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ABSTRACT

An Independent Central Bank Faced With Elected Governments*

The literature argues that the benefits of an independent Central Bank accrue at no cost to the real side. In this Paper, we argue that the lack of correlation between monetary autonomy and output variability is due to the proactive role of fiscal policy when faced with rigid monetary objectives. None of the attempts in the literature to measure these correlations allow for a changing fiscal role. As monetary policy is handled by an independent authority, fiscal and wage/social protection policies remain an instrument in the hands of national governments. We find that so long as the two authorities pursue their goals independently of each other, a conflict arises which is exacerbated as preferences diverge. Further to that, we find that the establishment of a conservative Central Bank encourages more left-wing preferences amongst the public (as reflected in the governments they elect). And the election of more left-wing governments makes it more difficult for each authority to reach their own preferred objectives, unless they are able to cooperate.

JEL Classification: E52, E63, F42
Keywords: central bank independence, accountability, fiscal policy, political uncertainty

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NON-TECHNICAL SUMMARY

This Paper examines two issues: first we are concerned with the need to adjust the mix of macroeconomic policies correctly and the need to resolve the accountability versus independence debate when there is more than one policy authority involved.

We find that unfettered competition between independent policy-makers with different preferences over the various targets of economic policy makes it unlikely that those policy-makers will either be able to set the right policy mix or to adjust it properly around the cycle. Such conflicts can lead one policy to neutralise the effectiveness of the other. In that case, no one's targets will be met. On the other hand, one-sided interventions to limit either fiscal or monetary policy in order to get a more effective mix, as in the Stability Pact, or the Keynesian policies of the 1970s for example, are no more than partial remedies. Independently negotiated coordination agreements (or performance contracts) are a better solution.

For the purposes of our Paper, we take independence to mean target and instrument independence as defined by Fisher (1995). Implicit in our analysis is the position of the European Central Bank but the analysis is general enough to allow for the interdependencies between any policy institutions at the national level. We apply a standard model in the manner of Rogoff, in which there are two players, the Central Bank that handles the monetary instrument and the Government that deals with fiscal policy. The two authorities optimise their respective instruments but, constrained by the same supply function, find themselves influencing the outcomes which each of them could hope or expect to achieve. We point out that our model is broad enough to cover the cases where the government's 'fiscal' instrument is in fact a wage control variable, a business or employment tax, or part of the social protection system.

We also discover that the more priorities differ between policy-makers, the more their policies will conflict in the sense of not being able to achieve their own preferred outcomes. Policies therefore become increasingly weaker and ineffective. Cooperation, in the sense of independently negotiated agreements, improves the outcome on two grounds: first by reducing the degree of inefficiency in the final outcome and second by re-introducing a kind of policy feed-back into the system, some accountability in fact, without compromising the degree of independence of the participating players.

Having looked at the way that monetary and fiscal policies interact, we then examine how the nature of the game is influenced by the mere introduction of an extra feature, that of the independence of the central bank. This time we

apply a different methodology, based on the work by Alesina in which the preferences and voting behaviour of the median voter is allowed to influence the result. We discover that the introduction of an independent Central bank into a world of democratically elected governments will automatically produce and sustain relatively liberal governments. But that in itself implies that the priorities amongst the policy-makers will tend to diverge, with the consequence that the fiscal-monetary conflicts can become more serious: an outcome which would render each instrument (monetary, as well as fiscal) less able to reach its own preferred objective. So there is an additional argument for greater coordination (if not explicit accountability and transparency): without it, inflation as well as growth will be compromised because of the policy competition between independent policy authorities. This result continues to hold, we show, even in the presence of an independently pre-committed monetary policy.

The important point from this second section is that granting independence to the central bank endogenises the electoral process. The intuition behind this result is rather straightforward. As independence guarantees lower inflation, the median voter is now more concerned with achieving high employment and growth. By definition, the most liberal party is the one that is best suited to pursue that objective and is therefore more likely to be elected. This result does not appear in the literature because the models previously applied (e.g. Alesina and Gatti) pursue two targets but only one instrument consequently. Once fiscal policy is allowed a role, the whole process is endogenised and the potential for conflict is exacerbated because governments who control those fiscal policies have to be elected whereas an independent central bank does not. Inevitably therefore governments will press harder with their own instrument to reach the targets for which they have been elected to achieve: the public understanding that, in the normal course of events, the appointment of an independent central bank means that governments can no longer be rewarded or penalised (electorally) for success or failure with the inflation target.

1. INTRODUCTION

This paper examines the link between the need to adjust the mix of policies correctly, and the need to resolve the accountability vs. independence debate when there is more than one policy authority involved. We find that unfettered competition between independent policy makers with different preferences over the various targets of economic policy, makes it unlikely that those policy makers will either be able to set the right policy mix or to adjust it properly around the cycle. Such conflicts can lead one policy to neutralise the effectiveness of the other. In that case, no one's targets will be met. On the other hand, one sided interventions to limit either fiscal or monetary policy in order to get a more effective mix - as in the Stability Pact, or the Keynesian policies of the 1970s for example - is no more than a partial remedy. Independently negotiated co-ordination agreements (or performance contracts) are a better solution.

For the purposes of our paper, we take independence to mean target and instrument independence as defined by Fisher (1995). Alternative schemes could include instrument independence only, or no independence at all for one of the parties; or it could be a negotiated solution in which each party has instrument independence but only a limited degree of target independence. We focus on the latter case.

2. ACCOUNTABILITY: AN INSTITUTIONAL VIEW

Why might policy makers not choose the right policy mix, or not adjust it properly to meet the economy's performance targets? Essentially the issue is one of different

priorities among policy makers. If one set of policy makers gets to dominate the policy setting process through institutional preferences or legal restrictions; or through the exercise of market or political power; or because it has a first mover advantage in decision making, then the policy mix will be chosen to suit them best. And to the extent that such an outcome does not suit other policy makers, the latter will inevitably use their instruments to retaliate and move the policy mix back in their direction. In this way no one gets what they want because no one takes account of the damage done to the targets of others. The problem arises from the independent pursuit of private objectives (a coordination failure, in other words).

Why might this be a problem in Europe? First, the statutes of the European Central Bank (ECB) state that price stability is the primary target of policy, and that output growth and employment can be pursued (by the ECB) only if they do not prejudice price stability[1]. But elected governments are likely to put a rather higher priority on growth and job creation since those are the targets for which they will be held to account. If wide differences persist between these two sets of policy makers, then the credibility and effectiveness of the ECB's monetary policy is likely to be affected by the strength of fiscal policy. The extent to which that happens will depend on the differences in preferences.

This is not a question of the independent ECB not having output growth as a target; but simply that it has a lower priority on that target since it is not charged with achieving it. It is therefore conservative in the way that Rogoff (1985) recommends.

However, a little accountability for the consequences of actions for the targets to which it is not assigned would, we argue, make the ECB more successful with the target to which it has been assigned. One way in which this might happen, even with the best intentioned and most independent central bank, is Woodford's (1995) version of the "unpleasant fiscal arithmetic" model. A tight monetary policy triggers unsustainable fiscal responses designed to save output and employment. Markets, anticipating a budget constraint failure at some point in the future, will expect, if not a build-up of excess demand, then increasing liquidity rising prices which prevent a collapse in the capital markets. Either way consumption will boom and prices will adjust in advance - obviating the need to adjust liquidity - even if the money supply never changes.[2]

It might be thought that this does not matter since the ECB is modelled on the Bundesbank, and the Bundesbank has always managed to balance two targets reasonably well by allowing suitable shifts in the policy mix. Why should the ECB not do the same? We argue that the ECB could do this, but is unlikely to do so because its constitutional position is quite different; and also because there is no obvious mechanism by which it can coordinate with the fiscal authorities (indeed, strictly speaking, such bargains are ruled out by the Maastricht treaty). The

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[1] The Descritpion of the ECB and its statutes used in this section is taken from Issing (1999).

[2] Leith and Wren-Lewis (1998) demonstrate this result formally using a Blanchard-Yaari consumption model with asset accumulation and intertemporal budget constraints. The same thing could happen if undisciplined fiscal authorities put pressure on the ECB to monetise their debt rather than face a liquidity collapse (Sargent and Wallace, 1981). It is important to realise that nothing which follows actually depends on these particular models. They are cited here to show that the literature already contains examples in which effectiveness of an independent monetary policy can be seriously compromised by fiscal actions elsewhere, whatever the degree of commitment to that monetary

Bundesbank, by contrast, was quite conscious that its independence of action could be cancelled by a simple vote in the Bundestag.

The ECB's statutes however contain no such provision; and even if they did, the ECB is expressly forbidden to talk to (take instructions from) the national governments; i.e. to exactly those who are likely to complain about a lack of accountability, and who are actually in a position to amend the bank's statutes, targets or operating rules. That gives the ECB considerable protection from outside influences. But it is the national governments who are the signatories to the treaty which govern the ECB's operations, not the European Parliament where the ECB might have to account for its actions. Thus the ECB can only be called to account by those who cannot change its statutes and procedures; and it is forbidden to talk to those with whom it needs to coordinate its policies.

The Bundesbank however, can be called to account by those who can change its statutes and those with whom it has to coordinate. An examination of the transcripts of Bundesbank policy meetings over the years shows that this has made a significant difference to its decisions (von Hagen, 1998). In fact the Bundesbank appears to have learnt that if it did not take the targets of output growth and stability seriously, and explain its decisions carefully against that background, then no-one would understand or accept their policies (Posen, 1997). In particular the Bank found that not accounting for output growth merely triggered compensatory

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policy. It is a mistake therefore to identify commitment/independence, one-for-one, with effectiveness.

fiscal and/or wage demands from government and the unions which undermined the Bank's inflation control policies[3]. In other words, the Bundesbank found it necessary to co-ordinate with both government and unions in order to avoid policy conflicts. Moreover wage controls, non wage costs, and structural reforms may prove to be just as important as coordination partners, as fiscal policy itself. But that is no reason to suppose that the ECB, with a more explicit commitment to independence but no obvious commitment to accountability, would find a corresponding incentive to accept "voluntary accountability" or enter into any co-ordination arrangements.

Now one could argue that none of this matters because Alesina and Summers (1993) and Alesina and Gatti (1995), among others, have argued that countries with an independent central bank typically have lower inflation at no extra cost to output growth or output stability. That happens, they say, because the independent central bank is able to take out the politically motivated part of the cycle. However that is no longer always true when a second policy instrument comes into play. The Rogoff (1985) analysis shows that the economic part of the cycle, as distinct from the politically motivated part, will increase as greater attention is paid to inflation rather than output. And if that happens by enough, then the overall cycle could increase in variability. One would then expect fiscal policies to be brought in to stabilise that

[3] Lohmann (1998), for example, has demonstrated that the Bundesbank has been more accommodating when both houses of the German Parliament were controlled by the same party and popular opposition could have forced a revision of its statutes. This interpretation can be contested: Berger and de Haan (1998) maintain that instrument independence was the essential ingredient in the Bundesbank's ability to achieve price stability when there were fears of policy conflicts. But that means the coordination of fiscal, monetary and wages policies would still be the key to successful outcomes.

cycle at the new (lower) inflation rate. And that is what we find: Campillo and Miron (1997), for example, show that when other factors such as fiscal policy are stripped out, independent central banks have not always provided lower inflation. Similarly Melitz (1997) notes that fiscal and monetary policy interventions have tended to move in opposite directions in *all* OECD countries, even in those with the most independent central banks (i.e. Germany and the US). If this represents a de facto coordination of fiscal and monetary policies, it also signals a desire among policy makers to avoid open conflict between them.

3. FISCAL-MONETARY CONFLICTS: THEORY

The lesson here is that fiscal, and wage or employment policies don't go away with the independence of the Central Bank. Indeed, granting the Central Bank independence gives governments a greater role.

This section examines how fiscal and wage policies will be affected by monetary independence, and whether the resulting policy mix will be effective in achieving its (collective) aims. We find that monetary independence will create the circumstances in which governments with more liberal policy objectives tend to get elected - the more so, the more conservative the Central Bank. That means the policy instruments in the hands of elected governments - fiscal policy, or wages and employment policies - will tend to conflict with monetary policy, weakening the ability of either party to reach its own preferred objectives.

The way out of this problem is to avoid policy conflicts. There are two things we can do. We can either restrict the fiscal or monetary interventions. The former of these is the approach of EMU's Stability Pact; the latter, the approach of the policy regimes of the 1970s and 1980s. Or we can introduce some co-ordinating mechanism between fiscal and monetary policies, in the sense of a bargain between two freely contracting parties. The advantage of this approach is that the bargain assigns responsibility, and makes the process more transparent: a degree of mutual accountability in other words. Thus transparency is necessary, but not sufficient for accountability because it makes no responsibility assignments. This notion of accountability leaves the Central Bank with full instrument independence and a circumscribed (but not empty) target independence.

3.A Independent Policy Making When Preferences Differ:

To show these results, we adapt the standard analysis of Barro and Gordon (1983), Rogoff (1985), Debelle and Fischer (1994), and Alesina and Gatti (1995). Following Rogoff's apprach, suppose that the Government delegates the conduct of monetary policy to a Central Bank with more conservative preferences than society would itself vote for. 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:

$$L_B = \frac{1}{2}\left[\pi^2 + \tau^2 + \gamma(y - k)^2\right] \tag{3.1}$$

subject to

$$y = \pi - \pi^e - \tau + \varepsilon \tag{3.2}$$

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 mean zero. 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[5]. 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 (3.2) into (3.1) and optimising with respect to π. We get

$$\pi = \frac{\gamma}{1+\gamma}\left[\pi^e + \tau + k - \varepsilon\right] \tag{3.3}$$

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

$$L_f = \frac{1}{2}\left[\pi^2 + \tau^2 + \beta(y-k)^2\right] \tag{3.4}$$

subject to (3.2). If, following Rogoff's arguments, the Central Bank should be more conservative than the government, then $\gamma<\beta$. The government's instrument is τ, with optimal reaction function

[4] Output is measured in deviations from its long run, full capacity level.
[5] Although the relation between π and τ is the inverse of that between interest rates and τ.

$$\tau = \frac{\beta}{1+\beta}\left[\pi - \pi^{e} + \varepsilon - k\right] \tag{3.5}$$

Substituting (3.5) into (3.3) and taking expectations reveals expected inflation as

$$\pi^{e} = \frac{\gamma}{1+\beta} k \tag{3.6}$$

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

$$\pi^{*} = \frac{\gamma}{1+\beta} k - \frac{\gamma\varepsilon}{1+\beta+\gamma} \quad , \quad \text{and} \tag{3.7a}$$

$$\tau^{*} = \frac{-\beta}{1+\beta} k + \frac{\beta\varepsilon}{1+\beta+\gamma} \ , \tag{3.7b}$$

However, it follows from (3.3) and (3.5) that the reaction functions themselves have slopes $(1+\gamma)/\gamma$ and $\beta/(1+\beta)$ in (τ, π) space. That means the Central Bank's reaction function is <u>always</u> steeper than that of the fiscal authorities, since $0<\gamma<\beta$ implies $(1+\gamma)/\gamma > \beta/(1+\beta)$. But they are both upward sloping for any β and $\gamma>0$. They therefore form an acute angle between them[6] which does not vanish even when $\beta \rightarrow \gamma$.

[6] i.e. the two instruments are strategic complements (Bulow et al, 1985) so that restricting the use of one in pursuit of "private" objectives would damage the ability of the other to reach its preferred objective. That is why "one sided" alternatives, such as the Stability Pact or fiscal dominance, produce inferior outcomes: Demertzis et al (1998).

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. Indeed (3.7) implies that an increasingly liberal government, relative to a consistently conservative Central Bank, would reduce both inflation and the budget surplus - or increase wage controls, tax competition, or supply side reforms - on average:

$$\partial E\pi^*/\partial\beta < 0, \quad \partial E\tau^*/\partial\beta < 0 \tag{3.8}$$

Hence, the more priorities differ between policy makers, the more their policies will conflict in the sense of not being able to achieve their own preferred outcomes –and the more ineffective they become. Indeed $E\pi^*>0$ and $E\tau^*<0$ which is an outcome no one wants. Moreover the budget deficit gets larger, and the wage restraints stronger, <u>even</u> if inflation is falling, as the disagreements between policy objectives become sharper. Hence it is the deflationary bias, not differences between the monetarist and Keynesian policy prescriptions, which causes both parties to miss their favoured targets. These losses therefore increase with the divergence between preferences.

3.B Distinguishing Demand Side from Supply Side Policies

There are now four points to make. First it would have made no difference if τ had been given a lower priority than π in (3.1), or if it were eliminated altogether; equation (3.3) would still have been the result. τ has been included simply because

the ECB has been so concerned to promote fiscal restraint and structural reforms, even though its decisions would only be indirectly (via y) affected by whether those restraints / reforms were undertaken. Second, τ could equally well be interpreted as a measure of social or wage costs, or supply side constraints imposed on producers. That means $\tau<0$ could represent direct wage controls; or reductions in the non-wage costs associated with social security or job protection legislation; or the pressures caused by tax or wage competition on a regional basis; or the more general effects of supply side deregulation. In other words, our analysis is broad enough to cover a whole range of structural reforms, or wage controls and social protection legislation, as well as fiscal policy. It is not just a Keynesian paradigm.

Third, there is a distinction to be made between supply side instruments (fiscal or otherwise) in the hands of governments, which can have permanent effects on the level of output, and demand side (fiscal) interventions which would not have any long run impacts (except on the level of prices). Equation (3.2) captures the supply side case. To capture the demand side case we need to replace τ with $\tau-\tau^e$ in (3.2). However to do that merely complicates the solution process; the solution itself is not materially affected, as we show in the appendix to this paper. That means we can continue with (3.2) with no loss of generality, giving τ a fiscal or structural reform interpretation as it affects changes in costs or supply side conditions. Any adjustments for the case where fiscal policy is a demand side instrument can then be derived from the appendix.

Finally one might question the presence of $k \neq 0$ among the Central Bank's objectives. It is a fact that all the models in this literature include such an objective[7], and always for the same reason. Taxes and supply side restrictions are systematically nonneutral in their effects on output: $E\tau^* < 0$ in (3.7). They are therefore distortionary in the sense of depressing output and employment more than surprise inflation can improve them. We therefore need $k > 0$ to correct those distorions. For our purposes it doesn't much matter what kind of behaviour causes this distortion, so long as they exist. In fact the literature contains a number of papers which explain in detail how such distortions may arise - see those in footnote 6 in particular, which cite income taxation and the need for unemployment insurance or job protection schemes as the obvious examples. Thus the fact that we need to make certain public expenditures, or introduce certain supply side restrictions for social reasons, would induce a shortfall in output which policy would need to correct. Any one of these explanations could be used to justify the presence of k here.

3.C A Hamada Diagram Representation

In this linear-quadratic world, certainty equivalence applies and the Hamada diagram operates in "expected constrained objective" space. We know the shape of the objective functions, and the slope of the reaction functions. The last step is to determine their location. Inserting (3.6) and (3.2) into (3.1), taking expectations and equating coefficients with a similar objective function centred on the implicit bliss

[7] See Barro and Gordon (1983) Rogoff (1985), Blanchard and Fischer (1989), Debelle and Fisher (1994), Alesina and Gatti (1995), or McCallum (1997). Also Devereaux (1987), Bryson at al (1993).

points (a, b) for the Central Bank - as marked on Figure 1 - we can verify that

$$a = \frac{\gamma(1+\beta+\gamma)k}{(2\gamma+1)(1+\beta)} > 0 \text{ for } \pi; \qquad \text{and } b = -a \text{ for } \tau. \tag{3.9}$$

Doing the same thing for the fiscal authority, we find the corresponding bliss points for the government are

$$c = -d = \frac{\beta(1+\beta+\gamma)k}{(2\beta+1)(1+\beta)} > 0 \tag{3.10}$$

Moreover c>a, and d<b, because $\beta>\gamma$ and because $\gamma/(2\gamma+1)$ is increasing in γ. That now allows us to draw Figure 1, since (3.9) and (3.10) imply $E\pi^*<a$ and $E\tau^*<b$ and that the Nash point lies "south-west" of the bliss points.

How do these bliss points shift with increasing divergence in the priorities (i.e. when β increases relative to γ)? (3.9) implies

$$\frac{\partial a}{\partial \beta} = \frac{-\gamma^2 k}{(2\gamma+1)(1+\beta)^2} < 0 \qquad \text{and} \qquad \frac{\partial b}{\partial \beta} = \frac{-\partial a}{\partial \beta} > 0 \tag{3.11}$$

Similarly

$$\frac{\partial c}{\partial \beta} = \frac{(1+\beta+\gamma)/(1+\beta) - \beta(2\beta+1)\gamma/(1+\beta)^2}{(2\beta+1)^2} k \tag{3.12}$$

which is positive if $\beta \le 1/\sqrt{2}$; or if $\gamma < (1+\beta^2)/(2\beta^2-1)$ otherwise. But $\gamma<\beta$. That implies the upper bound on γ only exceeds β if $\beta \le 1.625$, so we can be sure that $\partial c/\partial \beta > 0$ and $\partial d/\partial \beta < 0$ if $\beta \le 1.625$ (or if $\gamma^2<(1+\beta)^2/(2\beta^2-1)$ otherwise). In other words a reversal of sign in (3.12) cannot happen unless γ could exceed 1.625, which is

unlikely because it means the Central Bank would favour output stabilisation by more than inflation control. Hence (3.12) remains positive, except possibly in the depths of a severe recession. And even if (3.12) did turn negative, it would not destroy our result that, as priorities diverge, the acute angle between the reaction curve narrows and the noncooperative outcomes travel "South West" - indicating that the policy conflicts have got sharper. The inequalities in (3.8) have demonstrated that.

3.D Commitment Solutions as a Special Case

Certain precommitment solutions can also be fitted into our framework. The simplest perhaps is that proposed by McCallum (1997) in which the Central Bank ignores government actions, and sets its monetary policy to achieve a predetermined inflation rate in the long run:

$$\pi_t = \phi_0 + \phi_1 \pi_t^e + \phi_2 u_t \qquad (3.13)$$

where u_t is some exogenous shock with mean zero, and π_t^e is an expectation yet to be formed. The Central Bank's problem is then to choose values for ϕ_0, ϕ_1 and ϕ_2 in order to minimise (3.1), constrained by (3.2) and (3.13)[8]. However (3.13) implies $\pi^e = \phi_0 / (1-\phi_1)$. Hence

[8] In order to translate from McCallum's notation, note that his value of w equals $1/\gamma$ here; his β=1; that (3.2) implies that $\varepsilon = u + \bar{y}$ in his world; and hence that $k = \hat{k}\,\bar{y}$ are the output targets where full capacity output is $\bar{y}$ and $\hat{k} > 1$. Thus $\sigma_\varepsilon^2 = \sigma_u^2$ are the error variances and $E(\varepsilon u) = \sigma_\varepsilon^2$.

$$\pi_t - \pi_t^e = \phi_2 u_t \tag{3.14}$$

under rational expectations. Inserting (3.14) into (3.2), and the result together with (3.13) into (3.1), then yields

$$L_B = \frac{1}{2}E\left[\phi_0^2 + \phi_1^2\pi^{e^2} + \phi_2^2\varepsilon^2 + 2\left(\phi_0\phi_1\pi^e + \phi_0\phi_2\varepsilon + \phi_1\phi_2\pi^e\varepsilon\right) + \gamma\left\{\phi_2 u + \varepsilon - k\right\}^2\right] \tag{3.15}$$

Minimising, the first order conditions from (3.15) are

$$\partial L_B / \partial\phi_0 = \phi_0 + \phi_1 E\pi^e = 0,$$
$$\partial L_B / \partial\phi_1 = \phi_1 E\pi^{e^2} + \phi_0 E\pi^e + \phi_2 E\pi^e\varepsilon = 0, \text{ and}$$
$$\partial L_B / \partial\phi_2 = \phi_2\gamma_\varepsilon^2 + \phi_1 E\pi^e\varepsilon + \gamma\left(\phi_2 + 1\right)\gamma_\varepsilon^2 = 0$$

These conditions have to be satisfied for all possible realisations of π_t^e and ε_t. Hence the first two imply $\phi_0=\phi_1=0$, but $\phi_2\neq 0$ since π^e and ε_t are uncorrelated. The third condition then implies $\phi_2=-\gamma/(1+\gamma)$, and hence that

$$\pi_t^* = \frac{-\gamma}{1+\gamma}u_t = \frac{\gamma}{1+\gamma}(k_0 - \varepsilon_t) \qquad k_0 = k/\hat{k} \qquad \hat{k} > 1 \tag{3.16}$$

But the Bank's announced inflation was $\pi^e=0$ in this solution. So (3.16) is identical to (3.3) with a reduced output target k_0, when the Bank ignores τ. In other words this precommitment solution is a special case of the solution given in section 3.A. In particular, the Central Bank's reaction curve becomes vertical through the point $(a/\hat{k}, b/\hat{k})$ in figure 1. The fiscal authority's reaction curve is unaffected. Thus the two reaction functions continue to form an acute angle between them; and the story is unaffected except in so far as $E\pi^*=a/\hat{k}$ and $E\pi^*/\partial\beta=0$ now hold.

Two other commitment solutions may be of interest. In the first $\gamma=0$: the Central Bank commits itself to price stability exclusively, leaving the fiscal authorities to

worry about output stabilisation. This is a literal (but probably unfair) interpretation of the lexographic ordering which the statutes of the European Central Bank seem to require. Using (3.7), (3.9) and (3.10), this too leads to a vertical reaction function for the Central Bank, but going now through the origin. The fiscal authorities' reaction function is unaffected, except in so far as (3.10) implies that (c,d) shifts down and to the left. So once again we have an acute angle between the reaction functions; implying $E\pi^*=0$ and $\partial E\pi^*/\partial\beta=0$, but an unambiguous deterioration in $E\tau^*$.

The final possibility is that the Bank exercises its commitment through Stackelberg leadership. In this case the final outcomes will be determined by the point of tangency between the Central Bank's indifference contours and the fiscal authorities reaction curve. Figure 1 shows that, if there is precommitment as defined above, such a solution will be very close to the Nash point whenever the Central Bank is strongly inflation averse; i.e. γ is small and the indifference curves are elongated in the vertical dimension. However if <u>either</u> party is rather liberal, or if there is little precommitment, the Stackelberg outcomes will move up towards (c,d) and start to look more like a cooperative bargain between the two players.

Commitment solutions therefore follow the same pattern as our general solution. However the policy conflicts may be less severe than before because one reaction function is now vertical and the other unchanged - i.e. the angle between them is less acute. However the interpretation is not quite so simple as that because their location has changed. In terms of conflict, we can say the worst case is where the angle is very narrow: the reaction function for the Bank being flatter because it is not

conservative (γ large), while that for the government is steep because it is rather liberal (β larger). This probably describes the position of Russia and some Latin American countries. A more favourable case has a steep reaction function for the Bank, and a flat one for the government, because both are conservative (γ and β are both small). This describes Europe with its Stability Pact and rigid social protection rules. An intermediate position arises where the Bank is conservative or precommited, and the government liberal - as in the US perhaps.

The outcomes, however, are more complicated. The "worst case", with two liberal policy makers, will produce larger deficits and stronger wage controls or structural reforms ($\partial\tau^*/\partial\gamma=0$, $\partial\tau^*/\partial\beta<0$); but only less inflation if the government liberalises more than the Bank ($\partial\pi^*/\partial\beta<0$ exceeds $\partial\pi^*/\partial\gamma>0$). Conversely the best case, with two conservative institutions, will produce smaller deficits, wage controls or structural reforms - but lower inflation only if the Bank gets tougher faster than the government. Thus the "worst case" may produce worse outcomes, but only unambiguously so if the Bank shifts as much as the government.

4. VOTING: A CONSERVATIVE CENTRAL BANK INCREASES LIBERALISM IN FISCAL POLICY

How does voting affect this story? Can we simply assume $\beta\geq\gamma$? The results so far imply that, when preferences diverge, policies tend to conflict and thereby become less effective. But they do not explain why they might diverge, or whether they should be expected to do so systematically.

The point here is that 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 parameter values describing the priority which each voter would put on output stabilisation relative to inflation control.[9] Given that, let the median voter have preferences identified with the parameter value λ; and hence a loss function to be minimised[10]

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

According to Rogoff, $\gamma \leq \lambda$, a restriction required in order for the expected level of inflation to be lower when monetary policy is in the hands of an Independent Central Bank. But, whatever the values of γ and β eventually selected, inflation, tax

[9] 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, and that those probabilities should also be taken into account. But in order to isolate our points about conflicts in economic policy, we have to act as if governments were elected solely on their choice of economic priorities.

[10] This is the model described by Alesina (1987) and contains the idea that the Central Bank should be at least as conservative as the representative member of Society.

revenues and output will be chosen according to (3.7) and (3.2). The median voter's welfare losses will therefore 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

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

where $E(\varepsilon^2)=\sigma^2$.

The government's problem is therefore to choose a value of β to minimise (4.2). The difficulty is that 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 $\beta\leq(\gamma^2+\lambda)/(\gamma+1)$ or a bit beyond. So the last term in (4.3) is the first to switch sign as β increases. But L_{MV} is increasing in β from $\beta=\gamma^2+\lambda$ or a bit earlier. Consequently any government or party 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 or party with $\beta>\gamma^2+\lambda$ will have an

incentive to decrease its choice. Solving this cubic equation explicitly for β is not possible, but we can approximate that solution by linear interpolation to yield:[11]

$\beta^* = w\beta_1 + (1-w)\beta_2$

where

$$w = \frac{\sigma^2}{k^2(1+\gamma)^3 + \sigma^2}, \quad \beta_1 = \frac{\gamma^2 + \lambda}{\gamma + 1} \text{ and } \beta_2 = \gamma^2 + \lambda \tag{4.4}$$

Notice that $\beta^* > \gamma$ holds so long as $\gamma < \lambda$ or something a bit larger. But the latter inequality is guaranteed in the appointment of an independent Central Bank. Hence the fiscal authorities preference function and reaction curve will always lie below and to the right of that of the Central Bank, by virtue of the political process, just as we have drawn it in Figure 1. That means that the introduction of an independent Central Bank into a world of democratically elected governments will automatically produce and sustain relatively liberal governments; and hence the kind of fiscal-monetary conflicts which lead to less effective policies.

4.A Lower Inflation is not Obtained at No Extra Cost

Notice that (4.3) implies $\beta^* = \gamma^2 + \lambda$ will provide the best average outcomes for the median voter; but that $\beta^* = (\gamma^2 + \lambda)/(\gamma + 1)$ will minimise the variance of those outcomes and stabilise the economy best. There is therefore a conflict between these two objectives, which disproves Alesina and Gatti's claim to the contrary once the possibility of fiscal policy is introduced.

[11] The expression for w in (4.4) depends on noting that $1 + \beta_2 + \gamma = (1+\gamma)(1+\beta_1)$.

4.B Endogenous Political Preferences

The next question is, does this conflict with elected governments not produce an incentive for the Central Bank to become more conservative in order to regain its control over inflation? Should we not therefore expect a self-interested competition among preferences; or would they converge towards the political centre?

Since the Central Bank does not have to submit itself to electoral approval, this boils down to asking: what would happen if the Central Bank were to reduce its value of γ to get better inflation outcomes, while governments continue to pick optimal values of β? Adjusting preferences in this way would be counterproductive if $\partial\beta^*/\partial\gamma<0$, or $\partial\beta^*/\partial\gamma>1$ otherwise (we consider cases in which $d\gamma<0$ only), since the former has the preferences in Figure 1 moving in opposite directions and the latter has them moving apart because γ changes faster than β. This means we must examine the sign / size of:

$$\frac{\partial\beta^*}{\partial\gamma} = \frac{\partial w}{\partial\gamma}(\beta_1 - \beta_2) + (1-w)\frac{\partial\beta_2}{\partial\gamma} + w\frac{\partial\beta_1}{\partial\gamma} \tag{4.5}$$

using the definitions of β_1, β_2 and w in (4.4). It follows that

$$\frac{\partial\beta_1}{\partial\gamma} = \frac{\gamma(\gamma+2)-\lambda}{(\gamma+1)^2}; \qquad \frac{\partial\beta_2}{\partial\gamma} = 2\gamma > 0; \qquad \text{and} \quad 0 < w < 1.$$

Also that $\frac{\partial w}{\partial \gamma} = -3w(1-w) < 0$ and $\beta_1 - \beta_2 = \frac{-\gamma(\gamma^2+\lambda)}{\gamma+1} < 0.$ Hence the first two terms of (4.5) are always positive, as is the third unless $\lambda \geq \gamma(\gamma+2)$. However

$$\frac{\partial \beta^*}{\partial \gamma} \cong -w\lambda = -\frac{\sigma^2 \lambda}{k^2+\sigma^2} < 0 \tag{4.6}$$

always holds as $\gamma \to 0$ from above. Thus a reasonably conservative Central Bank will drive governments to more liberal policies, and trigger greater policy conflicts, if it becomes more "hard nosed" in its attempts to reach its own targets for inflation. But a more liberal minded Central Bank might be able to induce governments to follow its policies if it became a little more "hard nosed" in its pursuit of lower inflation.

The same conclusions about preferences diverging will hold for a larger range of γ values, if $w \to 1$ or if λ is large. Those are the cases where uncertainty is high (σ^2 large) but the tax distortions or the desire to raise employment are not so high (k^2 small); or where the population is relatively liberal. In all these cases, self-interested shifts in policy by the Central Bank (or governments) will create greater internal conflicts. A further relaxation of these conditions can be obtained from $\partial \beta^* / \partial \gamma < 1$. The latter holds if

$$\lambda < \frac{1-\gamma^2(1-w)\left[\gamma(3w+2)-3\right]}{\gamma w(2-3w)} \tag{4.7}$$

i.e. when $w \geq 2/3$, or small: or if w is small and $\gamma < 1$. Thus, given the likelihood of (4.7) holding, or of (4.5) being negative because γ is already small, preferences will frequently diverge, and the policy conflicts harden if the Central Bank increases its pressure for lower inflation. And if neither condition holds, the conflicts will be rather severe anyway since that is the "worst case" noted earlier.

4. C Two-Party Systems

The analysis so far has assumed that there is a continuum of political parties. In reality of course there are usually two main parties, or groups of parties, centred around some common ideological stance: be it left and right, liberal and conservative, or Democrat and Republican. It is important to extend our results for that case.

Suppose we have two parties aiming to capture the same median voter by offering their own β values, conditional on the predicted monetary path. We assume $\beta^R < \beta^D$ where we identify the more conservative party by its choice of β^R; and the liberal party by β^D. The choice of those β values will be partly determined by ideological factors (hence the inequality restriction). But they can also be adjusted up and down in an attempt to capture the median voter and get into power. Returning to (4.2), that means the median voter will choose party D if and only if

$L_{mv/R} - L_{mv/D} =$

$$\left[\frac{\gamma^2+(\beta^R)^2+\lambda}{(1+\beta^R)^2}k^2+\frac{\gamma^2+(\beta^R)^2+\lambda}{(1+\beta^R+\gamma)^2}\sigma^2\right]-\left[\frac{\gamma^2+(\beta^D)^2+\lambda}{(1+\beta^D)^2}k^2+\frac{\gamma^2+(\beta^D)^2+\lambda}{(1+\beta^D+\gamma)^2}\sigma^2\right] \tag{4.8}$$

is positive. Otherwise he/she will choose R. Thus, collecting terms, D will be elected if

$$A=(\beta^D+\beta^R)\left[(\lambda-1)(g^2+1)+\gamma(\gamma-2g^2)\right]-2(\beta^D\beta^R-\gamma^2-\lambda)(g^2(\gamma+1)+1)>0 \tag{4.9}$$

where[12] $g = k/\sigma$. However, we have

$$\partial A/\partial\beta^D=(\lambda-1)(g^2+1)+\gamma(\gamma-2g^2)-2\beta^R(g^2(\gamma+1)+1)$$

which is positive if $\beta^R<\frac{1}{2}.\frac{(\lambda-1)(g^2+1)+\gamma(\gamma-2g^2)}{(\gamma+1)g^2+1}$ (4.10)

Thus if (4.10) holds, D has an incentive to move left. These are the conditions under which an increase in the value of β^D would make it more likely that the median voter would choose party D. They can never hold if λ and γ are small; or if k is large relative to σ (i.e. when the world is relatively conservative, and structural unemployment is large relative to output/employment fluctuations). In such cases D will remain conservative. But they will certainly hold if λ and γ are large, and k small (i.e. when the world is relatively liberal, and output fluctuations are more serious than the supply side distortions). In this case D will move left.

[12] g is a political "signal to noise ratio", reflecting the strength of the policy commitments when compared to the size of the likely disturbances.

Conversely, $\partial A / \partial \beta^R$ is negative if

$$\beta^D > \frac{1}{2}.\frac{(\lambda-1)(g^2+1)+\gamma(\gamma-2g^2)}{(\gamma+1)g^2+1} \tag{4.11}$$

These are the conditions under which a <u>decrease</u> in β^R would make it more likely that the R party would capture the median voter. They will always hold if λ and γ are small (and k large relative to σ); but never if λ and γ are large, but k is small compared to σ. In the first case, R would move right; in the second it would stay liberal.

Summarising, we now have four cases. Define the typical government as pD+(1-p)R, and the expected β parameter as $p\beta^D+(1-p)\beta^R$, where p is the probability that party D gets elected. We have:

<u>Case A</u> If (4.9) is satisfied, D won't need to change its choice of β^D. But R will want to get more liberal if β^D satisfies (4.11). In that case the typical government will become <u>more</u> liberal. As a result E(β) increases, and the parties bunch together on economic policy.

<u>Case B</u> Suppose again that (4.9) is satisfied, so D has little incentive to change β^D. If β^D does not satisfy (4.11), then R will get more conservative and the typical government <u>less</u> liberal. In this case E(β) falls, and the parties diverge on economic policy.

<u>Case C</u> Now, suppose (4.9) is violated. Party R won't need to change its choice of β^R. But if (4.10) holds, D will wish to become more liberal. That means the expected government will be more left wing, E(β) will rise and the parties will diverge in preferences.

Case D Suppose (4.9) again does not hold. If (4.10) is violated, D will want to become less liberal which means the typical government will be more conservative, but the parties will bunch in terms of priorities.

Thus if (4.9) is satisfied, (4.11) will determine if governments will tend to get more liberal and the parties converge or not. Similarly, if (4.9) does not hold, (4.10) will determine if governments have the tendency to get more left wing and the parties converge. In principle, we have only to check these conditions empirically[13], to explain the tendencies for the parties to bunch and become more liberal in the Europe of the late 1990s; or when they diverged and became more conservative in the 1980s. Similarly for the tendency for the US parties to converge and become more conservative in the 1990s.

5. CONCLUSIONS

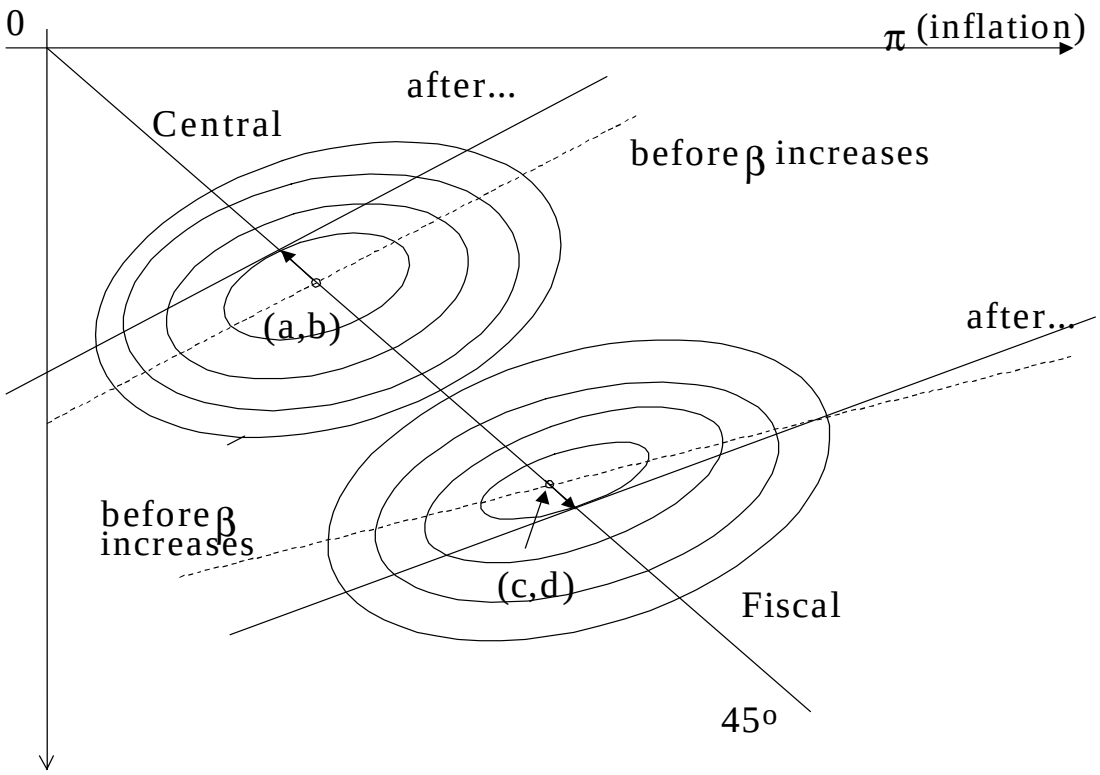
We have shown that the establishment of a Central Bank in Europe will increase the pressure for an active fiscal policy. The Central Bank is designed to achieve price stability. In the eyes of the public, that leaves governments to deliver employment and growth. In a simplified world, where conservatives worry about inflation and liberals about growth, the latter would have a better chance of being elected. And the Stability Pact, tax harmonisation, the synchronisation of cycles, and the principle of no "social dumping", will all give greater cohesion to fiscal and social policies which is implicit in this result.

We therefore conclude that the creation of an autonomous Central Bank dichotomises

policy making. This, we argue, creates greater scope for conflict between the two policy authorities and makes it more difficult for them to co-operate. Yet that, by the same token, - also makes it more important that they should cooperate. Hence the question is not whether the Bank will be exposed to political pressures - it will be. The question is whether there will be a framework which can contain those pressures.

[13] In Demertzis et al (1998) we used a small analytical model to demonstrate how an independent Central Bank could provoke pro-active fiscal reactions in the event of a positive price shock.

FIGURE 1



τ: (falling net tax revenues or an increasing fiscal deficit).

An INDEPENDENT CENTRAL BANK with ELECTED GOVERNMENTS, including what happens when the government becomes more liberal than in the past (becoming more liberal means $d\beta>0$).

NB: becoming more liberal implies a shift in position for the central bank; and a shift in position and sharper reactions for the fiscal authorities. So the angle between policy reactions narrows and the policy conflicts increase.

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Appendix: When Elected Governments make use of Demand Side Fiscal Policies

Following the argument of section 3.B, if fiscal policies acting through aggregate demand are not to have a permanent effect on output, we must replace (3.2) with

$$y = \pi - \pi^e - (\tau - \tau^e) + \varepsilon \qquad \text{(A1)}$$

Substituting this into (3.1) yields a new reaction function for the Central Bank:

$$\pi = \frac{\gamma}{1+\gamma}\left[\pi^e + \tau - \tau^e + k - \varepsilon\right] \qquad \text{(A2)}$$

Similarly, inserting (A1) into (3.4) yields a new optimal reaction function for the fiscal authority

$$\tau = \frac{\beta}{1+\beta}\left[\pi - \pi^e + \tau^e + \varepsilon - k\right] \qquad \text{(A3)}$$

Note that these two reaction functions have the exact same slopes as their counterparts in the supply side case: (3.3) and (3.5) respectively. Now, using (A3) to eliminate τ-τ^e from (A2), and taking expectations, yields

$$\pi^e = \frac{-\gamma}{1+\beta}\tau^e + \frac{\gamma}{1+\beta k} \qquad \text{(A4)}$$

Similarly inserting (A2) into (A3), and taking expectations, gives

$$\tau^e = \frac{-\beta}{1+\beta}\pi^e - \frac{\beta}{1+\gamma}k \qquad \text{(A5)}$$

Consequently, solving (A4) and (A5) together, we have the counterparts to (3.6):

$$\pi^e = \gamma k > 0 \quad \text{and } \tau^e = -\beta k < 0. \qquad \text{(A6)}$$

Lastly, having obtained expressions for π^e and τ^e, we can insert them into (A2) and (A3) and solve for the two optimal decisions:

$$\pi^* = \gamma k - \frac{\gamma\varepsilon}{1+\beta+\gamma} \qquad \text{(A7a)}$$

and

$$\tau^* = -\beta k + \frac{\beta\varepsilon}{1+\beta+\gamma} \qquad \text{(A7b)}$$

These decisions form a Nash equilibrium, replacing (3.7a) and (3.7b) for the case at hand. They are actually identical to the previous case, except that γk replaces $\gamma k/(1+\beta)$ in (3.7a) and βk replaces $\beta k/(1+\beta)$ in (3.7b). Consequently $E\pi^*>=0$ and $E\tau^*<0$ are both larger, in absolute size, than they were before. On the other hand we have