would work to reduce inflation and increase the budget deficit:[7]

$$\partial E\pi^*/\partial\beta < 0, \;\; \partial E\tau^*/\partial\beta < 0. \qquad (2.9)$$

Hence, the more the priorities differ between policy makers, the more their policies will conflict. In particular, the budget deficit will get larger, or the wage restraints stronger, as the disagreements between policy objectives expand - even if inflation is made to fall at the same time. In other words, these conflicts reflect a deflationary bias - not Keynesian policies.

[7] Or to increase wage controls, or tax competition, or supply side reforms, if the alternative interpretation for τ offered in Section 2.B is preferred.

2.B Alternative Interpretations for τ

There are now three points to make. The first is that τ is subject to a wide range of interpretations. We have treated τ as a fiscal surplus ($\tau>0$), or a fiscal deficit ($\tau<0$), which has a permanent effect on output if that surplus or deficit is maintained. However we can reinterpret it as a measure of the social security or nonwage costs imposed on employers; or of taxes on labour; or as the costs of certain supply side constraints, or market restrictions, or job protection legislation imposed on producers; or as the costs of any market imperfections in the wage bargaining process that might keep real wages above their market clearing levels.[8] It is also worth noting that (2.2) can also be derived by considering taxes on revenues as well as those on labour (Beetsma and Bovenberg, 1997). Consequently τ can carry a whole range of interpretations going from corporate and indirect taxes; through payroll taxes or production subsidies; to various restrictive practices or market regulation schemes. It is not just a proxy for the overall fiscal balance.

The second point is that equation (2.2) models supply side policies in which changes in τ have a permanent effect on the level of output. However τ could just as well represent fiscal interventions on the demand side, or the impact of wage controls which have only transitory effects on the real economy. To analyse those cases we need to replace τ with $\tau - \tau^e$ in (2.2). That however merely complicates the solution process. The solution itself is not materially affected, as we showed in Demertzis et al (1999a).

[8] All these results are derived formally in Demertzis et al (1999a).

The third point is that one might question the presence of $k \neq 0$ among the Central Bank's objectives. It is a fact that all models in this literature include such an objective, and always for the same reason.[9] Taxes and supply side restrictions are distortionary in the sense that they depress output and employment by more than surprise inflation can improve them. Similarly labour market imperfections, imperfect competition, and job protection schemes will also keep real wages above their market clearing levels, and output below its first best optimum (Persson and Tabellini, 1990). We therefore need to set $k>0$ to correct for any of those distortions.

Finally solutions where the Bank is fully precommitted to a certain inflation control rule (see McCallum, 1997) can also be fitted into this framework as a special case - see Demertzis et al (1999a) for details. So we do not report separate results for that case here.

3. THE OUTCOMES WHEN THERE IS PREFERENCE UNCERTAINTY

Suppose now that the private sector is uncertain about the Bank's priority for inflation control relative to its priority for stable output and employment. This may be because the Bank has not made its priorities clear, or because it has sent conflicting signals about how it will act at the margin when trading those two objectives off. That implies a lack of transparency about how the Bank will make its decisions, but not about the Bank's target values for inflation or the level of output. For the moment we take those target values to be known. But we allow them to be uncertain in Section 5 below.

[9] See Barro and Gordon (1983) Rogoff (1985), Bryson et al (1993), Debelle and Fisher (1994), Alesina and Gatti (1995), McCallum (1997), or Alesina and Wacziarg (1999). The most detailed justification appears in Persson and Tabellini (1990).

We study the case where private sector agents believe the Central Bank will use $\bar{\gamma}$ in (2.1), whereas the Bank actually decides to use γ_1. We suppose

$$\gamma_1 = \bar{\gamma} + \eta \tag{3.1}$$

where η is a random variable distributed with mean zero and variance σ_n^2. That means the private sector, and the fiscal authorities, are uncertain about the Central Bank's true preferences. They think the Bank will use $\bar{\gamma}$, being *either* their best guess out of the distribution of possible preference values; *or* the representative value when different agents have different beliefs from the distribution of possible values. But the Central Bank does know which value it will use: γ_1. It also knows that $\bar{\gamma}$, the mean of the private sector's distribution[10] for γ_1. In that sense the Central Bank has private information, but has been unwilling or unable to reveal that information to the rest of the economy. Consequently, from the private sectors point of view, we may treat γ_1 as a "random" choice - distributed in some suitable fashion about $\bar{\gamma}$.[11] That means η is similarly distributed about zero, with lower bound $-\bar{\gamma}$.

Since (2.2) refers to the economy's supply responses, π^e must represent the private sectors expectation for inflation - conditional on its own information set, including the value for $\bar{\gamma}$. That means the private sector will have to solve $\min_{\pi} E(L_{CB/PS})$ subject to (2.2)[12] in order to

[10] There is another paper to be written where the private sector simply makes a mistake about γ_1, so that the Central Bank doesn't know that $\bar{\gamma}$ is on average different from γ_1. But that represents genuinely uncertain preferences rather than a lack of transparency by one player.

[11] There are a number of possible assumptions here: a uniform or a beta distribution defined on the interval $(-\bar{\gamma}, \bar{\gamma})$, or a gamma distribution on the interval $(-\bar{\gamma}, \infty)$ if symmetry is not required. But normality is not an appropriate assumption because of the lower bound $-\bar{\gamma}$.

[12] From now on we write $L_{i/j}$ to denote the objective function of player i evaluated using the information set of player j. By contrast L^*_i will mean the outcome actually obtained by player i, after the corresponding policies have been implemented.

evaluate π^e and the outcomes it expects for π and τ. Retracing the steps of Section 2.A, we get

$$\pi^e_{PS} = \frac{\bar{\gamma}k}{1+\beta}, \tag{3.2}$$

with $$\pi^*_{PS} = \frac{\bar{\gamma}k}{1+\beta} - \frac{\bar{\gamma}\varepsilon}{1+\beta+\bar{\gamma}} \tag{3.3a}$$

and $$\tau^*_{PS} = \frac{-\beta k}{1+\beta} + \frac{\beta\varepsilon}{1+\beta+\bar{\gamma}} \tag{3.3b}$$

as the outcomes evaluated according to the private sectors' information set. For the moment we will assume that the private sector's information set is identical to that of the government and fiscal authorities. That means (3.3 a,b) are the government's expected outcomes too.

These expectations/outcomes are therefore conditional, and independent of the actual values of γ_1, σ^2_n or any covariance between η and ε that might have been chosen by the Bank. By contrast, the Bank's intended outcomes are

$$\pi^e_{CB} = \frac{\gamma_1}{1+\beta} k \tag{3.4}$$

with $$\pi^*_{CB} = \frac{\gamma_1 k}{1+\beta} - \frac{\gamma_1\varepsilon}{1+\beta+\gamma_1} \tag{3.5a}$$

and $$\tau^*_{CB} = \frac{-\beta k}{1+\beta} + \frac{\beta\varepsilon}{1+\beta+\gamma_1} \tag{3.5b}$$

Hence the private sectors expectations will differ from the Central Bank's expectations by a stochastic term:

$$\pi^e_{PS} - \pi^e_{CB} = \frac{-k\eta}{1+\beta} \tag{3.6}$$

Thus, private sector expectations will be too high if the Bank is more conservative than the private agents thought $(\gamma_1 < \bar{\gamma})$, but they will be too low if the Bank chooses to be more liberal. But there can be no systematic difference if the private sector has rational

expectations - it least in the long run, if efficient learning algorithms are used to determine the true value of γ_1. On the other hand short run "errors" are possible and could be exploited as long as γ_1 remains unknown. And long run errors are possible if the private sector is subject to bounded rationality or persistent information "biases" (i.e. if the conditions for an unconditional rational expectations equilibrium obtain; Fagin et al 1995).

Similarly the intended outcomes for inflation would be the same apart from certain random disturbances: i.e.

$$\pi^*_{PS} - \pi^*_{CB} = \frac{k\eta}{1+\beta} + \frac{(1+\beta)\eta\varepsilon}{(1+\beta+\gamma_1)(1+\beta+\bar{\gamma})} \tag{3.7}$$

and for the fiscal deficit

$$\tau^*_{PS} - \tau^*_{CB} = \beta\left[\frac{\eta\varepsilon}{(1+\beta+\gamma_1)(1+\beta+\bar{\gamma})}\right] \tag{3.8}$$

That means the Central Bank and the private sector would, based on their own information sets, have expected to have the same inflation and fiscal deficits so long as Cov(ε,η)=0.

3.B From Intentions to Actual Outcomes

The actual outcomes will be rather different however, since the private sector's information will go into the determination of π^e and the choice of τ^*; but the Central Bank's information will be used to determine π^*. That complicates the solution. Using (3.2) for π^e, (2.3) based on γ_1 for the Central Bank's reaction function, and (2.5) based on $\bar{\gamma}$ for the fiscal authorities' reaction function, we get π^e as before. But

$$\pi^* = \frac{\gamma_1}{1+\beta}\left[\frac{1+\beta+\bar{\gamma}}{1+\beta+\gamma_1}\right]k - \frac{\gamma_1\varepsilon}{1+\beta+\gamma_1} \tag{3.9}$$

and $$\tau^* = \frac{-\beta k}{1+\beta} + \frac{\beta\varepsilon}{1+\beta+\bar{\gamma}} \tag{3.10}$$

are the actual policy outcomes. They differ from the Bank's intended position only in the

extra term in square brackets in (3.9). However that term is positive but less than unity as long as $\eta > 0 (\gamma_1 > \bar{\gamma})$; and the stochastic term is unaltered from (3.5a). Hence, by choosing $\gamma_1 > \bar{\gamma}$, the Bank can reduce inflation on average - for no cost in the variability of that inflation. That is the origin of the incentive for the Bank to strategically misrepresent its preference for its own purposes.

However there is no change in the average size of the fiscal deficit[13] τ^* - either from what the Bank might have chosen for itself, (3.5b), or from what the private sector/government had expected - since the fiscal authorities don't know γ_1. The only change is that the deficit shows a higher variability in (3.10), because $\bar{\gamma} < \gamma_1$, than the Bank might have chosen for itself. That is the trade-off in misrepresenting ones preferences: lower inflation, but more active fiscal policies. However that is what actually happens; not what the Bank would have expected on the basis of what it knows (but the private sector doesn't know) about the Bank's intended outcomes for inflation. The Bank using (3.9) in (2.5), could have intended:

$$\tau^*_{CB/CB} = \frac{-\beta}{1+\beta}\left[\frac{1+\beta+\bar{\gamma}}{1+\beta+\gamma_1}\right] k + \frac{\beta\varepsilon}{1+\beta+\gamma_1} \qquad (3.11)$$

Equation (3.11) shows that the Bank could have tried to use a lack of preference transparency to create both smaller and more stable deficits $(\gamma_1 > \bar{\gamma})$. But in that endeavour, it will be frustrated since, to get (3.11), it would have to tell the fiscal authorities about

[13] Recall that $\tau<0$ represents a deficit.

γ_1 - whereupon we revert to (3.10) and (3.9), with γ_1 in place of $\bar{\gamma}$, and the advantages of lower inflation and lower deficits are lost. Hence another way must be found: a lack of transparency in which the private sector is persuaded that $\bar{\gamma}$ will be used, when actually $\gamma_1 > \bar{\gamma}$ has been chosen. That would explain why Central Banks appear to be so preoccupied with the fiscal authorities' apparent lack of discipline in setting fiscal policies.

3.C Can the Bank Use a Lack of Transparency Strategically?

The upshot of these results is that inflation may be lower on average (but more volatile) than the private sector had expected. The fiscal deficit, on the other hand, may be larger than the Central Bank had wished, and more flexible, as a result of uncertainty over the Bank's relative priorities. So both players get something of what they want, but at a loss in stability.

There are two further comments to make. First, from (3.7) and (3.8), if the Bank adopts time varying preferences by attempting to adjust its policies countercyclically - i.e. to become more inflation averse in boom periods, and less so in recessions, so that Cov $(\varepsilon, \eta)<0$ - then the private sector will appear to under-predict inflation and over-predict the size of the deficit needed ($\tau<0$). This is just one example of what can happen when there is an information asymmetry: it will appear to the private sector that the attempt to use activist policies is just producing an inflation bias, when in fact the root cause of the problem is an information deficit.

Second, since π^* and τ^* (defined in 3.9 and 3.10) determine the actual policy outcomes, the Bank has an opportunity to use its lack of preference transparency strategically - at least until the private sector learns the true value of γ_1. This is because, if the Central Bank can persuade the private sector that it is more conservative than it really is $(\gamma_1 > \bar{\gamma})$, then it can

achieve a lower inflation rate than it could otherwise have hoped for. That is possible because the private sectors inflation expectations are reduced from what they would have been had the Bank revealed its true preferences. But the cost may be larger deficits than the Bank might have wished, and more volatility in the system. So whether this tactic actually produces higher or more stable output, and hence a genuine incentive for the Bank to misrepresent its preferences, remains to be seen. (We check on that in Section 3.D.) If it does, then we have a plausible model of the ECB during its first two years of operation: conservative monetary policies and strong rhetoric, but little attempt explain to those policies despite widespread criticism that they were too inflation averse.

3.D Building a "Strategic" Reputation: will the Bank do so?

Inserting (3.2) and (3.3), or (3.2), (3.9) and (3.10), into (2.2) yields

$$y^{*}_{PS} = \frac{\beta k}{1+\beta} + \frac{\varepsilon}{1+\beta+\bar{\gamma}} \qquad \text{and} \qquad y^{*} = \left[\frac{\beta}{1+\beta} + \frac{\eta}{1+\beta+\gamma_1}\right]k + \left[1 - \frac{\eta(1+\beta)}{1+\beta+\gamma_1}\right]\frac{\varepsilon}{1+\beta+\bar{\gamma}}$$

which means that the Central Bank and the private sector both expect the same level of output if ε and η are uncorrelated:[14]

$$E\left(y^{*}_{PS}\right) = E\left(y^{*}\right) = \beta k / (1+\beta) \tag{3.12}$$

But they would expect very different levels of output stability, even if ε and η are uncorrelated. The Bank, for example, would expect higher output volatility than the private sector; and that any counter-cyclical policies (if η and ε were negatively correlated) would destabilise output. The private sector would expect neither of these things. However, for simplicity, and because it may be difficult to monitor ε with any accuracy, we will assume

[14] subject to first order certainty equivalence being applied to y*.

that ε and η are distributed independently from now on. In that case, the Central Bank will expect and also achieve an average loss function value of approximately:[15]

$$E\left(L^{*}_{CB}\right) \cong \frac{1}{2}\left[\frac{\left(\bar{g}^{2}+s_{n}^{2}\right)\left(1+b+\bar{g}\right)^{2}+\left(g_{1}+b^{2}\right)\left[\left(1+b+\bar{g}\right)^{2}+s_{n}^{2}\right]+g_{1}\left(1+b\right)^{2}s_{n}^{2}}{\left(1+b\right)^{2}\left(\left(1+b+\bar{g}\right)^{2}+s_{n}^{2}\right)}\right]k^{2}$$
$$+\frac{1}{2}\left[\frac{\left(\bar{g}^{2}+s_{n}^{2}\right)\left(1+b+\bar{g}\right)^{2}+\left(g_{1}+b^{2}\right)\left[\left(1+b+\bar{g}\right)^{2}+s_{n}^{2}\right]+g_{1}\left(1+b\right)^{2}s_{n}^{2}}{\left(1+b+\bar{g}\right)^{2}\left(\left(1+b+\bar{g}\right)^{2}+s_{n}^{2}\right)}\right]s_{e}^{2} \tag{3.13}$$

Notice that, in this expression, $\bar{\gamma}$ and σ_n appear in matched pairs of the same order in each of the terms. That will make credibility and a lack of transparency into strategic substitutes, as far as the Bank is concerned. That result would explain Issing's (1999) arguments about Central Bank policy, quoted in the introduction.

The private sector, by contrast, will expect the Central Bank to achieve

$$\mathrm{E}\left(\mathrm{L}^{*}_{\mathrm{CB/PS}}\right)=\frac{1}{2}\left[\frac{\left(\bar{\gamma}^{2}+\beta^{2}+\bar{\gamma}\right)}{\left(1+\beta\right)^{2}}\mathrm{k}^{2}+\frac{\bar{\gamma}^{2}+\beta^{2}+\bar{\gamma}}{\left(1+\beta+\bar{\gamma}\right)^{2}}\sigma_{\varepsilon}^{2}\right] \tag{3.14}$$

since it doesn't know γ_1. Consequently the private sector will believe that the Central Bank is better off, or more successful, than it actually is if

$$\mathrm{E}\left(\mathrm{L}^{*}_{\mathrm{CB}}\right)-\mathrm{E}\left(\mathrm{L}^{*}_{\mathrm{CB/PS}}\right)>0 \tag{3.15}$$

[15] Each of the loss function values quoted here and below depends on substituting the associated policy choices into the appropriate loss function: i.e. (3.9), (3.10) and y* into (2.1) for (3.13); or (3.3a,b) and y^{*}_{ps} into (2.1) for (3.14). However, in order to evaluate $E\pi^{*2}$ and $E(y^{*}-k)^{2}$ we have to apply our assumption of the independence of ε and η to evaluate terms such as $E\eta^{2}\varepsilon^{2}$ or $E\eta^{2}\varepsilon$; and independence and first order certainty equivalence to obtain $\mathrm{E}\left(\eta^{2}/\left(1+\beta+\gamma_{1}\right)^{2}\right)\cong\sigma_{n}^{2}/\left[\left(1+\beta+\bar{\gamma}\right)^{2}+\sigma_{n}^{2}\right]$ and $\mathrm{E}\left(\gamma_{1}/\left(1+\beta+\gamma_{1}\right)^{2}\right)\cong\left(\bar{\gamma}^{2}+\sigma_{n}^{2}\right)/\left[\left(1+\beta+\bar{\gamma}\right)^{2}+\sigma_{n}^{2}\right]$.

Substituting from (3.13) and (3.14), we can boil (3.15) down to

$$E\left(L^*_{CB}\right)-E\left(L^*_{CB/PS}\right) = \frac{1}{2}\left[\frac{s_n^2(1+b)(1+b+2\bar{g})+h\left((1+b+\bar{g})^2+s_n^2\right)+g_1(1+b)^2 s_n^2}{(1+b)^2\left((1+b+\bar{g})^2+s_n^2\right)}\right]k^2 + \frac{1}{2}\left[\frac{s_n^2(1+b)(1+b+2\bar{g})+h\left((1+b+\bar{g})^2+s_n^2\right)+g_1(1+b)^2 s_n^2}{(1+b+\bar{g})^2\left((1+b+\bar{g})^2+s_n^2\right)}\right]s_e^2 \tag{3.16}$$

which is clearly positive whenever $\eta \geq 0$. Consequently, a lack of transparency will always make the private sector (and governments) think that the Bank is going to be more "hard nosed" and successful in its anti-inflationary efforts than it will eventually turn out to be - especially if it misrepresents its preferences strategically ($\eta>0$).[16] This may be the source of the suspicion that many Central Banks, including the ECB, are often not quite as inflation averse as they say - but use a certain lack of transparency to create an image and reputation which can be used to deflate inflationary expectations and hence control inflation more successfully.

3.E Output Stabilisation with a Strategic Reputation

For inflation, the incentive to follow such a strategy is clear enough. But does the Central Bank face the same incentive when other variables, including the stability of output in particular, are taken into account? The Bank would want to create a lack of transparency deliberately, and misrepresent its preferences as more conservative, if

[16] $\eta>0$ is only a sufficient condition for (3.16) to be positive:
$\eta > -\sigma_n^2\left((1+\beta)^2+2(1+\beta)\bar{\gamma}+\bar{\gamma}\right)/\left[(1+\beta+\bar{\gamma})^2+2\sigma_n^2\right]$ would be necessary.

$$E\left(L^{*}_{CB}\right)-E\left(L^{*}_{CB}(\gamma_1)\right)=\frac{1}{2}\left[\frac{\left(\bar{\gamma}^2+\sigma_n^2\right)\left(1+\beta+\bar{\gamma}\right)^2+\gamma_1\left(1+\beta\right)^2\sigma_n^2-\gamma_1\left(\left(1+\beta+\bar{\gamma}\right)^2+\sigma_n^2\right)}{\left(1+\beta\right)^2\left(\left(1+\beta+\bar{\gamma}\right)^2+\sigma_n^2\right)}\right]k^2$$

$$+\frac{1}{2}\left[\frac{\left(\bar{\gamma}^2+\sigma_n^2\right)\left(1+\beta+\bar{\gamma}\right)^2+\gamma_1\left(1+\beta\right)^2\sigma_n^2-\gamma_1^2\left(\left(1+\beta+\bar{\gamma}\right)^2+\sigma_n^2\right)}{\left(1+\beta+\bar{\gamma}\right)^2\left(\left(1+\beta+\bar{\gamma}\right)^2+\sigma_n^2\right)}\right]\sigma_\varepsilon^2<0$$

(3.17)

holds, where $L^{*}_{CB}(\gamma_1)$ denotes the Central Bank's outcome had it announced its true preferences: γ_1. This expression is negative, meaning the lack of transparency solution is better, if

$$\left(\bar{\gamma}^2+\sigma_n^2\right)\left(1+\beta+\bar{\gamma}\right)^2+\gamma_1\left(1+\beta\right)^2\sigma_n^2<\gamma_1^2\left(\left(1+\beta+\bar{\gamma}\right)^2+\sigma_n^2\right) \tag{3.18}$$

Hence this opportunity for strategy reputation building, and the desire to use or maintain a lack of transparency, vanishes as $\sigma_n^2\to 0$ since then $\gamma_1\to\bar{\gamma}$. But an incentive to create a lack of transparency always exists if σ_n^2 is not too large, since the condition that satisfies (3.18) is

$$\sigma_n^2<\frac{\left(2\bar{\gamma}+\eta\right)\eta\left(1+\beta+\bar{\gamma}\right)^2}{\left(1+\beta+\bar{\gamma}\right)^2+\gamma_1\left(\left(1+\beta\right)^2-\gamma_1\right)} \tag{3.19}$$[17]

Hence the Bank will always want to permit a lack of transparency, and will always want to engineer a reputation of being more conservative, if that doesn't create too much extra uncertainty in the process. This is another version of a result obtained by Swank (2000): namely that those for whom reputation is important, prefer to take their decisions in secret. But what we have

[17] We have assumed that the denominator of (3.19) is positive: i.e. that $\eta\le 1$ and hence $\gamma_1\le 1+\bar{\gamma}$ which seems likely.

shown here is that there is a tension between a large value of η, and hence a large scope for manipulating preferences, and too much uncertainty as to where the mean of those preferences might be. On the other hand, positive values of η reduce the denominator in (3.19), because of the term in $-\gamma_1^2$. That raises the upper bound on σ_n^2. Similarly more liberal governments and greater output instability would also increase that incentive: (3.17).

3.F Private Sector Perceptions and Political Frustration

What of the private sector? Would it also find itself better off as a result of the Central Bank's lack of transparency and strategic reputation? The answer is no. If the private sector shares the preferences of the government it has elected, it will expect

$$E\left(L^*_{PS/PS}\right) = \frac{1}{2}\left[\frac{\left(\bar{\gamma}^2+\beta^2+\beta\right)}{\left(1+\beta\right)^2}k^2 + \frac{\left(\bar{\gamma}^2+\beta^2+\beta\right)}{\left(1+\beta+\bar{\gamma}\right)^2}\sigma_\varepsilon^2\right] \tag{3.20}$$

in place of (3.14). Similarly EL^*_{PS} can be obtained in a similar way to EL^*_{CB}, and leads to an expression like (3.13) where the γ_1 term has been replaced by β. The difference between that and (3.20),

$$\begin{aligned} E\left(L^*_{PS}\right) - E\left(L^*_{PS/PS}\right) = {} & \frac{1}{2}\left[\frac{\left[\left(1+\beta\right)+2\bar{\gamma}+\beta\left(1+\beta\right)\right]\sigma_n^2}{\left(1+\beta\right)\left(\left(1+\beta+\bar{\gamma}\right)^2+\sigma_n^2\right)}\right]k^2 \\ & + \frac{1}{2}\left[\frac{\left[\left(1+\beta\right)^2+2\bar{\gamma}\left(1+\beta\right)+\beta\left(1+\beta\right)^2\right]\sigma_n^2}{\left(1+\beta+\bar{\gamma}\right)^2\left(\left(1+\beta+\bar{\gamma}\right)^2+\sigma_n^2\right)}\right]\sigma_\varepsilon^2 \end{aligned} \tag{3.21}$$

is positive. That shows the private sector will always find that a lack of Central Bank transparency has made them worse off for any values of β and $\bar{\gamma}$. But, at the same time, the Central Bank will appear to be doing better than the private sector had expected: recall (3.15) and (3.16). That is bound to create frustration with the outcomes and a reaction - either in the form of pressure for a new government with policies focused more aggressively on output and employment; or at least a government committed to creating a regime with greater

accountability. Either development could lead to political instability. Or it could lead to a system of *institutional* coalitions, in which the policy makers attempt to create some accountability without losing the benefits of Central Bank independence.[18] But the fact that we have political pressures at all is due to the lack of transparency: let $\sigma_n^2 \to 0$, and the inequality in (3.21) disappears.

4. THE RESPONSES TO IMPERFECT TRANSPARENCY

How does a lack of transparency and an incentive to manipulate preferences affect voting patterns when there are conflicts between policies and preferences?

4.A The Electoral Responses in the Absence of Transparency Failures

We start with the case where there is no preference uncertainty, and no transparency problem. In that world, β is chosen by governments and governments are chosen by elections. Consequently any party or group of parties which wants to get into power must aim to capture the median voter. We may assume that the electorate has its own distribution of parameters describing the priority which each voter would put on output stabilisation relative to inflation control.[19] Let the median voter have preferences identified with the parameter

[18] Coalitions between policy makers who satisfy their own preferences without reference to the private sector, can - as Rogoff (1985) shows - create outcomes which make them better off, but the private sector worse off. So it is by no means clear that the private sector would actually regard this attempt to create political stability by "institutional fixes" as an improvement. Or that a regime of institutional fixes would be the way to protect the economy from unwarranted pressures to adjust its policies.

[19] The analysis which follows contains an extremely simple model of voting behaviour. A more sophisticated analysis would recognise that each party has a probability of being elected which depends on a whole range of factors other than its choice of economic priorities. But in order to isolate our points about the setting of economic policy, we have to act as if governments were elected on their choice of economic priorities.

value λ; and the loss function to be minimised:[20]

$$L_{mv} = \frac{1}{2}E\left[\pi^2 + \tau^2 + \lambda(y-k)^2\right] \tag{4.1}$$

If there is no uncertainty about the institutional preference parameters, γ or β, then inflation, output and tax revenues will be chosen according to (2.7a,b) and (2.2). Consequently the median voter's welfare losses will be:

$$L_{mv} = \frac{1}{2}E\left[\left(\frac{\gamma k}{1+\beta} - \frac{\gamma\varepsilon}{1+\beta+\gamma}\right)^2 + \left(\frac{-\beta k}{1+\beta} + \frac{\beta\varepsilon}{1+\beta+\gamma}\right)^2 + \lambda\left(\frac{-k}{1+\beta} - \frac{\varepsilon}{1+\beta+\gamma}\right)^2\right]$$

Inserting expectations and collecting terms, we have

$$L_{mv} = \frac{1}{2}\left[\frac{\gamma^2+\beta^2+\lambda}{(1+\beta)^2}k^2 + \frac{\gamma^2+\beta^2+\lambda}{(1+\beta+\gamma)^2}\sigma^2\right] \tag{4.2}$$

The government's problem is to choose a value of β to minimise (4.2) in order to get elected. The difficulty is, no simple closed form solution exists for such a β. The first order conditions are:

$$\frac{\partial L_{mv}}{\partial\beta} = \frac{2k^2}{(1+\beta)^3}\left[\beta - \gamma^2 - \lambda\right] + \frac{2\sigma^2}{(1+\beta+\gamma)^3}\left[\beta(1+\gamma) - \gamma^2 - \lambda\right] = 0 \tag{4.3}$$

Evidently L_{mv} is decreasing in β, i.e. $\partial L_{mv}/\partial\beta<0$, for $\beta\leq(\gamma^2+\lambda)/(\gamma+1)$; and L_{mv} is increasing in β from $\beta=\gamma^2+\lambda$. Consequently any government that sets $\beta\leq(\gamma^2+\lambda)/(\gamma+1)$ will have an incentive to increase its choice in order to capture the median voter. Similarly any government setting $\beta\geq\gamma^2+\lambda$ will have an incentive to decrease its choice. Between those two

[20] This is the model described by Alesina (1987).

points, we can approximate the solution by linear interpolation:[21]

$$\beta^* = w\beta_1 + (1-w)\beta_2, \tag{4.4}$$

where $w = \dfrac{\sigma^2}{k^2(1+\gamma)^3 + \sigma^2}$, $\beta_1 = \dfrac{\gamma^2 + \lambda}{\gamma + 1}$ and $\beta_2 = \gamma^2 + \lambda$.

Notice that $\beta^* > \gamma$ holds so long as $\gamma \leq \lambda$, or something a bit larger.[22] This means that the introduction of an independent Central Bank into a world of democratically elected governments will automatically produce and sustain relatively liberal governments.

4.B A Lack of Transparency Biases Electoral Outcomes

We now allow for a lack of transparency. The first point to note is that the median voter is likely to be frustrated by outcomes which are worse than they expected, just as the private sector was at (3.21) and for the same reason: the Central Bank's opportunity to manipulate its inflation choices when preferences are uncertain. But the situation is not quite the same in that we have to examine the consequences for the outcomes for the median voter, rather than for the elected government itself. However that change makes little difference since

[21] Equation (4.4) uses the fact that $1 + \beta_2 + \gamma = (1 + \gamma)(1 + \beta)$.

[22] In fact $\beta^* > \gamma$ remains true even if the Central Bank has the same preferences as the population at large ($\gamma = \lambda$). Moreover $\gamma \leq \lambda$ is a particularly weak sufficient condition for $\beta^* > \gamma$. The latter will continue to hold so long as $\gamma \leq 1$, or $\gamma^2(1-w) \geq 1$, or $\lambda > [(1-\gamma^2(1-w))/(1+\gamma(1+w))]\gamma$. Notice the last two conditions allow γ to be considerably larger than λ and yet still have $\beta^* > \gamma$ - for example where k is large relative to σ, or where w is small because γ is large. We should therefore expect $\beta^* > \gamma$ in most cases. Finally (4.2) has a unique minimum between β_1 and β_2, since its second derivative remains positive throughout the interval $(0, \frac{1}{2}(3\beta_2+1))$.

$$E\left(L^{*}_{MV}\right) - E\left(L^{*}_{MV/PS}\right) = \frac{1}{2}\left[\frac{\left[(1+\beta)(1+\lambda)+2\bar{\gamma}\right]\sigma_n^2}{(1+\beta)\left((1+\beta+\bar{\gamma})^2+\sigma_n^2\right)}\right] k^2$$

$$+\frac{1}{2}\left[\frac{\left[(1+\beta)^2(1+\lambda)+2\bar{\gamma}(1+\beta)\right]\sigma_n^2}{(1+\beta+\bar{\gamma})^2\left((1+\beta+\bar{\gamma})^2+\sigma_n^2\right)}\right] \tag{4.5}$$

now replaces (3.21). This is still positive for all legitimate values of $\bar{\gamma}$, β, λ and σ_n^2. Hence the median voter will still feel at a disadvantage when faced with a lack of transparency - even if the median voter does not share preferences with the government or private sector.

How does this affect voting behaviour? If the median voter does not recognise the uncertainty created by a lack of transparency, but merely uses $\bar{\gamma}$ as his/her best estimate of the Central Bank's preferences, then we return to the voting pattern given by (4.4) with $\bar{\gamma}$ for γ. Hence a lack of transparency would not affect this kind of voting behaviour - unless, of course, the strategic misrepresentation of preferences to make the Bank appear more conservative than it really is $(\bar{\gamma} < \gamma_1)$ has the effect of inducing more left-wing or populist governments (larger values of β^*) by way of compensation. In Demertzis et al (1999a), we showed this could happen if γ_1 was fairly small to start with; or if the population is rather liberal-minded (λ large); or if output shocks are large relative to the output target (σ_ε/k is large). So a lack of transparency in a conservative central bank is likely to end up producing more liberal-minded governments - at least when output volatility is a significant problem.

But what if voters do recognise that the uncertainty about preferences, which follows a lack of transparency, will also affect economic performance? Using (3.9) and (3.10), together with (3.2) and (2.2) in (4.1), we find

$$E\left(L^{*}_{MV}\right)=\left[\frac{\left(\bar{\gamma}^{2}+\beta^{2}+\lambda\right)\left(\left(1+\beta+\bar{\gamma}\right)^{2}+\left[\beta^{2}+\left(1+\beta+\bar{\gamma}\right)^{2}+\lambda+\lambda\left(1+\beta\right)^{2}\right]\sigma_{n}^{2}\right)}{2\left[\left(1+\beta+\bar{\gamma}\right)^{2}+\sigma_{n}^{2}\right]}\right] \tag{4.6}$$

$$\left[\frac{k^{2}}{\left(1+\beta\right)^{2}}+\frac{\sigma_{\varepsilon}^{2}}{\left(1+\beta+\bar{\gamma}\right)^{2}}\right]$$

This is the expression underlying the performance measures in (4.5). Writing now $\hat{L}_{MV}$ for the equivalent measure when there is no lack of transparency, i.e. the right hand side of (4.2), we get

$$E\left(L^{*}_{MV}\right)=\left\{1+\sigma_{n}^{2}\left[\frac{\left(1+\lambda\right)\left(1+\beta\right)^{2}+2\bar{\gamma}\left(1+\beta\right)}{\left(\bar{\gamma}^{2}+\beta^{2}+\lambda\right)\left(\left(1+\beta+\bar{\gamma}\right)^{2}+\sigma_{n}^{2}\right)}\right]\right\}\hat{L}_{MV} \tag{4.7}$$

Consequently $E\left(L^{*}_{MV}\right)\rightarrow\hat{L}_{MV}$ as $\sigma_{n}^{2}\rightarrow 0$. So a failure to account for the uncertainty element means that a lack of transparency would have no impact on voting behaviour (even if it turns out that $\bar{\gamma}\neq\gamma_{1}$). But if that uncertainty element σ_{n}^{2} gets large,

$$E\left(L^{*}_{MV}\right)\rightarrow\left\{1+\frac{1}{\bar{\gamma}^{2}+\beta^{2}+\lambda}\right\}\hat{L}_{MV} \tag{4.8}$$

which implies the optimal choice of β will be given by solving

$$\frac{\partial E\left(L^{*}_{MV}\right)}{\partial\beta}=\frac{\partial\hat{L}_{MV}}{\partial\beta}\left(1+\frac{1}{\bar{\gamma}^{2}+\beta^{2}+\lambda}\right)-\hat{L}_{MV}\left(\frac{1}{\bar{\gamma}^{2}+\beta^{2}+\lambda}\right)^{2}=0$$

or $$\partial\hat{L}/\partial\beta=\hat{L}_{MV}/\left[x\left(x+1\right)\right] \tag{4.9}$$

where $x=\bar{\gamma}^{2}+\beta^{2}+\lambda$. But since $\hat{L}_{MV}>0$ for all $\beta\geq 0$, and x>0, the β^{**} value that solves (4.9) must be larger than the β^{*} value that solved $\partial\hat{L}_{MV}/\partial\beta=0$ at (4.4). Hence the effect of introducing preference uncertainty, via a lack of transparency in monetary policy, is to <u>increase</u> the optimal value of β - the more so, the larger is output volatility $\left(\sigma_{\varepsilon}^{2}\right)$ or the output

target (k); and the more so, the more conservative the Central Bank appears to be $(\bar{\gamma})$.

Thus, not only does a lack of transparency give the Bank the opportunity to act as if it were more conservative, it will also push the voters to elect or sustain more left wing or populist governments as a counterweight. Hence a lack of transparency is likely to prove counterproductive in the long run, since it will automatically create more liberal fiscal preferences.

To get similar results with more moderate values of σ_n^2 is difficult because of the complexity of the first order conditions which follow from (4.6):

$$\frac{\partial E\left(L_{MV}^{*}\right)}{\partial \beta} = \left\{1+\sigma_n^2 \frac{(1+\lambda)(1+\beta)^2 + 2\bar{\gamma}(1+\beta)}{\left(\bar{\gamma}^2+\beta^2+\lambda\right)\left((1+\beta+\bar{\gamma})^2+\sigma_n^2\right)}\right\}\frac{\partial \hat{L}_{MV}}{\partial \beta}$$

$$+\frac{2\sigma_n^2}{\left(\bar{\gamma}^2+\beta^2+\lambda\right)\left((1+\beta+\bar{\gamma})^2+\sigma_n^2\right)}\left\{(1+\lambda)(1+\beta)+2\bar{\gamma}\right. \tag{4.10}$$

$$\left.-\frac{(1+\beta)\left[(1+\lambda)(1+\beta)+2\bar{\gamma}\right]\beta\left[(1+\beta+\bar{\gamma})^2+\sigma_n^2\right)+\left(\bar{\gamma}^2+\beta^2+\lambda\right)(1+\beta+\bar{\gamma})\right]}{\left(\bar{\gamma}^2+\beta^2+\lambda\right)\left((1+\beta+\bar{\gamma})^2+\sigma_n^2\right)}\right\}\hat{L}_{MV}$$

Evidently the first term is negative for $\beta \in [0,\beta_2)$, and then positive, given the result at (4.4). The second term however is negative when

$$\left[\bar{\gamma}^2+\lambda-\beta\right]\left[\left((1+\beta+\bar{\gamma})^2+\sigma_n^2\right)\right] < \beta(1+\beta)\left(\bar{\gamma}^2+\beta^2+\lambda\right)(1+\beta+\bar{\gamma}) \tag{4.11}$$

i.e. certainly for $\beta \geq \beta_2 = \bar{\gamma}^2+\lambda$. But it will be positive for $\beta \in [0,\beta_2)$, or some value a little below β_2. Hence, since $\partial E\left(L_{MV}^{*}\right)/\partial\beta$ is a nonstationary weighted average of $\partial \hat{L}_{MV}/\partial\beta$ and (4.11), in which the latter is an increasing function until approximately $\beta_2 \geq \beta^*$, the value of β^{**} which solves (4.10) will - to a first approximation at least - always exceed β^* itself. So we have the same result: a lack of transparency (involving preference uncertainty) will induce

more liberal or populist governments than otherwise.

4.C Transparency improves, but cannot provide Full Accountability

The implication of these results is that an independent monetary policy will tend to create the circumstances in which governments with more liberal or populist policy objectives get elected - the more so the more conservative the Central Bank, and the more so the more uncertainty there is about the Central Bank's true preferences. That means the policy instruments in the hands of elected governments - fiscal, or employment policies - will tend to conflict with monetary policy and weaken the ability of either to reach the objectives for which they were originally intended. That in turn implies a lack of accountability, where accountability is taken to mean actions designed to reduce the damage imposed on the targets of others in the pursuit of one's own (private) objectives.

There are two ways of overcoming such conflicts. We could restrict the size of fiscal or monetary interventions permitted. The former is the approach of EMU's Stability Pact; the latter, the approach of the fiscally dominant (Keynesian) regimes of the 1970s and 1980s. These options may or may not improve on the noncooperative outcomes modelled here (see Demertzis et al, 1999b). But they will be inferior to some degree of coordination between fiscal and monetary policies - in the sense of a negotiated bargain between two freely contracting parties. The reason is that to limit interventions by one sided constraints on fiscal or monetary policies is to hand the policy makers target independence but limit their instrument independence. That is not very sensible. A coordinated policy bargain, by contrast, grants policy makers full instrument independence and cuts down on target independence only to the extent that externalities actually damage the targets of others. Thus a coordinated policy bargain both assigns policy responsibilities, and makes the policy process more transparent to others. Hence transparency must be necessary, but is not a

sufficient condition for accountability because it makes no responsibility assignments.[23] We can show this as follows.

Fully coordinated policies will always be a Pareto optimal selection from the feasible set of instrument values (Da Cunha and Polak, 1967). If we restrict those choices to that subset which provides improvements for every player over the best available results under noncooperative policies,[24] then we will have satisfied all the requirements of mutual accountability (i.e. of the fiscal authorities to the Central bank, and of the Bank to the fiscal authorities). Transparency on its own, however, provide Pareto improvements but not Pareto optimality. It therefore falls short of full accountability. For example, returning to (3.13) and differentiating with respect to σ_n^2, we find

$$\frac{\partial E\left(L_{CB}^{*}\right)}{\partial \sigma_n^2} = \frac{\left(1+\beta+\bar{\gamma}\right)^2\left(\left(1+\beta\right)\left(1+\beta+2\bar{\gamma}\right)+\gamma_1\right)}{2\left[\left(1+\beta+\bar{\gamma}\right)^2+\sigma_n^2\right]}\left(\frac{k^2}{\left(1+\beta\right)^2}+\frac{\sigma_\varepsilon^2}{\left(1+\beta+\bar{\gamma}\right)^2}\right) \qquad (4.12)$$

which is clearly positive for all values of $\bar{\gamma}$ and γ_1, under the usual first order certainty equivalence assumption. Likewise the expressions underlying (3.21) imply

$$\frac{\partial E\left(L_{PS}^{*}\right)}{\partial \sigma_n^2} = \frac{\left(1+\beta+\bar{\gamma}\right)^2\left(\left(1+\beta\right)\left(1+\beta+2\bar{\gamma}\right)+\beta\right)}{2\left[\left(1+\beta+\bar{\gamma}\right)^2+\sigma_n^2\right]}\left(\frac{k^2}{\left(1+\beta\right)^2}+\frac{\sigma_\varepsilon^2}{\left(1+\beta+\bar{\gamma}\right)^2}\right) \qquad (4.13)$$

[23] In other words, accountability being defined as being responsible for achieving targets set for yourself by others; as well as those set by yourself for yourself (target independence) and an efficient use of instruments (instrument independence). Accountability in this wide sense, as opposed to the narrow sense implied by the last two criteria, implies that the purpose of accountability is to underwrite/support the political *legitimacy* of the Bank.

[24] The best known choice is the Nash bargain which selects policies to maximise the product of those gains across players (see Hughes Hallett, 1986, for some examples).

which is also positive under the same conditions.

In other words, increasing transparency $\left(\sigma_n^2 \to 0\right)$ is definitely Pareto improving, over the best that independent policy making with preference uncertainty can offer. But it does not provide Pareto optimality. Pareto Optimality is achieved by minimising the composite objective function (Da Cunha and Polak, 1967):

$$L = \alpha L_{CB} + (1-\alpha)L_{FA} \qquad 0<\alpha<1$$

$$= \pi^2 + \tau^2 + \theta(\pi - \pi^e - \tau + \varepsilon - k)^2 \qquad (4.14)$$

where $\theta = \alpha\gamma + (1 - \alpha)\beta$ and (2.2) has been substituted in. In this world, the Central Bank and the fiscal authorities would have equal and opposite reaction functions:

$$\pi = \frac{\theta}{1+\theta}\left(\pi^e + \tau - \varepsilon + k\right) \text{ and } \tau = \frac{\theta}{1+\theta}\left(\pi - \pi^e + \varepsilon - k\right) \qquad (4.15)$$

The private sectors rational expectations are therefore

$$p^e = qk \qquad (4.16)$$

while the actual policy choices will be

$$p^*_{CP} = qk - qe/(1-q) \qquad (4.17a)$$

and $$t^*_{CP} = -qk/(1+q) + qe/(1+q)^2 \qquad (4.17b)$$

From here it is easy to check that these policies will <u>never</u> equal the choices made under policy independence and complete transparency since (3.9) implies that $E\tau^*_{CP} \neq E\tau^*$ unless $\gamma=\beta$ exactly, where γ could be either γ_1 or $\bar{\gamma}$; but if $\gamma=\beta$, (3.10) then implies $E\pi^*_{CP} \neq E\pi^*$ unless $\beta(1+\beta) > \gamma$, which cannot be true. Hence $Et^*_{CP} = Et^*$ and $Ep^*_{CP} = Ep^*$ are mutually exclusive conditions, and complete transparency is <u>not</u> equivalent to accountability. It is a partial substitute at most. That result explains Buiter's argument.

4.D Preference Transparency vs. Credibility

In the light of the results of sections 3.C and 3.D, increasing transparency $\left(\eta \to 0,\ \sigma_n^2 \to 0\right)$ will reduce (remove) the Central Bank's opportunity to create and exploit a strategic reputation for anti-inflation rigour as a means to secure lower inflation outcomes on average. In that respect *a lack of* transparency is a strategic substitute for monetary credibility, as we saw at (3.13). However, as this derives from the incentive to misrepresent one's preferences, this presents the Bank with only a short term opportunity. The credibility of a Bank that exploits its private sector's uncertainty for its own ends is unlikely to last.

5. GOAL TRANSPARENCY

In this section we look at the effects of a lack of transparency about the Bank's policy objectives or target values.

5.A Asymmetric Information and Privately Computed Policy Choices

As before there are two policy authorities, but we are uncertain about the precise goals they set for their targets. If we take the preference parameters to be known for the moment, we have the following loss functions to be minimised:

$$L_{CB} = \frac{1}{2}\left[\pi^2 + \tau^2 + \gamma\left(y - k_{CB}\right)^2\right] \qquad \text{where } \gamma < \beta \tag{5.1}$$

for the Central Bank; and

$$L_{FA} = \frac{1}{2}\left[\pi^2 + \tau^2 + \beta\left(y - k_{FA}\right)^2\right] \tag{5.2}$$

for the government. Since we already discovered that expected inflation - for the Central Bank, or for the private sector or the government - is linearly related to k (see (3.2) and (3.4)), we can confine ourselves to uncertainty about the target values for output since that will reflect any uncertainty about the implicit inflation forecasts at the same time.

That said, there are two situations to consider. First, we could conduct a deterministic analysis in which $k_{CB} < k_{FA}$. However that does not imply any lack of transparency, merely a difference in aims with the Central bank being less concerned to overcome distortions in employment. And it doesn't change our deterministic results. It is easy to check that the policy choices of Section 2 go through with k_{CB} for k and extra terms that are positive in $k_{FA} - k_{CB}$. We need not consider that case here, therefore.

However a genuine lack of transparency arises when k_{CB} is uncertain: for example[25]

$$k_{CB} = k_{FA} + v \qquad (5.3)$$

where k_{FA} is the private sector's estimate, and v is a random variable with mean zero and variance σ_v^2. Given the common interpretation of k as a parameter indicating the difference between the natural and desired rates of employment, a different value for k may simply mean a different understanding of the structure of the economy. But as long as information on k_{CB} remains the private property of the Central Bank, we have a lack of transparency and asymmetric information about the structure of the economy. [26]

Thus the private sector and the fiscal authorities will have to use k_{FA} as their best estimate of k_{CB} when computing their versions of π^e and π^*. Likewise the Central Bank must assume the fiscal authorities will use k_{FA} when computing its estimate of the fiscal authorities' reaction function for τ, and that π^e refers private sector expectations throughout. Had they each

[25] This is the case considered by Faust and Svenson (1998).

[26] The asymmetry lies, once again, in the fact that the Central Bank and the fiscal authorities have different information as regards k_{CB} and k_{FA}; and that k_{FA} is known to the Bank, but k_{CB} is not known to the fiscal authorities or to the private sector.

intended to follow optimal policies based on their own (private) information sets, the Central Bank would get (2.6) and (2.7a, b) with k_{CB}; and an objective function value of (4.2) with k = k_{CB} and $\lambda = \gamma$. The fiscal authorities meanwhile would get (2.6) and (2.7a, b) with k_{FA} as their policy choice, with (4.2), k = k_{FA} and $\lambda = \beta$. On the reasonable assumption that $k_{CB} < k_{FA}$, they might then have expected

$$\pi^{e}_{CB} < \pi^{e}_{FA}\ ;\ \text{and}\ \ \pi^{*}_{CB} < \pi^{*}_{FA}\ ,\ \ \tau^{*}_{FA} < \tau^{*}_{CB}\ ,\ \text{and}\ L^{*}_{CB/CB} < L^{*}_{CB/FA}\ \text{but}\ L^{*}_{FA/FA} > L^{*}_{FA/CB}.$$

So once again the Central Bank might think of manipulating its targets/inflation forecasts to get lower inflation and smaller fiscal deficits. But this time that would leave the private sector believing that the Central Bank would do worse than the Central Bank intended; and the Central Bank believing that the private sector would do better than it had planned. As this is the exact opposite of the preference uncertainty case and conflicts with what the Bank actually knows, it would not produce the same political or institutional pressures for a change in the policy mix. But it does explain why Central Banks often argue that a more conservative approach to inflation control and fiscal discipline is actually in the private sector's own interest - and the ECB has done that. And it also explains why governments frequently don't believe them.

5.B Asymmetric Information: the Actual Outcomes

But those calculations, of course, are not the outcomes the policy makers are actually going to get. Instead they will get inflation from (2.3) with k = k_{CB}, and a budget balance from (2.5) with k=k_{FA}; where it is understood that $\pi^{e} = \gamma k_{FA} / (1+\beta)$, and that the fiscal authorities will use their own estimate of $\pi = f(k_{FA})$ in (2.5). That leads to:

$$\pi^{*} = \frac{\gamma}{1+\beta} k_{FA} - \frac{\gamma(\varepsilon - (1+\beta)v)}{1+\beta+\gamma} \tag{5.5}$$

$$\tau^{*} = \frac{-\beta}{1+\beta} k_{FA} + \frac{\beta\varepsilon}{1+\beta+\gamma} \tag{5.6}$$

and $\quad y^* = \frac{\beta}{1+\beta} k_{FA} + \frac{\varepsilon + (1+\beta)\gamma v}{1+\beta+\gamma}$ (5.7)

Since the Central Bank knows its choice of v, this means

$\pi^e - \pi^e_{FA} = \gamma v / (1+\beta)$, $\quad \pi^* - \pi^*_{FA} = \gamma(1+\beta)v / (1+\beta+\gamma)$, $\quad$ and $\quad \tau^* - \tau^*_{FA} = 0$.

Consequently, in terms of actual outcomes, the Central Bank might be tempted to manipulate its choice of (inflation) target by choosing v< 0 (i.e. $k_{CB} < k_{FA}$). But that won't affect either the fiscal authorities (τ^*), or private sector's beliefs $\left(\pi^e_{FA}\right)$. Consequently there is no point in doing so; there is no strategic reputation or advantage to be gained or used here.[27]

5.C Welfare and Performance

Equations (5.5) - (5.7) show that a lack of target transparency adds a shock to π and y. Can the Bank make use of that, and what would be the implications for credibility, accountability and electoral outcomes?

Inserting (5.5) - (5.7) into either (2.4) or (4.1), and sorting out terms, we get

$$L^*_{FA} = \theta_1 k^2_{FA} + \theta_2 \sigma_\varepsilon{}^2 + \theta_3 \sigma_v{}^2 + \theta_4 \rho \sigma_\varepsilon \sigma_v \qquad (5.8)$$

[27] They could however announce v in advance which, if the government prefers to retain k_{FA}, does change things. But then there wouldn't be any transparency problem; just a disagreement. What then happens depends on the Bank's credibility. If it has little, (5.4) and (5.5) are unchanged; but (5.6) has $\beta\varepsilon + \gamma v$ in the numerator of the second term, and (5.7) $\varepsilon + \gamma v$ likewise. Consequently v < 0 would reduce the deficit and increase output on average, but do nothing for inflation. That is a standard result. With credibility we would have the same effect but weaker - since π^e is lower, but less than proportionately to v. In either case governments and the private sector would be the beneficiaries, not the Central Bank for whom inflation is more important. So, again, the Central Bank has no incentive to do this.

where $\theta_1 = \frac{\left(\gamma^2 + \beta^2 + x\right)}{2(1+\beta)^2} > 0$ $\theta_2 = \frac{\left(\gamma^2 + \beta^2 + x\right)}{2(1+\beta+\gamma)^2} > 0$

and $\theta_3 = \frac{\gamma^2(1+\beta)^2(1+x)}{2(1+\beta+\gamma)^2} > 0$ $\theta_4 = \frac{\gamma(1+\beta)(x-\gamma)}{(1+\beta+\gamma)^2} \geq 0$

and x can be β; or λ if we have L^*_{MV} at (5.8). We have also written $Cov(\varepsilon, v) = \rho\sigma_\varepsilon\sigma_v$, where ρ = the correlation coefficient. The last term in (5.8) therefore only plays a role if the Central bank employs time varying (pro- or countercyclical) policy targets - as it might naturally do in a symmetric inflation targeting regime, or in the ECB's "two pillar" monetary rule.

Equation (5.8) now shows that a lack of goal transparency affects private sector (government) welfare. This is because the third term is an inverse function of the degree of inflation aversion, γ, since $\partial\theta_3 / \partial\gamma > 0$. That implies goal transparency and credibility are strategic complements; and that a lack of transparency and credibility are again substitutes.[28] Hence the more conservative the Central Bank, the less important is the issue of goal transparency. Thus a Central Bank which is able to achieve credibility by single-mindedly controlling inflation has no need to worry about target transparency or about the need to provide it. This would explain the ECB's reluctance to provide clear inflation (or output) targets, while the Bank of England has been relatively open about its target values.

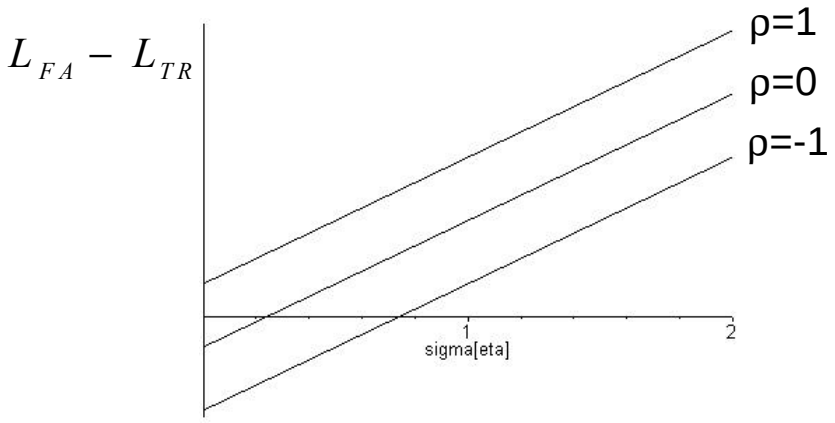
Notice also that a lack of transparency increases the cost of fiscal and monetary policies, but that that can be offset by the judicious use of countercyclical policies ($\rho < 0$ in the fourth term). Thus, if the lack of transparency is used strategically it will benefit the private sector -

[28] At least so long as ρ remains fairly small. The effect of θ_4 is ambiguous: for example $\partial\theta_4 / \partial\gamma < 0$ if $\beta \leq 2\gamma$ or $\lambda \leq 2\gamma$. In either case $\rho < 0$ would imply a lack of transparency and credibility were substitutes; but $\rho > 0$ the opposite.

and may even outweigh the costs of the lack of transparency. We have such an example in Figure 2. In that case performance can always be improved if $\rho < 0$, but not if $\rho \geq 0$.

Unfortunately exactly the opposite property will apply to the objective function of the Central Bank: see (5.9) below which has $\phi_4 < 0$, where (5.8) has $\theta_4 \geq 0$. So this kind of strategic behaviour would never be used in practice.

Figure 2 = : Difference between private sector objective function without and with transparency, for different correlation coefficients



$\left(L_{PS} = q_1 k_{FA} + q_2 s_e + q_3 s_v + 2q_4 r_{eh}\right)$: no transparency

$\left(L_{TR} = q_1 k_{FA} + q_2 s_e\right)$: full transparency

$\left(b = l = 1, g = 0.5, k_{FA} = 1, s_e = 1\right)$

5.D The Central Bank: Goal Transparency, Strategic Reputations and Credibility

Turning now to the Central Bank's performance, inserting (5.5) to (5.7) into (2.1) yields

$$L^*_{CB} = \phi_1 k^2_{FA} + \phi_2 \sigma_\varepsilon^{\,2} + \phi_3 \sigma_v^{\,2} + \phi_4 \rho \sigma_\varepsilon \sigma_v \qquad (5.9)$$

where $\phi_1 = \dfrac{\left(\gamma^2 + \beta^2 + \gamma\right)}{2\left(1+\beta\right)^2} > 0$ $\qquad$ $\phi_2 = \dfrac{\gamma^2 + \beta^2 + \gamma}{2\left(1+\beta+\gamma\right)^2} > 0$

and $\phi_3 = \dfrac{\gamma^2\left(1+\beta\right)^2 + \left(\beta(\gamma-1)-1\right)^2}{2\left(1+\beta+\gamma\right)^2} > 0$ $\qquad$ $\phi_4 = \dfrac{\beta\gamma - (\beta+1)\left(1+\gamma^2\right)}{\left(1+\beta+\gamma\right)^2} < 0$

This shows that a lack of target transparency has a smaller impact on the Central Bank ($\phi_3 < \theta_3$) than it does on the fiscal authorities or the private sector. Secondly the sign switch in ϕ_4 implies the Central Bank will now favour pro-cyclical targets for inflation and output ($\rho > 0$), but governments countercyclical targets ($\rho < 0$).

Equations (5.8) and (5.9) therefore explain why independent Central Banks are typically less concerned about target transparency, and less concerned to publish inflation forecasts than others might be. It also explains why independent Central Banks often seem to be prepared to contemplate potentially pro-cyclical policy regimes - like the Stability Pact, or asymmetric monetary or inflation targeting rules - whereas their governments put more emphasis on the importance of achieving symmetric countercyclical results.

Finally (5.9) confirms that there is no opportunity to create or exploit a strategic reputation here: (5.9) is independent of the size or sign of v, being dependent only on the potential variation of v and its covariance with ε. Consequently the Central Bank cannot pick values of v to its advantage, as it could values of η in Section 3. In the same way, the substitutability between credibility and lack of transparency is no longer guaranteed since $\partial\phi_3 / \partial\gamma > 0$ only if $\gamma > (1+\beta)/(1+2\beta)$. In other words the substitution property holds only if the Bank is fairly liberal; otherwise they are complements (ρ small). Once again a Bank with credibility will be relatively unconcerned about either target transparency or the provision of inflation forecasts.

5.E The Political Economy of Goal Transparency

Governments that wish to be elected or re-elected must solve

$$\min_{\beta} L_{MV} = \theta_1 k_{FA}^2 + \theta_2 \sigma_\varepsilon^{\,2} + \theta_3 \sigma_v^{\,2} + \theta_4 \rho \sigma_\varepsilon \sigma_v \tag{5.10}$$

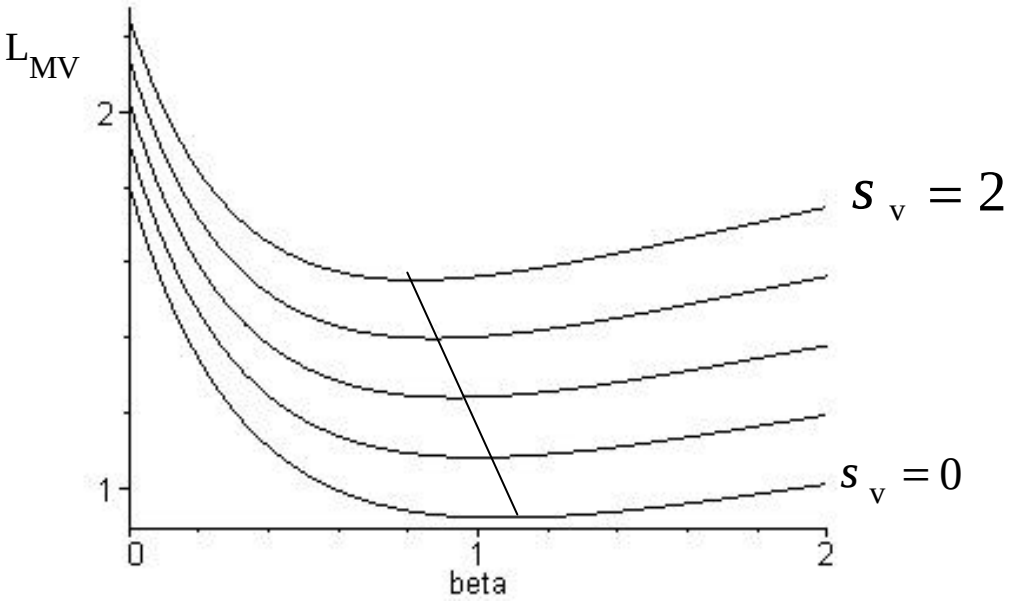
where x = λ. The result will be a function like[29]

$$\beta^* = f(k_{FA}, \lambda, \gamma, \sigma_\varepsilon, \sigma_v, \rho) \tag{5.11}$$

Figures 3 and 4 shows the values of L_{MV} as a function of β, for various values of k_{FA}, λ, ρ, and σ_ε, to give an idea of the optimal values of β^*. The straight line connects those optimal values for increasing degrees of goal uncertainty. A lack of transparency evidently makes the private sector more conservative about using fiscal policy. This is because they cannot be sure how the Central Bank will react to a stronger drive for output stabilisation. That reverses our earlier result, where a lack of preference transparency induced more liberal or populist governments and a greater use of fiscal policy.

[29] The first order conditions are given by (4.3) but with an extra term of $-\gamma^3(1+\lambda)(1+\beta)\sigma_v/(1+\beta+\gamma)^3$ added. Those conditions admit no simple closed form solution.

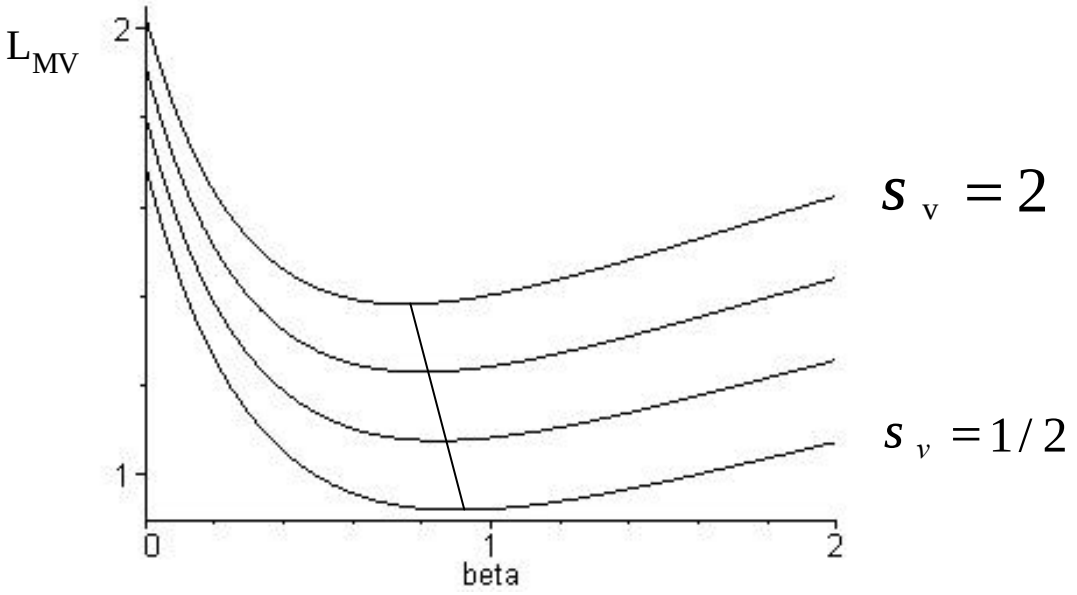
Figure 3



$$g = 0.5, l = 1, k_{FA} = 1, r = 0, s_e = 1$$

This effect is reinforced when a Central Bank follows time varying policy goals. Thus, if the Bank is producing anti-cyclical policies, the private sector would not want the fiscal policy to operate in the same way as the Bank. It would therefore choose an even more cautious fiscal authority: see Figure 4.

Figure 4



$$g = 0.5,\ l = 1,\ k_{FA} = 1,\ r = -1,\ s_e = 1$$

5.F Accountability

The last step is to note that, as before, transparency helps improve accountability but cannot in itself ensure accountability. The reason is that transparency will again provide Pareto improvements for both policy authorities, but not the Pareto Optimality property that would be required if each were to be accountable to the other. We can see those results for the fact that $\theta_3, \phi_3 > 0$ in (5.8) and (5.9). That means $\partial L^*_{FA} / \partial \sigma_v^2$ and $\partial L^*_{CB} / \partial \sigma_v^2$ are both positive, so increasing transparency unambiguously improves the lot of both players (ρ small). On the other hand, a regime with full accountability would choose policies to minimise

$$w = \frac{1}{2} E\left\{\pi^2 + \tau^2 + \alpha\gamma\left(y - k_{CB}\right)^2 + (1+\alpha)\beta\left(y - k_{FA}\right)^2\right\} \tag{5.12}$$

for some $0 < \alpha < 1$, in order to get Pareto Optimality. But (5.12) implies

$$w = \frac{1}{2} E\left\{\pi^2 + \tau^2 + \theta\left(y - k_{FA}\right)^2\right\} + \frac{1}{2}\alpha\gamma\sigma_v^2 \tag{5.13}$$

where $\theta = \alpha\gamma + (1-\alpha)\beta$, again if ρ is small. In other words, the set of Pareto Optimal policy choices is identical to that in section 4: the π^*_{CP} and τ^*_{CP} values which minimise (5.12) are given by (4.14a, b). Unfortunately that set of policies does not include the outcomes of independent policy making with complete transparency, i.e. (5.5) and (5.6), since, to do so, would require both $\gamma = \beta$ and $b(1+b) = g$. Since those restrictions cannot both be true, goal transparency is an incomplete substitute for accountability.

6. CONCLUSION: THE PUBLICATION OF INFLATION FORECASTS

a) Incomplete transparency about priorities produces quite different results than incomplete transparency about goals. The main difference lies in the fact that a lack of transparency about priorities gives the Central Bank the opportunity to create and exploit a strategic reputation for being conservative and inflation averse for its own ends. A lack of transparency about policy goals does not create that opportunity.

The reason for this difference is that a lack of goal transparency is a linear "shock". It therefore separates from the deterministic elements in the expected loss functions and cannot affect any of the decision rules (Hughes Hallett, 1981). The fiscal policy makers are risk neutral with respect to that type of uncertainty, even if the outcomes are more variable. But a lack of political transparency enters the decision rules in multiplicative form, and there is no such separation. Policy makers are not risk neutral therefore and the decisions are affected. Moreover, if one of the players knows what is going on, he can manipulate this information deficiency to his own advantage.

b) A second difference is that the use of a strategic reputation biases the electoral outcomes towards left wing or more populist governments. A lack of goal transparency has the opposite effect, and therefore produces fewer policy conflicts and fewer political pressures. The obvious implication is that secretive Central Banks would find that a transparency failure generates government policies at odds with their own. The way to reduce those conflicts (and to get better outcomes) would be to provide more transparency. One should therefore expect more secretive Central Banks to become more transparent as they become more independent.

c) Under a lack of preference transparency the Central Bank will not wish to publish its inflation forecast since that would allow the private sector to calculate the extent of the Central Bank's strategic reputation. Under a lack of goal transparency, publishing inflation forecasts would not put the Central Bank at any disadvantage since there is no such strategic advantage to be gained.

d) Insufficient transparency is able to explain a number of other features of Central Bank behaviour:

- why some are reluctant to publish inflation forecasts (e.g. the ECB) and others are not (the Bank of England)
- why Central Banks are often at pains to stress that conservative policies are in the private sector's own interest
- why conservative Central Banks don't see a lack of transparency as a problem
- and why some Central Banks are prepared to consider procyclical policies
- and why transparency will not usually be enough to provide accountability or political legitimacy.

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