

Partisan and Electoral Motivations and the Choice of Monetary Institutions Under Fully Mobile Capital¹

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Abstract

Central bank independence and pegged exchange rates have each been viewed as solutions to the inflationary bias resulting from the time inconsistency of discretionary monetary policy. While it is obvious that a benevolent social planner would opt for such an institutional solution, it is less obvious that a real world incumbent facing short-term partisan or electoral pressures would do so. In this paper I model the choice of monetary institutions from the standpoint of a survival-maximizing incumbent. It turns out that a wide range of survival-maximizing incumbents do best by forfeiting control over monetary policy. While political pressures do not, in general, discourage monetary commitments, they can influence the choice between fixed exchange rates and central bank independence. The paper highlights the importance of viewing fiscal policy and monetary policy as substitutes and identifies the conditions under which survival-maximizing incumbents will view fixed exchange rates and central bank independence as substitutes. In so doing, it provides a framework for integrating other contributions to this volume.

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According to the time inconsistency literature in monetary economics, even a benevolent social planner has an incentive to announce, and then renege on, a commitment to a low inflation policy because an inflationary surprise can result in an increase in national income. Market actors, however, should see through this plan and form inflationary expectations that will make surprise unlikely. As a result, inflation, but not income, should be higher under a discretionary regime than under a regime where credible commitments are possible. (Kydland and Prescott 1973; Barro and Gordon 1983). As the editors of this volume point out, central bank independence and fixed exchange rates have both been put forward as solutions to the benevolent social planner's problem (Rogoff 1985; Walsh 1995; Giavazzi and Pagano 1988). If central bank independence and fixed exchange rates are effective institutional fixes for the time inconsistency problem in monetary policy, it is easy to see why they would be adopted.

Despite its impeccable logical foundations, there are a number of reasons why the time inconsistency framework may be limited in its ability to explain the choice of monetary regimes. I will concentrate on three. First, and most importantly, while it is easy to see why a benevolent social planner would adopt an institutional fix that would enhance social welfare, it is less obvious why the elected officials who are responsible for the choice of monetary institutions would do so. Second, while the desire to solve the time inconsistency problem might explain why designers of institutions might want to limit monetary discretion, it does not explain which institutional fix they might opt for. Finally, a focus on the time inconsistency problem leads to a focus on the consequences of institutional choice related to monetary policy. In a world of highly mobile capital, however, the choice of the exchange rate regime also has important consequences for the effectiveness of fiscal policy.

In this paper I present a pair of models designed to address these concerns. Specifically, I model the choice of institutions by a survival maximizing incumbent who chooses a set of monetary institutions that can include an independent central bank, a fixed exchange rate, neither, or both. It turns out that, like benevolent social planners, survival-maximizing incumbents often do better by forfeiting control over monetary policy. While political pressures - thought of as either electoral or partisan pressures - do not, in general, discourage monetary commitments; they can influence the choice between fixed exchange rates and central bank independence. Thus, the paper

identifies the conditions under which fixed exchange rates and central bank independence will be viewed as institutional substitutes.

Most discussions of the political economy of monetary institutions ignore the fact that while monetary commitments may frustrate the ability of incumbents to use monetary policy for political purposes; fiscal policy may serve as a viable substitute for monetary policy. Failure to consider the possibility that incumbents might accomplish their goals through fiscal policy may lead analysts to overstate the reluctance of incumbents to forfeit the control of monetary policy. Consequently, this paper argues that policy substitution (in this case the potential for incumbents to achieve their political goals with either fiscal or monetary policy) is likely to be an important factor in the choice of monetary institutions.

In order to gauge the importance of policy substitution I compare a model in which monetary policy is the only instrument relevant to the control of the economy with a model in which fiscal policy is also potentially useful. In Model 1 (in which fiscal policy is not an option) it is possible to identify the conditions under which survival-maximizing incumbents view a fixed exchange rate as a close substitute for an independent central bank with a floating exchange rate. In model 2, where it is possible for the incumbent to substitute the use of fiscal policy for monetary policy, an independent central bank with a floating exchange rate is never a close substitute for a fixed exchange rate. Thus, if policy substitution is not possible, the incumbents choice of regimes depends on contextual factors such as the magnitude of political pressures or inflationary expectations. In contrast, if the incumbent can freely substitute fiscal policy for monetary policy in his attempt to achieve his political goals, choosing a fixed exchange rate is a dominant strategy.

1 Model 1: Choosing Monetary Institutions when Monetary Policy is the Only Instrument

Preferences

The incumbent's preferences are captured in the following loss function:

$$L_i = (y - y^n k)^2 + (\pi - \pi^*)^2 \quad (1)$$

where y is the growth rate, π is the inflation rate, and π^* is the incumbent's ideal rate of inflation. Political pressure is captured by its effect on the policy-maker's ideal point for growth. Specifically, the incumbent's growth target is $y^n k$ where y^n is the natural rate of growth (normalized so that $y^n = 1$) and k is a parameter equal to one in the absence of political pressure to push growth above the natural rate and proportionally greater than one in the presence of such pressure. It is assumed, with no loss of generality, that the policymaker's ideal inflation outcome is zero. The policymaker is also assumed to place the same weight on hitting her inflation target as she does on hitting her growth target. This assumption is relaxed in appendix 2. Normalization results in the following loss function:

$$L_i = (y - k)^2 + \pi^2 \quad (2)$$

The central banker's loss function is identical to the policy-maker's, except when the central bank is independent. When the central banker is granted independence, the central banker is insulated from political pressures and so, in the ideal typical case of total independence, $k = 1$. Otherwise the government and central banker have the same growth target. The political pressures mentioned above can be usefully thought of as deriving from either of two sources. First, the pressure to push growth above the natural rate (and accept the consequent short-term rise in inflation) could be thought of as pressure from constituencies on the Left of the political spectrum. This captures the intuition behind Hibbs' (1978) argument about the distribution of macroeconomic preferences in society and the notion that parties can be differentiated on the basis of which set of voters they seek to satisfy with their policies. Second, political pressure (felt by incumbents of all stripes) can be thought of in terms of short-term pressures to push growth above the natural rate in the period just prior to elections, long-term inflationary consequences be damned (Nordhaus 1975).

The control of the economy

The central banker controls the economy via an expectations-enhanced short term Phillips curve:

$$y = y^n + \mu(\pi - \pi^e) \quad (3)$$

where y is the growth rate, y^n is the natural rate of growth (normalized so that $y^n = 1$), π is the inflation rate, and π^e is expected inflation. The central banker chooses the rate of inflation and μ captures the transmission of inflationary surprises into changes in the growth rate.

According to the Mundell-Fleming model, the effectiveness of monetary policy depends on the exchange rate for the following reasons.² A monetary expansion by means of a reduction in interest rates will lead to an outflow of capital, resulting in downward pressure on the price of the local currency. If a government is committed to a fixed exchange rate, it will have to purchase local currency to “defend the exchange rate.” It will do so until the consequent monetary tightening returns interest rates to their original level. The degree of capital mobility determines the speed at which the original drop in interest rates results in a capital outflow and, therefore, the time elapsed between the monetary intervention and a restoration of the original interest rate. When capital is fully mobile; a drop in interest rate would lead to an instantaneous outflow of capital and so, monetary policy does not have even temporary effects. The effect of a monetary expansion is quite different under a flexible exchange rate. Now, when a drop in interest rates leads to a capital outflow, the government is no longer committed to purchasing local currency to defend the exchange rate and the currency will be allowed to depreciate. The ensuing increase in competitiveness leads to an increase in the demand for exports, which re-enforces the monetary expansion. Thus, under fully mobile capital, monetary policy is fully effective when the exchange rate is flexible, and ineffective when the exchange rate is fixed. Since I will assume in this paper that capital is fully mobile, $\mu=0$ when the exchange rate is fixed and $\mu=1$ when the exchange rate is flexible.³

Order of moves

²Foundations statements of this approach can be found in Mundell (1963) Fleming (1963). See Kenen (1994) for a particularly clear textbook statement. Frieden (1991) is the first attempt to examine the political implications of the Mundell-Fleming model.

³In order to focus attention on the effect of political motivations on the choice of monetary regimes I have chosen to model their choice under fully mobile capital. Two

The incumbent moves first and chooses the relationship between the central bank and the government (Independent, or Dependent) and the exchange rate regime (Fixed or Floating). The central banker then sets monetary policy by choosing the rate of inflation.

Proposition 1 *If $2(k - 1) < \pi_I^e$ the incumbent chooses a fixed exchange rate (with either an independent central bank or a dependent central bank) and the central banker sets monetary policy so that $\pi = 0$.*

If $2(k - 1) \geq \pi_I^e$ the incumbent chooses a flexible exchange rate and an independent central bank and the central banker sets monetary policy so that $\pi = \frac{1}{2}\pi_I^e$

Proof. See appendix 1. ■

1.1 Discussion

Proposition 1 says that a survival-maximizing incumbent always does better under a monetary commitment than under discretionary policy (a dependent central bank with a flexible exchange rate is not chosen in equilibrium). The question is *which* monetary commitment is best - a fixed exchange rate or an independent central bank with a flexible exchange rate? According to Proposition 1 there are two reasons why a survival maximizing incumbent would choose a fixed exchange rate. First, political pressures to push growth above the natural rate may be modest. Secondly, it may be the case that an independent central bank with a flexible exchange rate is, for some reason, not expected to be effective in reducing inflationary expectations. Conversely,

other alternatives are zero capital mobility and partially mobile capital. The former is clearly at odds with the experience of most, if not all, countries since the early 1970s. The Mundell-Fleming model's conclusions about the effectiveness of partially mobile capital on the effectiveness of monetary and fiscal policies are qualitatively similar to those of fully mobile capital. For example, since capital flows respond more slowly when capital is partially mobile than when it is fully mobile, monetary policy can be effective in the short run when the exchange rate is fixed, but capital outflows will eventually return interest rates to their original level. Consequently, partial capital mobility reduces, but does not eliminate, the effectiveness of monetary policy when the exchange rate is fixed. While empirical evidence suggests that predictions drawn from a model based on fully mobile capital fit the data on the political control of the macroeconomy (Clark and Hallerberg 2000; Clark, Hallerberg and de Souza 2002; Clark (Forthcoming)), an examination of the effects of partially mobile capital would be a worthwhile extension of the current model.

if political pressures are large, or an independent central bank with a flexible exchange rate is expected to be effective in reducing inflationary expectations, the incumbent is expected to opt for central bank independence and a flexible exchange rate. Note further that Proposition 1 tells us that the magnitude of political pressures and inflationary expectations are to be viewed in relation to each other.

The intuition behind the equilibria for Model 1 is driven by the effect of monetary institutions on the incumbent's ability to use monetary policy to respond to political pressures. As (3) shows, when the exchange rate is flexible and the central bank is not independent, the incumbent can freely choose the rate of inflation that minimizes his loss function. Unfortunately, however, the trade-off between inflation and growth embodied in the Phillips curve means that the incumbent can not hit both his inflation and growth targets when the latter is not equal to the natural rate. Instead, he must accept some non-zero inflation rate in order to push growth closer to his ideal point. Losses mount under a fully discretionary regime because the policy-maker's willingness to accept non-zero inflation ratchets up inflationary expectations, which in turn requires the incumbent to adopt an even higher rate of inflation than expected if progress is to be made in pushing growth above its natural rate. This familiar dynamic is the "problem" part of the time-inconsistency problem. Any progress an incumbent can make toward hitting his growth target comes at the expense of large deviations from his inflation target. It is, therefore, clear that the inflationary bias in discretionary monetary policy is just as much of a problem for survival maximizing incumbents as it is for benevolent social planners. And so, to the extent that hitting his inflation target matters, the incumbent is drawn away from efficient goal attainment to the extent that he is responsive to political pressures. Consequently, it is not hard to imagine why he might want to give up control of monetary policy by granting independence to the central bank or pegging the exchange rate.

In fact, in the context of model 1, a fixed exchange rate regime always leaves the incumbent better off than he would be if the exchange rate is flexible and the central bank is not independent (see appendix).⁴ When capital is

⁴In the context of the models in this paper, a fixed exchange rate regime with a dependent central bank is turns out to be equivalent to a fixed exchange rate with an independent central bank. Consequently, I will refer to a "fixed exchange rates regimes" to mean a

mobile and the exchange rate is fixed, monetary policy is ineffective and, so, the incumbent will miss his growth target and be forced to accept the natural rate of growth.⁵ Since the growth rate is independent from monetary policy when capital is mobile and the exchange rate is fixed, there is no temptation to engineer an inflationary surprise and, therefore, no inflationary bias. It is in this sense that a pegged exchange rate is said to be a solution to the time inconsistency problem. This “corner solution” in which the incumbent hits his inflation target but misses his growth target under fixed exchange rates is preferred to a flexible exchange rate because any progress made towards hitting the incumbent’s growth target facilitated by control over monetary policy is more than offset by the inflationary spiral it induces.

The question remains whether the incumbent would ever prefer a flexible exchange rate with an independent central bank to a fixed exchange rate. Before answering this question, it is worthwhile to consider the determinants of monetary policy under an independent central bank and a flexible exchange rate. First, let us consider equilibrium monetary policy when the central banker is fully independent and able to communicate her preference for a zero inflation policy. Such a signal should be credible since, if it is believed and expected inflation equals zero, the central banker can only hit her growth and inflation targets by sticking to her announced plan. It is in this sense that central bank independence does away with the time inconsistency of monetary policy. Under such conditions an independent central bank with a flexible exchange rate will produce exactly the same policy outcome as a fixed exchange rate regime - zero inflation and the natural rate of growth. Consequently, the incumbent is indifferent between a pegged exchange rate and an independent central bank with a flexible exchange when the expected rate of inflation under the later is equal to zero.

Contributors this volume, however, point out that there are circumstances under which a nominally independent central bank may have difficulty signalling its commitment to a low inflation policy in a fully credible manner (Broz; Keefer and Stasavage). When this is the case, inflationary expectations are not likely to be precisely zero, and Proposition 1 tells us the consequences of this state of affairs for both equilibrium monetary policy

combination of fixed exchange rates with either an independent or a dependent central bank.

⁵When monetary policy is ineffective, the Phillips curve (3) reduces to $y = y^n$.

and the incumbent's choice of exchange rate regime. An independent central bank will not respond to political pressures but will loosen monetary policy in response to positive inflationary expectations. Failure to do so would lead to a rate of growth below the central bankers target -the natural rate (see appendix). Given positive inflationary expectations, therefore, an independent central bank will accept some increase in inflation in exchange for a growth outcome closer to her ideal point. The incumbent anticipates the central banker's response to inflationary expectations and its consequences for inflation and growth outcomes and is, therefore, able to compare the losses anticipated under a range of inflationary expectations in light of the pressure it feels to push growth above the natural rate.

Figure 1 plots the losses experienced by the incumbent as a function of expected inflation. Note that when expected inflation under an independent central bank equals zero, the incumbent hits his growth target and so, all losses come from missing his growth target. Since his growth target is a function of the political pressure to push growth above the natural rate (k), so is the size of the loss he experiences under these conditions. The central bankers's response to low, levels of expected inflation discussed above produces an outcome that is closer to the incumbent's growth target but further away from the incumbents inflation target than was the case under zero expected inflation. Accordingly, the loss that results from the incumbent missing his inflation target increases, and the loss associated with missing his growth target decreases, as expected inflation under a independent central bank with a flexible exchange rate increases. At a certain point ($\pi_I^e = 2(k-1)$), however, a monetary expansions response to high levels of expected inflation push both growth and inflation outcomes away from the incumbent's ideal points.

Figure 2 plots the incumbent's total all loss under a flexible exchange rate (the sum of the two curves in Figure 1), and compares it to the loss experienced under a fixed exchange rate. Note that when expected inflation is above zero but below $2(k-1)$, the incumbent experiences a greater loss under a fixed exchange rate than under a flexible exchange rate. The vertical distance between the curved line representing the incumbent's total loss under a flexible exchange rate with an independent central bank and the horizontal line representing the incumbent's total loss under a fixed exchange rate is the marginal utility gain associated with a switch from a fixed exchange rate

to a flexible exchange rate with an independent central bank.⁶ Notice that this marginal utility (the space between the two lines) is at first increasing, and then decreasing in expected inflation. The losses associated with each of the incumbent's targets (carried over from Figure 1 as dashed lines) tell us why. When expected inflation is low, a monetary expansion resulting from a further increase in inflationary expectations reduces the incumbent's loss from missing his growth target a great deal while only modestly increasing the incumbent's loss from missing his inflation target. When expected inflation is high, however, an identical increase in inflationary expectations will result in a large increase in the loss associated with missing the incumbent's inflation target and only a marginal reduction in the loss associated with missing the incumbent's growth target. The marginal utility from switching from a flexible exchange rate to a flexible exchange rate with an independent central bank is greatest mid-way between these two extremes, at $k - 1$. It is there that improved performance in growth is perfectly offset by declining performance on inflation.⁷

Notice that the effect of expected inflation on the incumbent's choice of regime depends on the magnitude of political pressures. The amount of expected inflation required for losses under a flexible exchange rate with an independent central bank to reach their minimum and the point at which losses from this regime exceed those produced by a fixed exchange rate regime are both increasing in k . To see this, compare Figure 3 with Figure 2. In figure 3 (where $k = 1.5$), the incumbent's loss under a flexible exchange rate with an independent central bank reaches its minimum when expected inflation under this institutional combination equals .5, and the incumbent begins to prefer a fixed exchange rate when expected inflation reaches 1. In figure 2 (where $k = 2.0$), in contrast, the incumbent's loss under a flexible exchange rate with an independent central bank does not reach its minimum until expected inflation equals 1 and the incumbent begins to prefer a fixed exchange rate when expected inflation equals 2. Note also that the losses under a fixed exchange rate regime or an independent central bank that produces zero expected inflation under a flexible exchange rate are also increasing in k (the lines plotting the losses for both regimes meet the y -axis a much higher level in Figure 2 than in Figure 3).

⁶Given exogenously determined amounts of political pressures and expected inflation.

⁷This occurs when $\pi_I^e = 2(k - 1)$.

So, in Model 1 (in which policy substitution is not possible) the incumbent's choice between monetary institutions will be driven by a combination of the magnitude of political pressures and the rate of expected inflation under an independent central bank with a flexible exchange rate. If complete central bank independence can be credibly communicated, the incumbent is indifferent between the two forms of monetary commitment. If, however, expected inflation under an independent central bank is not zero, the incumbent will prefer a flexible exchange rate if expected inflation can be kept at moderate levels (relative to the magnitude of political pressures). Thus, the incumbent could be said to prefer flexible exchange rates under a "pretty good" central banker, and fixed exchange rates otherwise.

1.2 Extension: Relaxing the assumption that actors care as much about inflation as they do growth

The above results are generated by a model in which the actors place the same weight on hitting their growth targets as they do hitting their inflation targets. This may not be true in general, and so, we would like to know if the results of the model change significantly when this assumption is relaxed. In appendix 2 I present a more general model in which the actors can place any weight ($\alpha \geq 0$) on hitting their inflation target (relative to hitting their growth target). Here I will report the main implications of this model for the choice of monetary institutions in order to reassure the reader that the conclusions drawn from Model 1 are not restricted to the special case where actors place the same weight on hitting their inflation target as they do on hitting their growth target.

The choice of monetary institutions outlined in proposition one depends vitally on two institutional comparisons. First, the incumbent must compare the losses he receives in equilibrium when the exchange rate is flexible and the central bank is dependent with the losses he receives under an institutional combination involving a pegged exchange rate. Second, the incumbent must compare the losses he receives in equilibrium when the exchange rate is flexible and the central bank is independent with the losses he expects to receive under an institutional combination involving a pegged exchange rate.⁸

⁸Because the incumbent always prefers a flexible exchange rate and a dependent cen-

In appendix 2 I show that a) the choice involving the second institutional comparison never depends on the weight the actors place on hitting their inflation target; b) there are a wide set of conditions under which the first institutional comparison does not depend on the weight the actors place on hitting their inflation target; and c) even when the first institutional comparison does depend on the weight the actors place on hitting their inflation target, the equilibrium choice described by proposition one is sustained under a wide range of such weights. Thus, there are many plausible conditions under which the results of model one hold no matter how much or how little weight the actors place on hitting their inflation target. That said, there are some conditions under which the results only hold if actors place “sufficient” weight on hitting their inflation target. The good news is that under most plausible conditions, what constitutes “sufficient” is modest. The appendix gives a precise definition of what these conditions are and what is meant by “sufficient.”

2 Model 2: Choosing Monetary Institutions when Fiscal Policy exists as a possible substitute

The model introduced above analyses the strategic interaction between an incumbent who designs monetary institutions and a central banker who - given a set of institutions - attempts to use monetary policy to influence the macroeconomy. In this framework, the incumbent cannot influence the macroeconomy directly, but merely chooses the institutional context in which the central banker will operate. Under such conditions the incumbent must accept a trade-off between accepting the natural rate of growth and zero inflation or adopting a flexible exchange rate that will allow a central bank it does not control to try to implement a policy that may produce a growth outcome more to its liking but at the cost of non-zero inflation. Clark and Hallerberg (2000) and Hallerberg (this volume) argue that while pegging the

tral bank when evaluating the first comparison, we need not concern ourselves with the third logically possible institutional combination (the incumbent’s losses under a flexible exchange rate with a dependent central bank compared to his losses under a flexible exchange rate with an independent central bank).

exchange rate or granting the central bank independence may curtail the political use of monetary policy, it does not necessarily discourage the political use of fiscal policy. This argument is potentially important for attempts to examine the effects of partisan or electoral incentives on the choice of monetary institutions because if the incumbent can use fiscal policy to respond to political pressures monetary institutions may not have a constraining effect on incumbent behavior. As a consequence, incumbents with strong incentives to manipulate the economy may be no less likely to make monetary commitments than incumbents without such incentives.

Consequently, in this section I allow the incumbent to influence the macroeconomy through fiscal policy. The game is identical to the one presented in the previous section with the following exceptions. First, after the incumbent chooses a combination of monetary institutions, she adopts a budget that influences the economy in a direct manner. Specifically, (3) is replaced by:

$$y = y^n + \mu(\pi - \pi^e) + \phi g \quad (4)$$

where g is net government spending and ϕ is a parameter that captures the rate at which changes in net government spending are transformed into changes in the growth rate. Following the standard Mundell-Fleming set-up it is assumed that, given fully mobile capital, fiscal policy is effective ($\phi = 1$) when the exchange rate is fixed, but not when the exchange rate is allowed to fluctuate ($\phi = 0$). To understand why, consider first the effect of a fiscal expansion under a fixed exchange rate. An increase in net spending will lead to an increase in interest rates and, therefore, an inflow of capital. The capital inflow will put upward pressure on the price of the local currency. A government committed to a fixed exchange rate will, therefore, need to sell domestic currency to prevent an appreciation. As a consequence, fiscal expansions under fixed exchange rates will be accompanied by a reinforcing monetary expansion. Next, consider the effect of a fiscal expansion under flexible exchange rate. As before an increase in net spending leads to an increase in interest rates inducing a capital inflow and upward pressure on the exchange rate. In the absence of exchange rate intervention, an appreciation will occur. The consequent loss in competitiveness in turn reduces the demand for exports - counteracting the expansionary effects of the fiscal expansion. As in Model 1, monetary policy is assumed to be effective ($\mu = 1$)

when the exchange rate is flexible and ineffective ($\mu = 0$) when the exchange rate is fixed.

Proposition 2 *The incumbent chooses a pegged exchange rate and chooses a budget $g = k - 1$, and the central banker responds by choosing $\pi = 0$.*

Proof. See appendix 3. ■

2.1 Discussion

Proposition 2 states that when the assumptions of model 2 are true, a survival-maximizing incumbent will choose a fixed exchange rate. The fixed exchange rate renders monetary policy ineffective, making the central banker's commitment to a zero inflation policy credible. Under these conditions the incumbent and the monetary authority both achieve their shared goal of zero inflation. In addition, the incumbent is free to use fiscal policy to achieve his growth target.

Outcomes under flexible exchange rates are identical to Model 1 because, when fiscal policy is ineffective, a model with both fiscal and monetary policy reduces to a model with just monetary policy. Outcomes are markedly different under flexible exchange rates when policy substitution is possible. In contrast to Model 1 the incumbent does not have to accept the natural rate of growth as the outcome under fixed exchange rates. While monetary policy is ineffective, the incumbent can increase net government spending and, therefore, achieve its growth target. Since monetary policy is ineffective, monetary policy is set to zero inflation and inflationary expectations are beside the point. The combination of hard-wired zero inflation and the ability to use fiscal policy to achieve his growth goal means that the incumbents' loss under a fixed exchange rate is reduced to zero. This outcome is not achievable under alternative institutional combinations. Consequently, an incumbent that can freely substitute fiscal policy for monetary policy will always prefer a fixed exchange rate to a flexible exchange rate with an independent central bank.

The above results depend crucially on the implicit assumption that increases in net spending lead to increased growth without a corresponding

change in the inflation rate. Deficit spending will be inflationary if it is financed by borrowing from the central bank, but not if it is financed by borrowing from the general public, because the former expands the money supply and the latter does not. Since the former requires the consent of the central bank and operates through the expansion of the money supply, in the context of the current model the inflationary consequences deficit spending (should there be any) should be thought of as the result of monetary policy. Since the goal of this model is to examine the choice of monetary institutions in light of the strategic interaction between fiscal and monetary authorities, it is important to try to separate fiscal and monetary functions as much as possible. Consequently, if increases in net spending require financing, they should be thought of as being financed by the general public, not the central bank.⁹

In addition, the attractiveness of a fixed exchange rate to a survival-maximizing incumbent depends on the availability of a low inflation nominal anchor currency to peg to. If no such currency is available, the incumbent faces the same trade-off between hitting his growth and inflation targets under a fixed exchange rate as he does under a flexible exchange, only now the inflation rate is outside of his control. This was, in fact, the complaint of many countries in the later part of the Bretton Woods era. The perception was that expansionary macroeconomic policies in the U.S. meant that countries pegged to the dollar were forced to "import" inflation. The break-up of Bretton Woods and the creation of the EMS can be viewed as a decision by European countries to trade the Dollar for the Deutschmark as the anchor currency. The need for a low inflation nominal anchor also raises the familiar degrees of freedom problem. If a set of countries peg their currencies to a nominal anchor, the currency to which they peg is, effectively, forced to accept a floating exchange rate. The U.S. and Germany, for example, have both experienced prolonged periods in which they had *de facto* flexible exchange rates.

Unlike Model 1, the results of Model 2 discussed above are entirely robust with respect to changes in the weight policymakers place on hitting their monetary target.

⁹The author wishes to thank Jude Hays and an anonymous reader for their thoughts on this issue.

3 Empirical Implications

The two models produce a number of interesting implications about monetary and fiscal policy, macroeconomic outcomes, and the choice of monetary institutions. I will compare the predictions of the two models presented in this paper and, where appropriate, suggest tests capable of distinguishing between them.

3.1 The Choice of Monetary Institutions

The two models presented here have interesting implications for the role political pressures should play in the choice of monetary institutions. Model 1 predicts that as political pressures increase, relative to expected inflation under a flexible exchange rate and an independent central bank, incumbents are less likely to prefer fixed exchange rates. This result is consistent with Bernhard and Leblang's suggestion (1999) that incumbents that have strong incentives to manipulate the economy to stay in office ought to be the most reluctant to forfeit monetary policy autonomy by pegging. Model 1, however, qualifies Bernhard and Leblang's claim. When expected inflation under an independent central bank is very low all but incumbents facing almost no political pressure should prefer a flexible exchange rate with an independent central bank to a fixed exchange rate. In contrast, when expected inflation is very high, all but incumbents facing very severe political pressures can be expected to peg the exchange rate. Thus, if Model 1 is the appropriate model, the effect of political pressures on the choice between domestic and international monetary commitments is conditioned by the expected rate of inflation under an independent central bank with a flexible exchange.

The rate of institutional substitution depends on the relationship between the magnitude of political pressures and the rate expected inflation under an independent central bank with a flexible exchange rate. As figure 4 shows, proposition 1 identifies a cut point in the relationship between political pressure and expected inflation. Points on the line $\pi_I^e = 2(k - 1)$ describe conditions under which the incumbent is indifferent between a fixed exchange rate or a flexible exchange rate with a independent central bank. Any combination of political pressures and inflationary expectations northwest of this line

results in a pegged exchange rate and any combination southeast of this line would result in a flexible exchange rate. Were a central bank to be completely independent, it could be expected to implement the equilibrium policy for an independent central bank in the model above. If this independence was signalled in an unproblematic manner, the inflationary expectations of the relevant actors would converge on $\pi_I^e = \pi = 0$. Under such conditions, all incumbents would choose a flexible exchange rate because the condition for adopting a “domestic” solution to the time inconsistency problem is met for all political pressures (i.e. whenever $1 < k$). Conversely, whenever inflationary expectations under a flexible exchange rate and an independent central bank are very high, a wide range of incumbents will choose to peg. This is so because the condition for adopting an “international” solution to the time inconsistency problem is met for all but those incumbents facing the most severe political pressures. In a more moderate range of inflationary expectations some incumbents (those facing strong political pressures) will want to peg and some will want to float (those facing modest political pressures). Consequently, while the propensity to peg is strictly increasing in the political pressures facing the incumbent as Bernhard and Leblang suggest, the estimated causal effect of an increase in political pressures should be greatest when expected inflation under an independent central bank would be modest.

Thus, when a central bank is highly independent and is able to credibly signal this independence we would expect political pressures to have little effect on the propensity to peg. If however, either of these factors is not true (i.e. either the bank is *de facto* not independent or it cannot credibly signal its independence), we might expect political pressures to have a significant effect on the propensity to peg. Put differently, the demand for pegged exchange rates is relatively inelastic when expected inflation under an independent central bank and a floating exchange rate is either very high, or very low. As a result, we can say that according to Model 1 a survival maximizing incumbent would only view central bank independence and fixed exchange rates as close substitutes when expected inflation under an independent central bank and a flexible exchange rate is in the neighborhood of two times the incumbents growth target.

In contrast, Model 2 implies that there should be no connection between political pressures and the propensity to peg the exchange rate. Why? Be-

cause *any* amount of political pressure should suffice to induce the incumbent to prefer an international solution to a domestic one. Similarly, Model 2 implies that there should be no connection between inflationary expectations under a flexible exchange rate and an independent central bank and the propensity to peg. Thus, according to Model 2, central bank independence and fixed exchange rates are never close substitutes from the perspective of a survival-maximizing incumbent. Because fiscal policy is effective under fixed, but not flexible, exchange rates incumbents always prefer the former. Consequently, the propensity to peg is inelastic with respect to political pressures.

To determine which of the two models in this paper is more consistent with observed experience, therefore, we can examine the relationship between political pressures and the propensity to fix. The absence of a relationship between the propensity to fix and the magnitude of political pressures would lend support for Model 2. In contrast, the existence of a conditional relationship between political pressures and the propensity to fix would lend support to Model 1.

As noted above, the pressure to push growth above the natural rate could come from either electoral or partisan sources. If the political pressures are partisan in nature, some governments (those elected by left-wing constituents) should experience greater political pressures to produce growth than others. If political pressures are electoral in nature, then all governments that must stand for election might experience roughly similar amounts of political pressure. Bernhard and Leblang (1999) have identified a set of institutions that, they argue, should heighten electoral pressures on incumbents.

Consequently, one could test the implications of the models in this paper in two ways. Under the assumption that the partisan model is the appropriate model of the political control of the economy, one might examine the historical record to determine if there is a relationship between the ideological orientation of government and the propensity to peg. Conversely, under the assumption that the electoral model is the appropriate model of the political control of the economy, along with the auxiliary assumption that Bernhard and Leblang have correctly identified institutions that heighten the electoral incentives of the incumbent, one could examine whether there is a correlation between the existence of such institutions and the propensity to peg.

Because the current model suggests that the relationship between political pressures the propensity to peg depends on whether a central bank with a flexible exchange rate would be able to credibly signal its commitment to maintain a low inflation policy, such a re-examination should be conditional in nature. This would require a measure for credible commitment.

Fortunately, two of the contributors to the current volume provide some help in this area. Lawrence Broz argues that commitments to central bank independence will not be effective in lowering inflationary expectations in the absence of a high degree of transparency. Such transparency will allow financial sector actors to determine whether politicians are making good on their promise not to interfere with the conduct of monetary policy. He argues that the necessary transparency is most likely to be present in democracies. Consequently, his findings that a) central bank independence has little or no inflation fighting power in the absence of democracy, and b) that non-democracies are more likely to peg their exchange rates can, therefore, be interpreted as support for Model 1.

Keefer and Stasavage (this volume) argue that the credibility of central bank independence is related to the existence of legislative veto players. They argue that commitments to low inflation policies will be more credible in the presence of multiple veto players (such as in Germany) and that when there is only one veto player (as is typical in the United Kingdom) central bank independence is expected to be no more credible than an incumbent's low inflation promises. This suggests that expected inflation under an independent central bank with a flexible exchange rate will be negatively correlated with the number of veto players.

Consequently, one way to test the predictions of the models in this paper is to examine whether the factors that are expected to influence political pressures on incumbents (the institutions identified by Bernhard and Leblang or the ideological orientation of government) are correlated with the propensity to peg, conditioned on the number of veto players. Specifically, when there are multiple veto players commitments to central bank independence should be credible and so, inflationary expectations should be near zero if Model 1 is correct. Under these circumstances political pressures should have little or no effect on the propensity to peg. But as the number of veto players moves towards one, expected inflation under an independent central

bank should increase. As a result, the estimated causal effect of political pressures should increase. In contrast, evidence that the propensity to peg is unrelated to political pressures would support Model 2 and suggest that the substitutability of monetary and fiscal policy mitigates the effect of political pressures on the choice of monetary institutions.

Evidence in support of Model 1 would support the idea that the effect of political pressures on institutional substitution is key to understanding the choice of monetary institutions. Evidence in support of Model 2 would support the idea that the existence of close policy substitutes requires us to fundamentally rethink the way political pressures influence the choice of monetary institutions (Hallerberg, this volume) .

3.2 Monetary and Fiscal Policies

As noted above, both models yield the same predictions about monetary policy, and Model 1 is mute on fiscal policy. Since the policy sub-game of Model 2 is identical to the model in Clark and Hallerberg 2000, their empirical test is relevant here. The model predicts that monetary policy will be tied to political pressures if and only if the exchange rate is flexible and the central bank is not independent. The model also predicts that fiscal policy will be tied to political pressures if and only if the exchange rate is fixed. Consistent with the two dominant models of the political control of the economy, Clark and Hallerberg examine both partisan and electoral pressures to push growth above the natural rate. In the former case, we would expect to find a context-dependent correlation between policy instruments and the ideological orientation of government. In the latter case, we should expect to find a context-dependent correlation between policy instruments and elections. Using time-series cross-sectional data from OECD countries, Clark and Hallerberg (2000) and Clark (forthcoming) find a link between elections and the money supply when the exchange rate is flexible and the central bank is not independent (an institutional combination found in the UK for much of the post-Bretton Woods period) but not when the central bank is independent (as in the U.S. or Germany) or when the exchange rate is fixed (which has been the case in most Western European and developing countries in the post-War era). They do, however, find a link between elections

and government spending when the exchange rate is fixed. Hallerberg et.al., (2002) find very similar results using time-series cross-sectional data from a set of Eastern European countries. In sharp contrast, Clark and Hallerberg (2000) find no evidence of context-dependent partisan cycles in monetary and fiscal policies in OECD countries. Clark (Forthcoming) argues that there is little evidence of partisan differences in monetary and fiscal policy - context-dependent or otherwise. Together these results suggest that the relevant political pressures with respect to monetary and fiscal policy probably operate similarly on incumbents of all political stripes and are most keenly felt in the period just prior to elections. Governments respond to this pressure by adopting expansionary policies before elections whenever the combination of monetary institutions leaves at least one policy instrument in their hands. Evidence that incumbents use monetary policy for electoral purposes under some institutional arrangements and fiscal policy under others suggests that they view these policy instruments as substitutes.

3.3 Macroeconomic Outcomes

Models 1 and 2 yield somewhat different predictions about the effects of the equilibrium policies on macroeconomic outcomes. Model 1 predicts that economic growth should be tied to political pressures if and only if the exchange rate is flexible and the central bank is independent. Model 2, in contrast, predicts that, since fiscal policy can be substituted when incumbents lose control of monetary policy, political pressures should influence macroeconomic outcomes except when the incumbent controls neither macroeconomic policy instrument. This is the case when the exchange rate is flexible and the central bank is independent (as in the United States). Clark (forthcoming) evaluates empirical predictions equivalent to those derived from the policy sub-games of both of the models presented here. Note, the models differ most with respect to their predictions about the effects of political pressures on growth when the exchange rate is fixed. While model 1 predicts that the loss of national monetary policy autonomy that occurs under fixed exchange rates and mobile capital is sufficient to sever the link between political pressures on incumbents and macroeconomic outcomes. In contrast, model 2 predicts that the link between political pressures and macroeconomic outcomes is maintained under fixed exchange rates because elected officials can

use fiscal policy to respond to such pressures (as is the case in the member countries of the Economic and Monetary Union in Europe).

Clark (Forthcoming) presents evidence that is more consistent with Model 2. Consistent with both models he finds evidence of a link between growth and unemployment and the electoral calendar when the exchange rate is flexible and the central bank is dependent. But consistent only with Model 2, he finds evidence of a tighter link between the electoral calendar and macroeconomic outcomes when the exchange rate is fixed than when it is allowed to fluctuate. Echoing Clark and Hallerberg's results for policy instruments, Clark finds very little systematic evidence of a link between the ideological orientation of government and macroeconomic outcomes.

3.4 Conclusion

A standard argument for the benefits of fixed exchange rates and/or central bank independence is that these institutions help policymakers overcome the time consistency problem which creates an inflationary bias when monetary policy is under the discretionary control of policymakers. Policymakers in such circumstances are unable to resist the temptation to enact a policy that is inconsistent with their optimal plan. An institutional fix is the only way out of this inter-temporal dilemma. A mechanism, much like the ropes that bound Odysseus to the mast and the wax that shielded the ears of his oarsmen from the song of the sirens, must be constructed to force the policymaker to implement the optimal plan.

What standard economic treatments do not explain, however, is why the ex ante existence of such a rule would change the ex post behavior of the policymaker. These institutional fixes are reasonable responses to the time consistency problem as originally formulated, but the original formulation of the problem contained a key assumption, the relaxation of which calls into question the feasibility of each of the institutional fixes. In order to establish the generality of the time consistency problem, Kydland and Prescott, and others that followed, started with the assumption that the policymaker in question has precisely the same goals as society in general. In effect, they were saying, "even if we found ourselves in the enviable position of having leaders that wanted only what was best for us, discretionary policy could not produce

optimal outcomes.” While this made for a “hard case” for the existence of time consistency problems, it made for an “easy case” for their solution. If the existing institutional arrangement leads the benevolent dictator to behave in a sub-optimal manner, it is reasonable to expect the benevolent dictator to design an institution that removes such “perverse” incentives. If central bank independence or fixed exchange rates can be conceived as embodying, or at least facilitating, such institutional fixes, their occurrence can be explained as a rational response to the time consistency problem.

But if the designers of institutions are not benevolent social planners but, instead, are survival maximizing politicians, and solutions for the time inconsistency problem of monetary policy require these politicians to forfeit control of monetary policy instruments that can help them survive in office, it is not obvious that they would ever choose to increase central bank independence or peg the exchange rate. But both models presented in this paper agree that under a wide range of conditions incumbents would choose to forfeit their control over monetary policy in at least one of these ways. Model 1 predicts that a wide range of incumbents will choose either to peg the exchange rate or enhance central bank independence (or both) in order to avoid the inflationary consequences of politically motivated monetary policy. Model 2 predicts that all incumbents will choose to peg the exchange rate in order to use fiscal policy to hit their growth target. In addition, Model 2 produces a number of hypotheses related to the effect of political pressure on macroeconomic policy and outcomes which are consistent with existing observations based on the electoralist model.

One other implication of these models is worth mentioning. In both models incumbents use whatever instruments they have available to manipulate the economy for survival-maximizing reasons. Both models also point to instances where incumbents would prefer to forfeit their ability to act in this way. Thus, even though incumbents are willing to forfeit instruments that allow them to control the economy in a politically motivated manner at the institutional design stage, they aggressively use these instruments if they inhabit institutions that allow them to do so. This result strongly suggests that institutions are not merely endogenous to the preferences incumbents hold, they have an independent effect on incumbent behavior.

Appendix : Derivation of proposition 1

The game is solved by backwards induction.

The central banker observes the incumbent's choice of monetary institutions and chooses an inflation rate that minimizes her loss function. The central banker's loss function is:

$$L_{cb} = \begin{cases} (y - k)^2 + \pi^2 & \text{if } Dependent \\ (y - 1)^2 + \pi^2 & \text{if } Independent \end{cases}$$

And the short term Phillips curve depends on the incumbents choice of exchange rate regime. Specifically:

$$y = \begin{cases} y^n + \mu(\pi - \pi^e) & \text{if } Flexible \\ y^n & \text{if } Fixed \end{cases}$$

Equilibrium policy is determined by plugging the appropriate Phillips curve into the appropriate loss function, differentiating with respect to π , setting equal to zero and solving for π . The resulting, context dependent, monetary policies are displayed in table A1.

A1. *Equilibrium monetary policies under alternative structural conditions*

| | | |
|--------------------|------------------------------------|--------------|
| | Exchange Rate is: | |
| Central Bank is: | <i>Flexible</i> | <i>Fixed</i> |
| <i>Independent</i> | $\pi = \frac{1}{2}\pi_I^e$ | $\pi = 0$ |
| <i>Dependent</i> | $\pi = \frac{1}{2}(k - 1 + \pi^e)$ | $\pi = 0$ |

The incumbent chooses a set of monetary institutions that is a combination of the exchange rate regime (*Fixed*, *Flexible*) and the relationship between the central bank and the government (*Independent*, *Dependent*) so as to minimize his loss function:

$$L_i = (y - k)^2 + \pi^2$$

The incumbent does so by anticipating the growth and inflation outcomes implied by the context dependent equilibrium monetary policies in table A1. Inflation is determined directly by monetary policy, growth outcomes are produced by substituting equilibrium inflation rates in table A1 into the appropriate context dependent Phillips curve. Equilibrium growth rates are presented in table A2.

A2. *Equilibrium growth outcomes under alternative structural conditions*

| | | |
|--------------------|--------------------------------------|--------------|
| | Exchange Rate is: | |
| Central Bank is: | <i>Flexible</i> | <i>Fixed</i> |
| <i>Independent</i> | $y = 1 + \frac{1}{2}\pi_I^e$ | $y = 1$ |
| <i>Dependent</i> | $y = 1 + \frac{1}{2}(k - 1 + \pi^e)$ | $y = 1$ |

The incumbent's evaluation of inflation and growth outcomes can be seen by substituting these outcomes into the incumbents loss function. For the reader's convenience, the loss incurred by the incumbent under each combination of context-dependent inflation and growth outcomes are listed in table A3.

Table A3. *Incumbent's equilibrium losses under alternative structural conditions*

| | | |
|------------------|---|--------------|
| | Exchange Rate is: | |
| Central Bank is: | <i>Flexible</i> | <i>Fixed</i> |
| | $(1 + \frac{1}{2}\pi_I^e - k)^2 + (\frac{1}{2}\pi_I^e)^2$ | $(1 - k)^2$ |
| <i>Dependent</i> | $(1 + \frac{1}{2}(k - 1 + \pi^e) - k)^2 + (\frac{1}{2}(k - 1 + \pi^e))^2$ | $(1 - k)^2$ |

Note that the loss generated under a fixed exchange rate and an independent central bank are identical to those generated under a fixed exchange rate with a dependent central bank. Consequently, the incumbent will always be indifferent between these two institutional combinations. The incumbents choice comes down to a choice, effectively, between three institutional combinations: a flexible exchange rate with a dependent central bank (combination A), a flexible exchange rate with an independent central bank (combination B), or a fixed exchange rate regime (combination C). I will refer to the losses associated with each of these combinations as L_A , L_B , and L_C , respectively.

A fixed exchange rate is chosen when it produces a smaller loss than a flexible exchange rate with a dependent central bank, $L_C < L_A$ and a smaller loss than a flexible exchange rate with an independent central bank, $L_C < L_B$. From table A3, the first of these two conditions is met when

$$(1 - k)^2 < (1 + \frac{1}{2}(k - 1 + \pi^e) - k)^2 + (\frac{1}{2}(k - 1 + \pi^e))^2$$

which is the case whenever $1 - k < \pi^e$ and since, by assumption $k > 1$ and $\pi^e \geq 0$ this is always true. Thus choosing a flexible exchange rate with a dependent central bank is a strictly dominated strategy. Incumbents will always choose an institutional combination that involves some type of monetary commitment. Consequently, the incumbents choice is between a fixed exchange rate and an independent central bank with a flexible exchange rate. He chooses the former when $L_C < L_B$ or , when

$$(1 - k)^2 < (1 + \frac{1}{2}\pi_I^e - k)^2 + \frac{1}{2}\pi_I^{e2} \quad (5)$$

After some algebra this simplifies to $2(k - 1) < \pi_I^e$.

Appendix 2: Examination of robustness claims regarding Model 1

In the section entitled extension, I argue that the assumption in Model 1 that the actors place the same weight on hitting their inflation targets as they do on hitting their growth targets is not very restrictive. This appendix is devoted to providing detailed support for that claim. Specifically, I will show that a) the choice involving the second institutional comparison never depends on the weight the actors place on hitting their inflation target; b) there are a wide set of conditions under which the first institutional comparison does not depend on the weight the actors place on hitting their inflation target; and c) even when the first institutional comparison does depend on the weight the actors place on hitting their inflation target; the equilibrium choice described by proposition one is sustained under a wide range of such weights. To do so, I will solve a model that is identical to Model 1 except that the weight that the actors place on hitting their inflation target, relative to hitting their growth target, is $\alpha \geq 0$. In such a model, the incumbent's

loss function is:

$$L_i = (y - k)^2 + \alpha\pi^2 \quad (6)$$

As before, the central banker's loss function is the same as the incumbents, unless the central bank is independent, in which case the central banker's target growth rate (k) equals 1. The process for deriving equilibrium inflation and growth rates are exactly as described in Appendix One. These result in the context dependent losses described in table A4.

A4. *Incumbent's equilibrium losses under alternative structural conditions*

| | Exchange Rate is: | |
|--------------------|--|--------------|
| | <i>Flexible</i> | <i>Fixed</i> |
| Central Bank is: | | |
| <i>Independent</i> | $(1 + \frac{\alpha}{1+\alpha}\pi_I^e - k)^2 + \alpha(\frac{1}{1+\alpha}\pi_I^e)^2$ | $(1 - k)^2$ |
| <i>Dependent</i> | $(1 + \frac{\alpha}{1+\alpha}(k + \pi^e) - k)^2 + \alpha(\frac{1}{1+\alpha}(k - 1 + \pi^e))^2$ | $(1 - k)^2$ |

The chooses to peg if He

$$(1 + \frac{\alpha}{1+\alpha}\pi_I^e - k)^2 + \alpha(\frac{1}{1+\alpha}\pi_I^e)^2 < (1 - k)^2 \quad (7)$$

which is the case when $2(k - 1) < \pi^e$. Thus, his comparative evaluation of a fixed exchange rate and a flexible exchange rate with an independent central bank does not depend on the weight he places on hitting his inflation target (α).

The equilibria described in Proposition 1, however, also depends on the fact that choosing a flexible exchange rate with a dependent central bank is a dominated strategy. I show in appendix 2 that when $\alpha = 1$ this is always true. But is it true for all $\alpha \geq 0$? Choosing a flexible exchange rate with a dependent central bank would remain a dominated strategy if

$$(1 + \frac{\alpha}{1+\alpha}\pi_I^e - k)^2 + \alpha(\frac{1}{1+\alpha}\pi_I^e)^2 < (1 - k) \quad (8)$$

for all values of α , k , and π_I^e . Inequality (8) is true when

$$\frac{k^2 - \pi_I^{e2} - 1}{k(2 - k) + \pi_I^e(2 + \pi_I^e)} < a \quad (9)$$

And if this were true for all values of the parameters, we could say that anything said about Model 1 in the text is completely robust. Unfortunately, this is not the case. I will show, however, that it is true for a wide range of plausible values for these parameters.

First, if (9) is true when $\alpha = 0$, then it is true for all values of α greater than zero. Thus, (9) is true for all values of α when the numerator is negative or when the denominator is negative, but not both. The former is true whenever $p > \sqrt{k^2 - 1}$. (all combinations of inflationary expectations and political pressures above the top curve in figure A1). The latter is true if and only if

$$p < \frac{-2 \pm \sqrt{(4 + 8k + 4k^2)}}{2} \quad (10)$$

(all combinations of inflationary expectations and political pressures below the bottom curve in figure A1). Consequently, choosing a flexible exchange rate and a dependent central bank is a dominant strategy for all combinations of inflationary expectations except those falling between the two curves in figure A1. In that range, the results of Model 1 depend on the weight the actors place on hitting their inflation target.

Figure A2 plots the relationship between critical α and expected inflation at some representative levels of political pressure. Thus, when political pressures are almost entirely absent ($k = 1.1$) the critical value of α is approximately zero when inflationary expectations are low ($\pi^e = .5$). Substantively, this means that when inflationary expectations and political pressures are both low, the loss experienced by the incumbent is lower when the exchange rate is fixed, than when it is flexible and the central bank is not independent - *even if the incumbent places little or no weight on hitting his inflation target*. If expected inflation is held constant and political pressures increase enough to induce the incumbent to have a growth target about 50% higher than the natural rate of growth ($k = 1.5$) then the incumbent does better under a peg only if the weight placed on hitting his inflation target is about .75

or greater (when $\alpha=.75$ the incumbent cares more about hitting his growth target than hitting his inflation target). If, while holding inflationary expectations constant, political pressures are allowed to increase further to the point where the incumbent has a growth target about twice the natural rate, then inequality (9) is true only when the incumbent places three times the weight on hitting his inflation target as he does in hitting his growth target. In all cases, however, as inflationary expectations increase, the critical value of α moves toward zero and eventually becomes negative.

It is easy to see, therefore, that Model 1's assumption that $\alpha=1$ is restrictive only in the cases where political pressure is high and expected inflation is low. Since expected inflation should be a function of actual inflation and dependent central bankers are expected to increase inflation in response to political pressures, the combination of strong political pressures and low expected inflation should be rare. Thus, the conclusions in the text based on Model 1 should apply under a wide range of real world conditions.

Appendix 3: Derivation of Proposition 2

The actor's loss functions are the same as in model one. The crucial difference between the models is that fiscal policy, as well as monetary policy, can influence the growth rate in Model 2. The incumbent moves first by choosing institutions, as above, and then choosing a fiscal policy (thought of as a change in net government spending). The central banker responds by setting monetary policy. Specifically, the context dependent expectations enhanced Phillips curve becomes:

$$y = \begin{cases} y^n + \mu(\pi - \pi^e) & \text{if } Flexible \\ y^n + \phi g & \text{if } Fixed \end{cases}$$

Once again, the game is solved by backwards induction. The central banker chooses an equilibrium monetary policy as in model 1, except that now it is also a response to fiscal policy. The incumbent anticipates this response when formulating its fiscal policy. In general, the incumbent sets fiscal policy equal to:

$$g = \frac{1}{\phi} [y^n(k-1) - \mu(\pi - \pi^e)]$$

and the central banker responds by setting inflation at:

$$\pi = \frac{1}{\mu + \frac{\alpha}{\mu}} [\mu\pi^e + y^n(k-1) - \phi g]$$

These policies, of course, depend on institution context. Accordingly, table A4 lists the context dependent equilibrium policies.

A4. Equilibrium monetary and fiscal policies under alternative structural conditions

| | | | |
|------------------|--------------------|--|--------------------------|
| | | Exchange Rate is: | |
| | | <i>Flexible</i> | <i>Fixed</i> |
| Central Bank is: | <i>Independent</i> | $g = 0$ $\pi = \frac{1}{1+\alpha}\pi^e$ | $g = k - 1$ $\pi = 0$ |
| | <i>Dependent</i> | $g = 0$ $\pi = \frac{1}{1+\alpha}(\pi^e + k - 1)$ | $g = k - 1$ $\pi = 0$ |

Substituting context-dependent equilibrium policies into the Phillips curve determines growth outcomes. These, are summarized below.

A5. Equilibrium growth outcomes under alternative structural conditions

| | | | |
|------------------|--------------------|---|--------------|
| | | Exchange Rate is: | |
| | | <i>Flexible</i> | <i>Fixed</i> |
| Central Bank is: | <i>Independent</i> | $y = 1 + \frac{\alpha}{1+\alpha}\pi_I^e$ | $y = k$ |
| | <i>Dependent</i> | $y = 1 + \frac{1}{1+\alpha}(k - 1 + \alpha\pi^e)$ | $y = k$ |

A6. Equilibrium losses under alternative structural conditions

| | | | |
|------------------|--------------------|---|--------------|
| | | Exchange Rate is: | |
| | | <i>Flexible</i> | <i>Fixed</i> |
| Central Bank is: | <i>Independent</i> | $(1 + \frac{\alpha}{1+\alpha}\pi_I^e - k)^2 + \alpha(\frac{1}{1+\alpha}\pi_I^e)^2$ | 0 |
| | <i>Dependent</i> | $(1 + \frac{1}{1+\alpha}(k - 1 + \alpha\pi^e) - k)^2 + \alpha\frac{1}{1+\alpha}(\pi^e + k - 1)^2$ | 0 |

It is readily apparent that the incumbent is able to achieve both of his targets under a fixed exchange rate. Thus, unless it can reduce its loss to zero under one of the flexible exchange rate regimes, the incumbent always does better under a peg. And, since his loss under a flexible exchange rate with either a dependent or an independent central bank could equal zero only if $1 - k = 0$, this is never the case.¹⁰ The incumbent always does better with a peg if it can supplement its choice of the combination of monetary institutions with a fiscal policy of its choosing.

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¹⁰Since $k > 1$ by assumption, $1 - k = 0$ can not be true.

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Figure 1 The effect of expected inflation on the incumbent's losses under a flexible exchange rate with an independent central bank (with political pressures set to $k=2$)

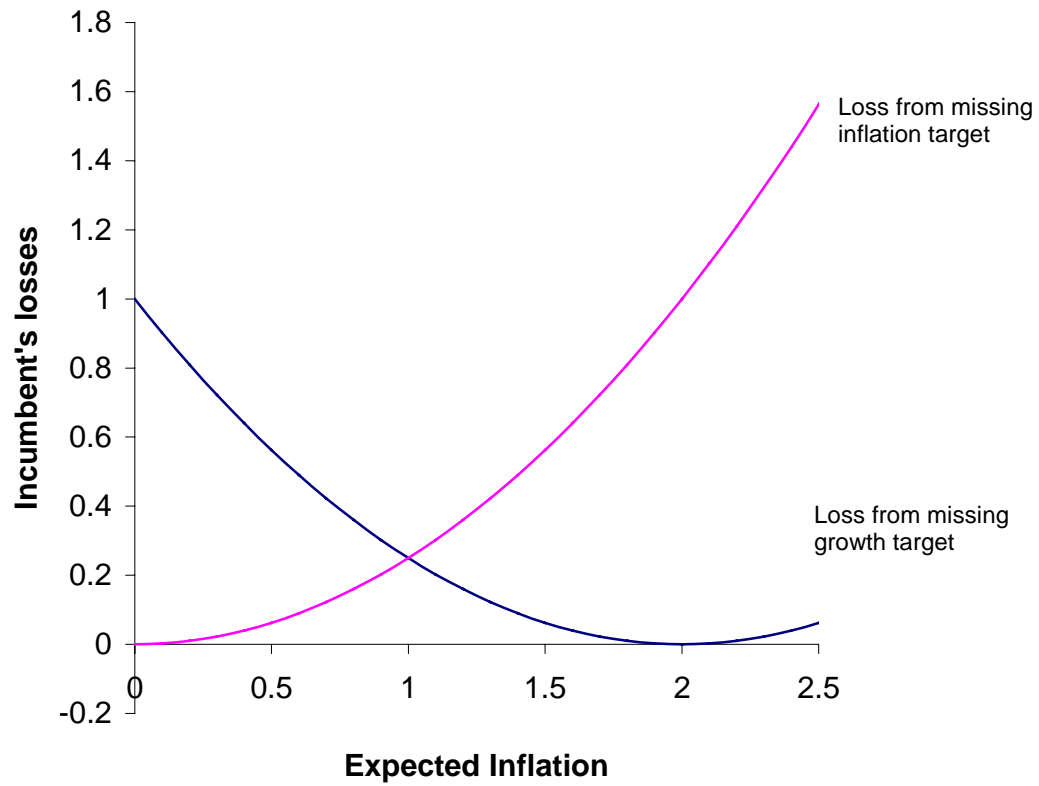


Figure 2 The effect of expected inflation on the incumbent's losses under alternative monetary commitments (with political pressures set to $k=2$)

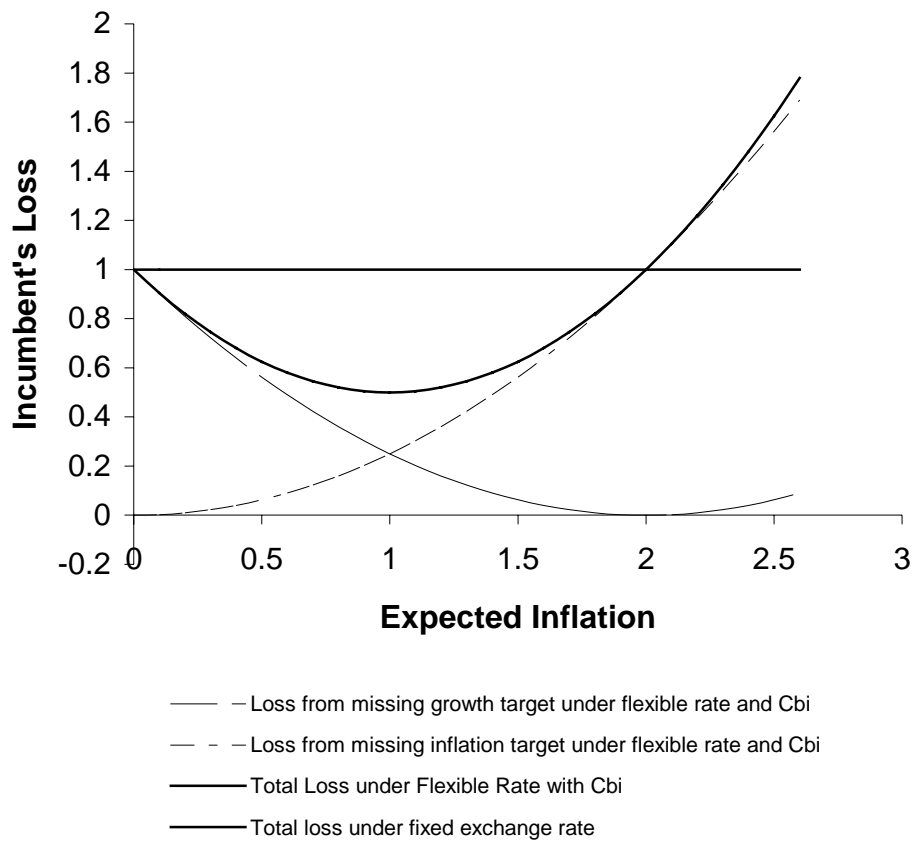


Figure 3 The effect of expected inflation on the incumbent's losses under alternative monetary commitments (with political pressures set to $k=1.5$)

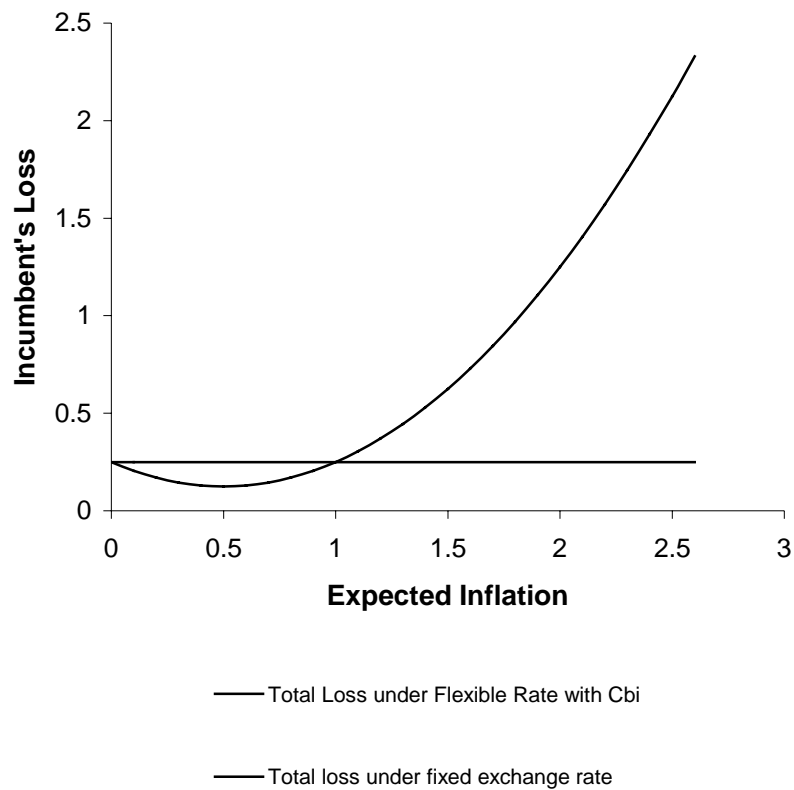


Figure 4 Relationship Between Expected Inflation and Political Pressures

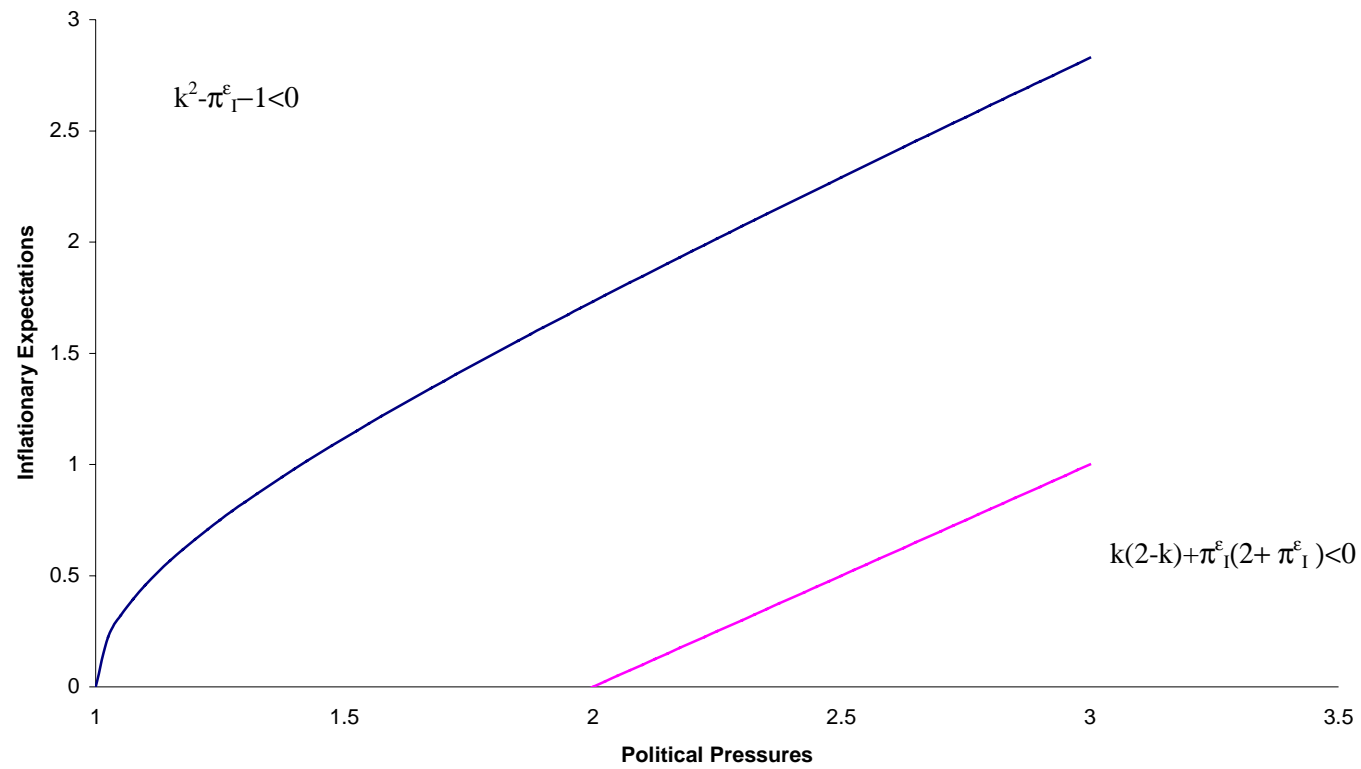


Figure A2. The relationship between the necessary weight placed on the incumbent's inflation target for a fixed exchange rate to be preferred to a flexible exchange rate with a dependent central bank, as a function of expected inflation (under a flexible exchange rate and a dependent central bank) and political pressures

