Measurement issues in political economy

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Chapter 4

Who creates political business cycles: should central banks be blamed?*

4.1 Introduction

There are two principal reasons why central banks are independent. First, the inflationary bias is reduced, provided that the central bank is more conservative than the government. Many empirical studies provide evidence for that.[1] Second, "the most obvious advantage a fully independent central bank has is that of not being influenced by electoral deadlines" (Muscatelli, 1998). That the incumbent government may be inclined to stimulate the economy before elections to enhance re-election probabilities is well-known, see Alesina, Roubini and Cohen (1997) for an overview. Are central banks also influenced by electoral deadlines? Put differently, if we observe political business cycles (PBCs) in macroeconomic variables, such as unemployment and the growth rate, who is responsible for creating them – and who should or should not be blamed?

Surprisingly, the empirical literature has little to say about the exact role of governments and central banks when it comes to PBCs. Worse, in most previous studies different institutional features have largely been neglected. Often the scope for electorally-motivated monetary policies is reduced, since national or international restrictions bind central bankers. In a regime of fixed exchange

*This chapter is based on Leertouwer and Maier (2001) and Leertouwer and Maier (2002).

[1] See Eijffinger and de Haan (1996) and Berger et al. (2001) for overviews. Posen (1998), however, challenges this view by providing evidence that a higher degree of central bank independence does not reduce disinflation costs.

rates, for example, opportunistic policies are less likely to occur than in a flexible exchange rate system. Similarly, independent central banks are less likely to be involved in electorally motivated policies than central banks that are under the spell of the government. The restricting effects of these institutional features are recognized in economic theory, yet empirical papers on PBCs do not explicitly control for them.

Clark et al. (1998) argue that common cross-country studies of PBC models may be seriously flawed since they do not account for institutional differences that constrain national policymakers.[2] However, these authors only examine economic outcomes, namely output growth and unemployment. Although these variables are likely to be influenced by monetary policy, there are a number of other influences that may offset or reinforce the impact of monetary policy. Furthermore, the rational political business cycle model predicts that policymakers manipulate instruments while the effects on outcomes are less certain.

This chapter focuses on policy outcomes for which the central bank *can* be held responsible, namely the short-term interest rate. We can thereby answer the question of whether the central bank can be blamed for active opportunistic behavior. Our sample runs from the 1960s until 1997 and consists of monthly data for 14 OECD countries.

The results are simple and strikingly robust. The short-term interest rate shows hardly any sign of a PBC. We thus reject the hypothesis that central banks have actively been engaged in opportunistic behavior.

The outline of this chapter is as follows. In the next section, we explain the PBC models in more detail and show how national or international constraints can prevent politicians from using monetary policy for short-sighted purposes. Our estimation results are presented in sections 4.3 and 4.4. In section 4.5, we summarize our findings.

4.2 When do political business cycles occur?

4.2.1 Electoral pressure on the economy

A test for the existence of PBCs requires the following: first, we need a theoretical basis to explain why such short-sighted behavior might be pursued by the government or the central bank. Second, one has to account for restrictive institutional features that constrain implementation of such a policy. And finally, we need an appropriate measure for the central bank's policy stance.

[2] Clark and Hallerberg (2000) formulate this idea in terms of a theoretical model.

The theoretical framework

The first model on PBCs has been developed by Nordhaus (1975). It is based on the assumptions that politicians care only about their re-election and that voters judge the incumbent's performance by the state of the economy. The economy is characterized by an exploitable Phillips-curve and the incumbent can directly control the rate of inflation. Nordhaus assumes that the government is responsible for both monetary and fiscal policy.

Under the assumption of adaptive or non-rational expectations, the incumbent government has an incentive to pursue expansive economic policies before elections to enhance its probability of re-election by lowering the unemployment rate. After elections, the government has to reduce inflation with contractionary monetary policies, thereby raising the unemployment rate, before switching to expansionary policies again as the next election approaches. Due to the poor memory of the voters, this cycle might be repeated endlessly.

Such behavior is called 'opportunistic'. The testable prediction of Nordhaus' model is that before elections the unemployment rate drops due to expansionary policies, while after elections inflation is high and contractionary measures are taken. Similar patterns apply to economic instruments.

A common criticism has concerned the assumption of adaptive expectations. This has led to a reformulation of the model by Rogoff and Sibert (1988) who expand the framework to a 'rational political business cycle model' (RPBC). They assume that voters lack information about the competence of the politicians and in order to appear 'competent', policymakers manipulate policy instruments. The RPBC model predicts visible cycles in economic instruments, and short, possibly irregular cycles ('blips') in economic variables such as the inflation rate or the unemployment rate.

Restrictive institutional features

The above models make the simplifying assumptions that (a) the central bank and the government pursue similar policies, and (b) policymakers have sufficient national autonomy to implement their policies. Both assumptions need not hold in reality. The following two types of constraints may prevent governments from implementing an opportunistic policy:

National constraint If the central bank enjoys a low degree of statutory independence, then it is likely that pressure is applied such that monetary policy follows the opportunistic pattern set by fiscal policy. In this case, electoral cycles may be observed in monetary instruments. However, central

banks may be independent. If we abstract from the idea that central banks have their own interests, due to which they prefer one government over another, then we should not expect them to behave opportunistically.[3] After all, one of the main arguments for making a central bank independent is that this enables decisions to be based on a longer time-horizon, which rules out short-sighted behavior. Still, even for central banks with a high degree of statutory independence, it might be rational to comply to the government's wishes, as independence might be threatened by a change in the central bank law. If this is the case, then independent as well as dependent central banks have an incentive to engage in PBC behavior. This argument has been put forward by Frey and Schneider (1981) and Berger and Schneider (2000).

International constraint Economic theory tells us that, under a regime of fixed exchange rates and high capital mobility, the scope for autonomous economic policies is reduced. Following the worldwide increase in capital mobility in the 1970s, we can thus expect more restricted opportunities for implementing a national monetary policy for countries that have either been member of a fixed exchange rate regime (such as the Bretton Woods system or the European Monetary System EMS), or that have pegged their currency unilaterally. Participation in a fixed exchange rate regime restricts national economic policies and restricts opportunities for PBCs.

Measuring monetary policy

Still unsolved is the question how monetary policy should be measured. Clearly unemployment or growth rates cannot be solely attributed to government or central bank policies, as has been suggested in Alesina and Roubini (1992), Soh (1986) and the original paper from Nordhaus (1975). Previous studies on PBCs in monetary policy have in general focused on monetary aggregates. Examples of this approach are Alesina, Roubini and Cohen (1997), Allen and McCrickard (1991), or Vaubel (1997), who all use M1. A survey of evidence for the US can be found in de Haan and Gormley (1997). Still, a PBC in, say, M1, does not necessarily imply active central bank behavior: if, for instance, the incumbent government uses expansionary fiscal policy before elections, and the central bank tolerates this behavior, then obviously a monetary aggregate must reflect preelectoral manipulation. Berger and Woitek (1997, 2001) have looked at the German case. They find cycles in M1, which could indicate opportunistic behaviour

[3] In Vaubel (1997) it is assumed that the central bank follows its own interests.

of the Deutsche Bundesbank. However, their findings indicate that the Bundesbank did not target a monetary aggregate, but rather economic variables such as inflation or output. Therefore, Berger and Woitek conclude that the cycle in M1 was demand-driven rather than supply-driven. However, it would be unfair to (fully) blame the central bank, as the PBC was created by the government. To answer the question of whether central banks regularly abuse monetary policy, evidence should be found in monetary instruments. This has the additional advantage that the distinction between PBC and RPBC no longer matters: both models predict cycles in policy instruments. Only under the assumption of non-rational expectations do these cycles translate into policy outcomes.

There is, however, one problem. It is nearly impossible to determine a 'key variable' that fully characterizes the current monetary policy stance. For most countries, focusing on one single instrument is not possible. In Germany, for example, different instruments have been used over time, and the relative weight of these instruments has changed considerably. Open market operations, for example, which were the most powerful monetary tool in the late 1980s and 1990s, were fully developed only in 1985. For most countries *the* monetary instrument does not exist.

Still, there is a possibility to circumvent these problems. The direction of monetary policy is reflected in the behavior of interest rates, as monetary instruments either directly or indirectly influence interest rates. Therefore, interest rates can be viewed as capturing the 'net effect' or the 'sum' of all monetary instruments. A similar view has been taken in Maier (2000).

There is a second argument why the choice of an interest rate might be appropriate. If politicians attempt to influence a central bank before elections, the political request will in most cases not be formulated in terms of a monetary aggregate ('increase the growth rate of M1!'), but in term of interest rates ('lower the interest rate!'). This point has first been made by Johnson and Siklos (1994), who use a short-term interest rate to estimate a VAR model.

What interest rate pattern can we expect before elections? If we assume a standard IS/LM model, three possibilities arise: first, only expansionary monetary policy is used and the LM-curve shifts to the right. Then we would expect the interest rate to fall before elections and (correctly) infer that the central bank caused the PBC.

Second, if only expansionary fiscal policy is used, the IS-curve shifts to the right and we would expect an increase in the interest rate before elections. Both cases can be easily distinguished. There is a third case that is more difficult: imagine a situation where monetary policy accommodates expansionary fiscal

policy. Then, both curves shift to the right. If accommodation is perfect, the interest rate could remain unchanged. A similar pattern could be observed if both the government and the central bank try to create a PBC in such a way that the combination of both effects on the interest rate 'cancels out', or if the central bank follows an interest rate rule (horizontal LM-curve). In these cases we have an identification problem.

The above considerations show that the use of interest rates as an indicator of PBCs is not without caveats. In practice, however, these problems are less serious: all available evidence indicates that the third case is highly unlikely. In order to show up in a pooled regression, this case would require a PBC in fiscal policy in all countries in our sample. Such a cycle has for most countries been rejected by Alesina et al. (1997).

Therefore we have the following expectations: if interest rates remain unchanged (or go up) prior to elections, central banks have refrained from opportunistic manipulation. If the interest rate decreases before an election, we conclude that the central bank has *actively created* a PBC. This is reflected in a comment by Goodhart (1994, pp. 1426-27), who claims that interest rates are manipulated by politicians:

> "... those in charge of central banks generally regard monetary base control as a non-starter. The instrument which they can, and do, control is the short-term money market rate.
>
> Politicians ... suggest that an electorally inconvenient interest rate increase should be deferred, or a cut 'safely' accelerated. This political manipulation of interest rates .. leads to a loss of credibility..."

Few researchers have tested whether this claimed influence on interest rates does indeed exist. In this chapter we use short-term interest rates that are tightly controlled by the central banks and reflect their intentions.[4] If PBCs exist and if they have been actively created by central banks, they should be visible in the short-term interest rates.

4.2.2 Institutional constraints

National constraints

To account for national constraints, we need to classify the degree of statutory central bank independence in various countries. First, we use the index of CBI

[4]The German Bundesbank has considered the day-to-day rate as a 'key indicator' (Deutsche Bundesbank, 1995).

developed by Cukierman, Webb and Neyapti (1992), since it is the indicator most commonly used in the empirical literature. As an alternative, we apply the FS indicator that was developed in the previous chapter. These indicators are available for four subsets of the sample period, namely 1960–1971, 1972–1979, 1980–1989 and 1990–1997.

We divide the countries into two groups: those having scores above the median, which we consider as 'independent central banks', and those with scores below the median ('dependent central banks'). Countries ranked above the median value are marked with '+' (i.e. national constraints are present) and countries ranked below the median value with '-' (i.e. absence of national constraints). We expect this classification to give a reliable overall ranking of the degree of statutory independence: in the '+' countries PBCs are not likely to occur in monetary policy, as these countries have an independent central bank. Countries with a '-' have a central bank with a low degree of statutory independence and if PBCs are to be found, we expect them there. The classification, for the different time periods, is shown in table 4.1.

Table 4.1: Presence of national constraints

	1960–1971		1972–1979		1980–1989		1990–1997	
Country	CWN	FS	CWN	FS	CWN	FS	CWN	FS
Austria	+	+	+	+	+	+	+	+
Belgium	-	-	-	-	-	-	+	+
Canada	+	+	+	+	+	+	+	+
Denmark	+	+	+	+	+	+	+	+
Finland	-	-	-	-	-	-	-	-
France	+	+	-	-	-	+	+	+
Germany	+	+	+	+	+	+	+	+
Italy	-	-	-	-	-	-	-	-
Japan	-	+	-	+	-	+	-	+
Norway	-	-	-	-	-	-	-	-
Spain	-	-	-	-	-	-	-	-
Sweden	-	-	-	-	-	-	-	+
UK	+	+	-	-	-	-	-	-
US	+	+	+	+	+	+	+	+

From the table it is clear that the differences between the different indicators and the different time periods are small. The main difference is that CBI in Japan is classified as below-median by the CWN indicator and above-median by the FS indicator. Furthermore, if we assess the presence of a national constraint in terms of the CWN indicator, we see that the level of CBI in Belgium changes from below median until 1989 to above median in the 1990s. We also see that, in

1972, France and the UK experienced a change in CBI sufficiently large to change signs in table 4.1.[5] While CBI in the UK remains below the median value for the rest of the period, the value of France changes back to above median in the 1990s. If we use the FS indicator, we again see that central bank independence in France changes from above median to below median and back. For France, the level of CBI seems to hover around the median value. The level of CBI in Belgium and Sweden changes from below median until 1989 to above median in the 1990s. In the UK, both indicators show that the level of CBI is above the median until 1971 and below afterwards.

International constraints

Next, we examine when monetary policy could be controlled in an entirely autonomous way in the countries in our sample. Therefore, we check for participation in fixed exchange rate regimes.

Table 4.2: Participation in fixed exchange rate systems

Country	Snake	EMS	Unilateral peg
Austria	–	1995 : 01–1997 : 12	1973 : 04–1994 : 12
Belgium	1973 : 04–1978 : 12	1979 : 01–1997 : 12	–
Canada	–	–	–
Denmark	1973 : 04–1978 : 12	1979 : 01–1997 : 12	–
Finland	–	1996 : 01–1997 : 12	1977 : 01–1995 : 12
France	Intermittent	1979 : 01–1997 : 12	–
Germany	1973 : 04–1978 : 12	1979 : 01–1997 : 12	–
Italy	–	1979 : 01–1992 : 08	–
Japan	–	–	–
Norway	1973 : 04–1978 : 12	–	1979 : 01–1997 : 12
Spain	–	1989 : 01–1997 : 12	–
Sweden	1973 : 04–1976 : 12	–	1977 : 01–1997 : 12
UK	–	1990 : 10–1992 : 08	–
US	–	–	–

The 1970s mark a turning point in at least two relevant respects. First, international capital mobility has increased sharply since the 1970s. Secondly, the Bretton Woods system of fixed exchange rates collapsed in 1973. Clark et al. (1998) assume that during the Bretton Woods period capital mobility was sufficiently low for the fixed exchange rate system not to constrain monetary policy. While we generally follow their methodology in deriving the institutional constraints, we believe that capital mobility was sufficiently high before 1973 to

[5] In Clark et al. (1998), only the UK experiences a national constraint.

effectively constrain monetary policy. Therefore we interpret the Bretton Woods system as a constraint for all countries but the US, which dominated the system. Table 4.2 shows the time periods during which countries were part of a fixed exchange rate system.[6] The first two columns of table 4.2 show the participation in the Snake (the predecessor of the European Monetary System) and in the European Monetary System (EMS), respectively. The third column shows when countries have pegged their currencies unilaterally.

Italy and the UK left the EMS after the turmoil in 1992, see Deutsche Bundesbank (1993, p.93). As Germany was the anchor currency in the EMS, we do not count the EMS as a binding restraint for German monetary policy, see Lohmann (1998). Following Clark et al., we do not consider the Snake to be a binding constraint for France, as its participation was highly unstable. In table 4.3 we define the dummy variable FEX. The first column shows the periods during which countries have maintained fixed exchange rates. In other words, in these periods monetary policy autonomy is absent, and the dummy FEX has value $+1$. The second column shows when autonomous monetary policy could have been pursued ($FEX = 0$).

Table 4.3: Presence of international constraints

Country	Fixed Exchange Rates ($FEX = 1$)	No international constraint ($FEX = 0$)
Austria	$1960:01-1997:12$	$-$
Belgium	$1960:01-1997:12$	$-$
Canada	$1960:01-1973:03$	$1973:04-1997:12$
Denmark	$1960:01-1997:12$	$-$
Finland	$1960:01-1973:03$, $1977:01-1997:12$	$1973:04-1976:12$
France	$1960:01-1973:03$, $1979:01-1997:12$	$1973:04-1978:12$
Germany	$1960:01-1978:12$	$1979:01-1997:12$
Italy	$1960:01-1973:03$, $1979:01-1992:08$	$1973:04-1978:12$, $1992:09-1997:12$
Japan	$1960:01-1973:03$	$1973:04-1997:12$
Norway	$1960:01-1997:12$	$-$
Spain	$1960:01-1973:03$, $1989:01-1997:12$	$1973:04-1988:12$
Sweden	$1960:01-1997:12$	$-$
UK	$1960:01-1973:03$, $1990:10-1992:08$	$1973:04-1990:09$, $1992:09-1997:12$
US	$-$	$1960:01-1997:12$

[6] Source: Clark et al. (1998).

Summary: National and international constraints

Summarizing the above, table 4.4 shows for each country the combination of both constraints, for both measures of CBI.

Table 4.4: National and international constraints

FEX	*CBI: CWN indicator*	
	above median	below median
No autonomy	Austria, Belgium (1990–1997), Denmark	Belgium (1960–1989), Norway, Sweden
For part of period	Canada, France (1960–1971 & 1990–1997), Germany, UK (1960–1971)	Finland, France (1972–1997), Italy, Japan, Spain, UK (1972–1997)
Always autonomy	US	
	CBI: FS indicator	
	above median	below median
No autonomy	Austria, Belgium (1990–1997), Denmark, Sweden (1990–1997)	Belgium (1960–1989), Norway, Sweden (1960–1989)
For part of period	Canada, France (1960–1971 & 1980–1997), Germany, Japan, UK (1960–1971)	Finland, France (1972–1979), Italy, Spain, UK (1972–1997)
Always autonomy	US	

Only the US experienced monetary policy autonomy during the entire sample period. However, this does not pose a problem, as we find substantial variation in the other parts of the table to give us reliable estimates of the influence of fixed exchange rate systems.

In a regression analysis, we would not expect to find PBCs in countries that are constrained in either way. Clark et al. (1998) have shown this hypothesis to hold for policy outcomes, such as inflation or unemployment rates. Their approach cannot, however, reveal the precise role of central banks, since these policy outcomes are influenced by many additional factors (e.g. supply and demand shocks). If we find cycles in policy outcomes, we cannot conclude that the central bank actively creates them. For cycles in the short-term interest rate, the central bank *can* be blamed. In the next section, we conduct country-specific tests of the PBC hypothesis. In order to examine the effects of cross-national differences in the constraints, we apply panel regressions in section 4.4.

4.3 Country-specific tests

The country-specific tests we apply seek to examine whether a significant degree of covariation exists between elections and the short-term interest rate if we control for institutional restrictions. We start with a general model description incorporating changes in the international constraint. A model that incorporates changes in the national constraint is discussed later in this section. Following Alesina, Roubini and Cohen (1997), we start with the following model specification:

$$\begin{aligned} r_{it} &= \beta_{0i} + \beta_{1i}E_{it} + \beta_{2i}FEX_{it} + \beta_{3i}E_{it} * FEX_{it} \\ &\quad + \sum_{j=1}^{p} \beta_{j+3,i} r_{i,t-j} + \delta_{1i}IP_{it} + \delta_{2i}\pi_{it} + \delta_{3i}OC_t + u_{it}, \end{aligned} \tag{4.1}$$

for countries $i = 1, \cdots, N$ and time periods $t = 1, \cdots, T$. In model (4.1), r_{it} is the log of the nominal short-term interest rate. When estimating the model, using the log of the interest rate is preferable on econometric grounds: in our estimations, the disturbances u_{it} are assumed to be normally distributed, thus having positive and negative values. While the interest rate can only be positive, the log of the interest rate can take on negative as well as positive values and thereby fits the model assumptions better. It is noted, however, that the results are not affected qualitatively by the log transformation. E_{it} is the election variable, for which we use a *pre-election period* of 12 months. That is, the dummy variable E_{it} has value $+1$ in the month of a general election *and* in the eleven preceding months, and 0 otherwise. Different pre-election periods are discussed when we examine the robustness of our results. FEX_{it} is the coefficient for participation in fixed exchange rate systems as defined in table 4.3. The interaction term $E_{it} * FEX_{it}$ is also included, equaling $+1$ during electoral periods in countries that lack monetary policy autonomy. Finally, we have added three additional economic variables: industrial production IP_{it}, as a proxy for GDP growth, the inflation rate π_{it}, measured as the change in consumer prices, and a dummy variable that covers the impact of the oil crises in the 1970s (OC_t). To obtain comparable values for the different countries in our sample, we use monthly IFS data on the short-term interest rate for 14 OECD countries. The sample period starts for most countries in the 1960s and goes until 1997. Further details on the data can be found in appendix 4.A.

The interpretation of equation (4.1) is as follows: if a country does not participate in a fixed exchange rate regime and determines its monetary policy au-

tonomously, then $FEX_{it} = 0$. In this case the model is reduced to a standard PBC model:

$$\begin{aligned} r_{it} &= \beta_{0i} + \beta_{1i}E_{it} + \sum_{j=1}^{p} \beta_{j+1,i} r_{i,t-j} + \delta_{1i} IP_{it} + \delta_{2i}\pi_{it} \\ &+ \delta_{3i} OC_t + u_{it}. \end{aligned} \tag{4.2}$$

If, however, $FEX_{it} = 1$ and an international constraint is present, then the sum $E_{it} + E_{it} * FEX_{it}$ becomes important: if our argument is correct that the absence of monetary policy autonomy decreases the probability that politicians will manipulate the macroeconomy for electoral purposes, we do not expect the sum of the coefficients of $E_{it} + E_{it} * FEX_{it}$ to be significantly different from zero. To examine this, we perform a Wald test in these cases to test for $\beta_1 + \beta_3 = 0$. Note, however, that this only makes sense if the election coefficient E_{it} is significantly different from zero, otherwise PBCs cannot be found in our sample.

For all country-specific tests, the models include lagged dependent variables, the order of which (p) is determined by examining the (partial) autocorrelation function. With respect to possible stationarity of the interest rate, we adopt the approach of Bierens (1997) and take the short-term interest rates to be nonlinear trend stationary processes. To see whether the inclusion of lagged disturbances is necessary, we have performed Breusch-Godfrey serial correlation LM tests and find no evidence of serial correlation. We use White's test to check for heteroscedasticity. If necessary, a heteroscedasticity-consistent covariance matrix is used to calculate standard errors. The model parameters are estimated using OLS techniques. Although OLS estimation in autoregressive models is known to give biased results, the very large number of time periods in our models validates the use of asymptotic results. More on this subject can be found in Hamilton (1994, chapter 5).

In all tables, the significance of the estimates is marked with superindices * and ** for significance at 5% and 1%-levels, respectively. In the last two rows of table 4.5, p shows the number of lags and $\bar{R}^2$ is the adjusted R^2 value. We do not report the estimates for the lagged interest rate coefficients in the tables for reasons of clarity. The estimation results of model (4.1) are shown in table 4.5.

The results are strikingly simple: for most countries we do not find any evidence of an electoral cycle. We observe that the coefficients for inflation and industrial production are not significant in most cases. The FEX_{it} coefficient is only significant for Germany and Italy, which means that interest rates are not significantly higher or lower under a fixed exchange rate regime for all other

Table 4.5: Country-specific tests

Country	E	FEX	$E*FEX$	IP	π	p	$\bar{R}^2$
Austria	-0.319^{**}	–	–	0.182	0.496	3	0.93
Canada	0.005	–	–	-0.023	0.370	2	0.92
Denmark	0.025	–	–	0.878	2.382^{*}	4	0.79
Finland	-0.004	0.003	0.014	-0.151	0.786^{**}	3	0.98
Germany	0.001	-0.046^{*}	-0.008	-0.428	2.310	3	0.85
Italy	0.016	0.022^{*}	-0.028	0.003	0.267	2	0.98
Japan	0.025^{**}	0.016	-0.028^{*}	0.552^{*}	0.142	4	0.99
Norway	-0.024	–	–	0.279	0.813	2	0.83
Spain	0.054	-0.037	-0.001	0.142	0.289	6	0.76
Sweden	0.012	–	–	0.080	0.628	3	0.84
US	-0.006	–	–	2.479^{**}	0.698^{*}	4	0.97

countries. The negative coefficient for Germany is probably due to the reunification, the positive coefficient for Italy shows that leaving the EMS after the turmoil in 1992 has led to lower interest rates.

The PBC coefficient is insignificant for most countries, which indicates that PBCs are not visible in the short-term interest rate in most OECD countries. There are, however, two exceptions: Austria and Japan.

Austria yields a negative, highly significant coefficient, which means that the interest rate decreases before elections. This would mean that Austria, despite its relatively independent central bank, experiences a PBC. This is rather puzzling, as Austria has closely followed the German interest rate policy since the mid 1970s. Only very small differences between the Austrian and the German interest rate exist, which we could assume to be too small to be used for systematic opportunistic monetary policy.[7] An explanation could be that the significant coefficient is a statistical coincidence rather than clear opportunistic evidence. This idea can easily be verified: if we find a PBC in Austria, this would mean that the *German* central bank creates it. That is, the German Bundesbank systematically misuses its monetary policy to influence Austrian election outcomes. This seems, at the very least, highly unlikely. Indeed, this speculation is not confirmed: as can be seen in table 4.6, the election coefficient for Austria is no longer significant if we use the German interest rate as the dependent variable.

Therefore, it seems that there *were* differences between the German and the Austrian interest rate, and that they were big enough to allow opportunistic

[7]For details on the Austrian exchange rate policy see, for example, Hochreiter and Winckler (1995).

Table 4.6: Results for Austria using the German interest rate as dependent variable

Country	E_{it}	IP_{it}	π_{it}
Austria	-0.011	0.068	0.160

policies. This could be explained by the fact that Austria is very corporatistic, which could result in a relatively close cooperation between the (on the surface relatively independent) central bank and the government. Following that reasoning, a PBC in Austria does not necessarily come as a surprise, but rather shows the weakness of CBI indicators. This has been formulated by Forder (1996): 'A central bank may be independent by statute, and it is nevertheless accepted – on all sides – that the government will have its wishes implemented.' The concept of corporatism is discussed extensively in chapter 5 of this thesis.

Japan also deserves a closer look, as both the election coefficient and the FEX-election interaction term are significant. Do we have a binding constraint here in the sense that the Bretton Woods system prevented electoral cycles in Japan's monetary policy? This would be the case if the sum of the two coefficients E_{it} and $E_{it} * FEX_{it}$ is not significantly different from zero. As mentioned earlier, this hypothesis can be tested using a Wald test, the outcome of which is shown in table 4.7.

Table 4.7: Wald-test for Japan

Country	$E + E * FEX$	χ^2-Wald	critical χ^2 (5%)
Japan	-0.003	0.051	0.103

As the results in table 4.7 show, the hypothesis that the sum of E_{it} and $E_{it} * FEX_{it}$ is zero is not rejected. In other words, the constraint is binding, and the Bretton Woods system has indeed been a restriction. This, however, does not mean that the Bank of Japan used monetary policy in an opportunistic sense.

First, it is noted that the sign of the election coefficient is positive: instead of lower (as the PBC model predicts), the short-term interest rate was higher before elections. Thus, the Bank of Japan used monetary brakes before elections instead of stimulating the economy. As has been documented in the literature, Japan is a special case, since its elections are endogenous. This means that the parliament can call elections when the ruling party experiences a favorable situation. There is a broad consensus that elections are more likely to be held when economic conditions are favorable for the incumbent (see Ito and Park, 1988), which is difficult to capture in a common PBC model, see also Cargill et al. (1997).

Second, the result is not robust. In fact, only for a pre-election period of 12 months (as we use in table 4.5), the election coefficient is significant. A pre-election dummy covering a period of 18 months is insignificant, as table 4.8 shows.

Table 4.8: Results for Japan using an 18 month pre-election dummy

Country	E_{it}	FEX_{it}	$E_{it} * FEX_{it}$	IP_{it}	π_{it}
Japan	0.008	0.016	-0.018	0.571^{**}	0.124

Moreover, if we use the plain nominal interest rate instead of its log, even the election coefficient using a 12-month pre-election period becomes insignificant. Further tests using different pre-election periods confirm that the result for Japan lacks robustness.

Finally, we take a look at the country-specific results for countries that have experienced a national constraint. For Belgium, France and the UK, and for Sweden only when the FS indicator is used, the score of the CBI variable changes over time. This is captured in our second country-specific regression model:

$$\begin{aligned} r_{it} &= \beta_{0i} + \beta_{1i}E_{it} + \beta_{2i}FEX_{it} + \beta_{3i}E_{it} * FEX_{it} + \beta_{4i}CBI_{it} \\ &+ \beta_{5i}E_{it} * CBI_{it} + \sum_{j=1}^{p} \beta_{j+5,i} r_{i,t-j} + \delta_{1i}IP_{it} + \delta_{2i}\pi_{it} \\ &+ \delta_{3i}OC_t + u_{it}. \end{aligned} \tag{4.3}$$

The dummy variable CBI_{it} has value $+1$ when the level of central bank independence is above-median, and 0 otherwise. We have added an interaction term for elections and CBI, as for elections and FEX before. For the periods in which the central banks have a low degree of independence, the model reduces to that in equation (4.1). The results are presented in table 4.9.

Table 4.9: Results in case of a national constraint

Country	E	FEX	$E * FEX$	CBI	$E * CBI$	IP	π
Belgium-both	-0.002	–	–	-0.002	0.036	0.182	0.529
France-CWN	< 0.001	0.013	0.003	-0.014	0.005	-0.023	0.467
France-FS	-0.001	0.032	-0.009	-0.030	0.021	-0.017	0.534^{*}
Sweden-FS	0.021	–	–	0.019	-0.036	0.079	0.745^{*}
UK-both	-0.043	0.011	0.056	-0.034	-0.017	0.959	-0.974^{*}

Again, we do not show the results for the lagged interest rate coefficients. The number of lags for Belgium and France is $p = 2$, for Sweden $p = 3$ and for

the UK $p = 4$. The adjusted R^2 values are 0.90 for both models for Belgium, 0.97 for both models for France, 0.84 for Sweden and 0.87 for both models for the UK. None of the reported coefficients, apart from the one for inflation in some cases, is significant. This indicates that the central banks of Belgium, France, Sweden and the UK have not been engaged in creating PBCs. For the UK, similar findings have been reported by Clark et al. (1998, 2000).

Robustness checks We have performed a series of robustness checks. First, we have omitted the additional economic variables, and used the real interest rate (proxied by subtracting inflation from the nominal interest rate). This does not qualitatively change our results. Second, we have experimented with different lengths of the pre-election period. Economic theory gives no clear recommendation of how long we should expect the pre-election period to be. In the literature, periods of 12, 18 and 24 months are commonly used. We have found that our results in most cases do not depend on the length of the pre-election period. This does not hold for Austria and Japan. For Austria, the coefficient is highly significant for pre-election periods of 12 and 24 months, but not for 18 months. Also, the sign is reversed. The coefficient for Japan is only significant for a pre-election period of 12 months.

4.4 Panel data estimation

By pooling the data, we can examine the effects of cross-national differences in the national and international constraint. Since our focus is on a specific set of 14 countries instead of drawing the countries randomly from a large population, a fixed effects model is the appropriate specification here, see Baltagi (1995, p.10). By analogy to the country-specific case, it would seem natural to use an autoregressive panel data model. Before we do so, however, we examine whether this is indeed the correct specification, using the exact test for dynamics in panel data models that is described in chapter 2. Also, we test for unit roots.

4.4.1 Testing for dynamics and unit roots

The simplest dynamic panel data model with fixed effects to describe the influence of elections on the short-term interest rate is the following:

$$r_{it} = \gamma r_{i,t-1} + \alpha_i + \beta E_{it} + u_{it}, \tag{4.4}$$

where $i = 1, \cdots, N$, $t = 1, \cdots, T$, and the variables are defined as in the previous section. Data on the short-term interest rate are available for all 14 countries

from January 1975 until December 1997, so $T = 252$ and $N = 14$. To examine whether a dynamic model specification is appropriate here, we test the hypothesis $H_0 : \gamma = 0$ versus $H_1 : \gamma > 0$. As shown in chapter 2, to test for $\gamma = 0$ we use the fixed effects estimator

$$\hat{\gamma}_{FE} = \frac{r'_{-1} M_W r}{r'_{-1} M_W r_{-1}}, \tag{4.5}$$

corresponding to the augmented regression model

$$\begin{aligned} r &= \gamma r_{-1} + E\beta + Z\alpha + BE\beta^* + BZ\alpha^* + u \\ &= \gamma r_{-1} + W\theta + u. \end{aligned}$$

Here, $Z = \iota_T \otimes I_N$ and, using

$$B_0 = \begin{bmatrix} 0 & 0 \\ I_{T-1} & 0 \end{bmatrix},$$

$B = B_0 \otimes I_N$. Also, $W = (E, Z, BE, BZ)$, and θ contains all parameters except γ. Equation (4.5) can also be written as

$$\hat{\gamma}^*_{FE} = \frac{u' B' M_W u}{u' B' M_W B u}. \tag{4.6}$$

When u is a normally distributed random variable, the test statistic in (4.6) is a ratio of quadratic forms in standard normal variables, and its distribution can be assessed with great precision by simulation. Using 1000 replications, the distribution of $\hat{\gamma}^*_{FE}$ is shown in Figure 4.1.

From the figure, we find that the critical value of a one-sided test $H_0 : \gamma = 0$ versus $H_1 : \gamma > 0$ is 0.023 at the 95%-level. The value of the test statistic can be computed using (4.5) and is 0.968. The null hypothesis is therefore rejected, and a dynamic model specification is taken to be the appropriate one.

Next, we test for a unit root. The estimator for γ, under the unit root hypothesis $H_0 : \gamma = 1$, is the fixed effects estimator

$$\hat{\gamma}^{**}_{FE} = \frac{r'_{-1} M_W r}{r'_{-1} M_W r_{-1}}, \tag{4.7}$$

of the augmented regression model

$$\begin{aligned} r &= \gamma r_{-1} + X\beta + Z\alpha + B\Gamma X\beta^* + B\Gamma Z\alpha^* + u \\ &= \gamma r_{-1} + W\theta + u, \end{aligned}$$

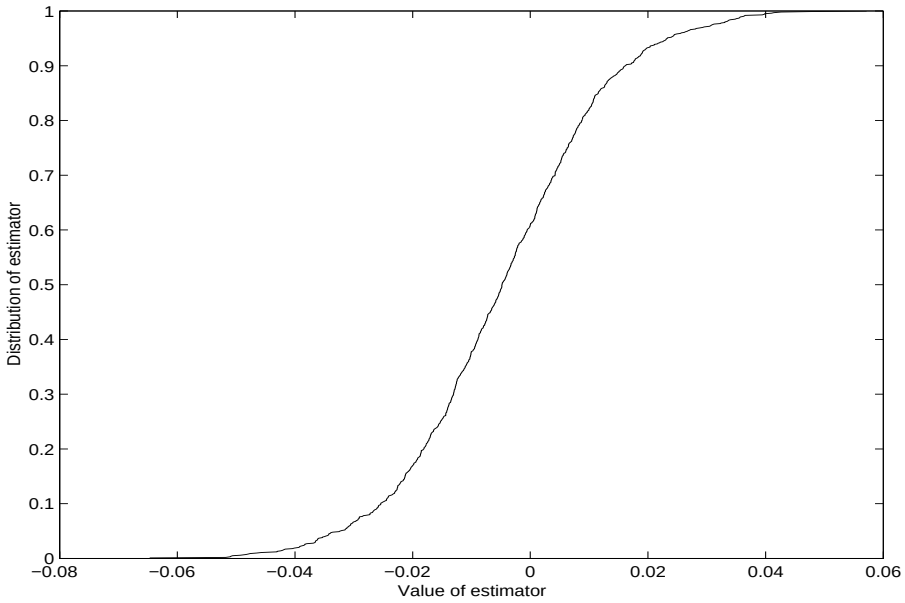

Figure 4.1: Distribution of $\hat{\gamma}^{*}_{FE}$ (y-axis) against the value of $\hat{\gamma}^{*}_{FE}$ (x-axis) under $H_0 : \gamma = 0$

where

$$\Gamma = \begin{bmatrix} 1 & & 0 \\ \vdots & \ddots & \\ 1 & \cdots & 1 \end{bmatrix} \otimes I_N.$$

The fixed effects estimator can also be written as

$$\hat{\gamma}^{**}_{FE} = 1 + \frac{u'\Gamma' B' M_W u}{u'\Gamma' B' M_W B \Gamma u}, \tag{4.8}$$

see chapter 2. Again using 1000 replications, the distribution of $\hat{\gamma}^{**}_{FE}$ is shown in Figure 4.2.

The critical value of a one-sided test $H_0 : \gamma = 1$ versus $H_1 : \gamma < 1$ is 0.978 at the 95%-level. The value of the test statistic can be computed using (4.7) and is 0.942. The null hypothesis of a unit root is therefore rejected.

4.4.2 Estimation results

Based on the test results from the exact tests, we use an autoregressive panel data model to examine the effects of cross-national differences in the national

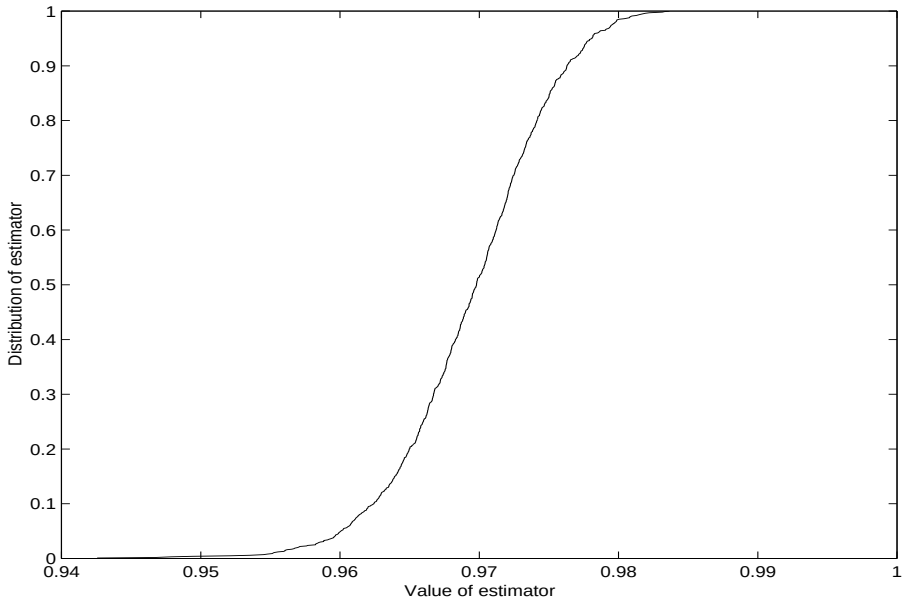

Figure 4.2: Distribution of $\hat{\gamma}^{**}_{FE}$ (y-axis) against the value of $\hat{\gamma}^{**}_{FE}$ (x-axis) under $H_0 : \gamma = 1$

and international constraint. We assume that the short-term interest rate does not exhibit a unit root. The constraint on PBC behaviour for the pooled sample can be modelled as follows:

$$\begin{aligned} r_{it} &= \beta_{1i} + \beta_2 E_{it} + \beta_3 FEX_{it} + \beta_4 CBI_{it} + \beta_5 E_{it} * FEX_{it} \\ &+ \beta_7 E_{it} * CBI_{it} + \beta_8 FEX_{it} * CBI_{it} + \beta_9 E_{it} * CBI_{it} * FEX_{it} \\ &+ \sum_{j=1}^{p} \beta_{j+9} r_{i,t-j} + \delta_1 IP_{it} + \delta_2 \pi_{it} + \delta_3 OC_t + u_{it}. \end{aligned} \tag{4.9}$$

In this model, we have included all possible combinations of central bank independence, fixed exchange rates and elections. The interpretation of the combination $E_{it} * FEX_{it}$ and $E_{it} * CBI_{it}$ has been given above. The interaction terms $FEX_{it} * CBI_{it}$ and $E_{it} * FEX_{it} * CBI_{it}$ are measures that tell us whether having an independent central bank influences a country's interest rate under a regime of fixed exchange rates. If such an effect is present, we would expect the coefficients to be negative.

Judson and Owen (1999) and Bun (2001) show that, for an unbalanced panel with a very large time dimension, the LSDV estimator is recommended. As

in the country-specific case, White heteroscedasticity-consistent standard errors are computed. The lag length used in the panel data models is $p = 4$. Estimates of the lagged interest rate coefficients are not reported in the table. The estimation results of (4.9), for both measures of CBI, are reported in table 4.10.

Table 4.10: Results for the panel regression

	CWN indicator		FS indicator	
Variable	Coefficient	t-value	Coefficient	t-value
E	0.021	1.46	0.019	0.88
FEX	0.020**	2.99	0.007	0.81
CBI	0.032	1.66	−0.003	−0.25
$E * FEX$	−0.023	−1.40	−0.019	−0.81
$E * CBI$	−0.024	−1.48	−0.014	−0.64
$FEX * CBI$	−0.039*	−2.07	0.005	0.33
$E * FEX * CBI$	0.025	1.21	0.012	0.49
OC	0.007	0.72	0.007	0.73
IP	0.113*	2.00	0.114*	2.01
π	0.404**	2.59	0.376*	2.45

The adjusted R^2 value is 0.93 for both models. As in our previous regressions, the estimated coefficient for elections is insignificant. This confirms our findings of the country-specific model: we do not find any pattern compatible with the PBC model. The influence of the exchange rate systems is quite strong when the CWN indicator is used to measure CBI: the coefficient of FEX_{it} is significant at the 1% level. Its positive sign shows that countries that abandon their monetary policy autonomy by pegging their interest rate or participating in a fixed exchange rate regime have a tendency for higher interest rates. However, the significance of the coefficient disappears when the FS indicator is used. The interaction term $FEX_{it} * CBI_{it}$ is significant at the 5% level, which means that higher central bank independence lowers a country's interest rate under a fixed exchange rate regime. Again, this effect disappears when we use the FS indicator.

To summarize, the panel regressions confirm our previous findings. The main result is that the E_{it} dummy is insignificant, which implies that elections do not influence the short-term interest rate. Neither the degree of central bank independence nor participation in fixed exchange rates influences our findings. Given these results, we have to reject PBC theory as far as central banks are concerned. We do not find evidence that central banks have been actively engaged in short-sighted behavior before elections. Indeed, we have to conclude that, if cycles occur in monetary aggregates (as has been reported in previous stud-

ies), they are, in all likelihood, fiscally-induced. For this, central banks should not be held responsible. Moreover, we conclude that there is no evidence that national and international constraints effectively reduce the scope for electoral manipulations. Our estimation results suggest that central banks conduct monetary policy quite independent from upcoming elections. Overall, we conclude that central banks do not use their instruments as suggested by the PBC theory.

4.5 Conclusions

Making central banks independent is often justified by the concern that monetary policy might be opportunistically manipulated. According to Beck (1991), "the major argument for Fed independence is that monetary policy is politically neutral and technical. If the Fed is caught with its hand in the electoral cookie jar, then it can hardly claim to be apolitical in any sense of that word". Using short-term interest rates, we have tested whether central banks in OECD countries indeed create PBCs and whether the degree of CBI is crucial to prevent that.

We have established evidence from two outcomes. First, we have conducted country-specific tests, based on the short-term interest rate for 14 OECD countries. The results of these tests show hardly any support for the PBC hypothesis. We conclude that central banks do not manipulate interest rates before elections. This suggests that either governments cannot impose their will on central banks, or that central banks have effectively resisted the wishes of the government. Our results do not suggest that the degree of statutory central bank independence matters in this respect. Alternatively, our results could be due to the fact that the short-term interest rate is not as tightly controlled by central banks as we have assumed. If financial markets have a strong impact on the short-term interest rate, under rational expectations manipulations are useless. This, however, would have the following implication. If, as the theory suggests, central banks use interest rates to manipulate monetary growth (and ultimately the inflation rate), and if their actions before elections have no effect on the short-term interest rate, then PBCs – if they exist in macroeconomic data, such as GNP growth or unemployment – cannot be due to central bank action, as their actions have no effect.

The second source of evidence stems from our panel data regressions. Their results provide more or less the same picture, namely that there is no evidence that central banks actively create PBCs. Overall, the implications are clear. If PBCs in macroeconomic variables such as unemployment show up, then the

central banks should not be blamed.

Further research has to be done to reveal why cyclical behavior can be found in monetary aggregates. Still, if one believes that central banks have the means to control interest rates, then one has to reject the idea that central banks help governments to win elections. Electoral cycles that might appear in monetary aggregates could largely be demand-induced (perhaps due to fiscal behavior), but are not due to central bank action.

Appendix 4.A Data sources

Where available, we use monthly data from IMF's IFS statistics on industrial production, inflation and the short-term interest rate (line 60B). In addition, data have been provided directly by the central banks of Denmark, Sweden and the UK. Data for Germany have also been obtained from the CD-ROM "Deutsche Bundesbank: 50 Jahre Deutsche Mark". Data for the United States have been obtained from FRED (http://www.stls.frb.org/fred/).

Growth rates are computed as the change in the log of the raw series and have been detrended if necessary. All computed series are stationary. The election dummy is +1 eleven months before the election and during the election month, and 0 otherwise. The dummy for central bank independence, measured by the CWN indicator or the FS indicator, is +1 if the level of central bank independence is above-median, and 0 otherwise. The dummy for monetary policy autonomy (FEX) is +1 during participation in a fixed exchange rate regime (monetary policy autonomy is absent), and 0 if a country is not constrained.

The sample period differs for each country due to data availability. The period for which short-term interest rates are available for each country are shown in table 4.11, along with the corresponding sample size T. Due to lack of democratic elections until 1977, the sample period for Spain further reduces to 1977:01–1997:12.

Table 4.11: Availability of short-term interest rates

Country	Period	T
Austria	$1967:01-1997:12$	369
Belgium	$1960:01-1997:12$	444
Canada	$1975:01-1997:12$	274
Denmark	$1972:01-1997:12$	287
Finland	$1972:10-1997:12$	296
France	$1964:01-1997:12$	396
Germany	$1960:01-1997:12$	444
Italy	$1971:01-1997:12$	322
Japan	$1960:01-1997:12$	444
Norway	$1971:08-1997:12$	315
Spain	$1974:01-1997:12$	252
Sweden	$1965:12-1997:12$	382
UK	$1960:01-1997:12$	444
US	$1960:01-1997:12$	444