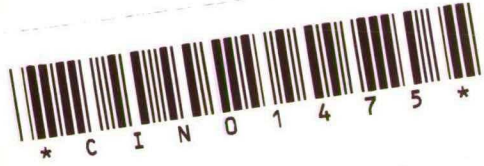


CBM  
R

8414  
1995  
87

entER  
for  
omic Research

# Discussion paper



Tilburg University



Center  
for  
Economic Research

No. 9587

R  
S414  
1995 = 87

L44

**THE POLITICAL ECONOMY OF CENTRAL  
BANK INDEPENDENCE**

By Sylvester Eijffinger and  
Jacob de Haan

R31

August 1995

Central Banks  
Independence  
Political Economy

ISSN 0924-7815



K.U.B.  
BIBLIOTHEEK  
TILBURG

# THE POLITICAL ECONOMY OF CENTRAL BANK INDEPENDENCE

Sylvester C.W. Eijffinger and Jakob de Haan

Second, revised version

August 1995

Correspondence to: CentER for Economic Research, Tilburg University, P.O. Box 90153,  
5000 LE Tilburg, The Netherlands

## Abstract

This study critically reviews the discussion about central bank independence. We use a distinction between various aspects of central bank independence (personnel, financial and policy independence) in analyzing the literature. Our survey deals with four issues. First, we start with a review of the theoretical case for central bank independence. Next, we discuss how central bank independence has been measured. Then, we continue with a discussion of empirical studies on the relationship between central bank autonomy and economic performance. Finally, we deal with the question as the why central bank independence varies across countries or, in other words, the determinants of central bank autonomy.



## CONTENTS

	PREFACE	4
1.	INTRODUCTION	5
2.	THEORETICAL CONSIDERATIONS ON CENTRAL BANK INDEPENDENCE	9
	2.1 Inflation	9
	2.2 Inflation variability	17
	2.3 Level and variability of economic growth	18
	2.4 Objections against central bank independence	19
3.	MEASURES OF CENTRAL BANK INDEPENDENCE	26
	3.1 Legal measures of central bank independence	26
	3.2 A comparison of legal independence measures	31
	3.3 Non-legal measures of central bank independence	34
4.	EMPIRICAL EVIDENCE ON THE CONSEQUENCES OF CENTRAL BANK INDEPENDENCE	39
	4.1 The level and variability of inflation	41
	4.2 Economic growth and disinflation costs	48
	4.3 Other variables	52
5.	THE DETERMINANTS OF CENTRAL BANK INDEPENDENCE	56
	5.1 The equilibrium level of unemployment	57
	5.2 Government debt	60
	5.3 Political instability	60
	5.4 Supervision of financial institutions	62
	5.5 Financial opposition to inflation	65
	5.6 Public opposition to inflation	67
	5.7 Other determinants	68
6.	CONCLUDING COMMENTS	70
	REFERENCES	72

## **TABLES**

Table 1.	Alternative approaches to central bank independence and accountability	23
Table 2.	Legal indices for central bank independence	27
Table 3.	Rank correlation coefficients of indices of central bank independence	32
Table 4.	Cukierman's legal variables: the Dutch case	33
Table 5.	Aspects of central bank independence: a comparison of five indicators	34
Table 6.	The turnover rate of central bank governors, 1950-1989	37
Table 7.	Empirical studies on the consequences of central bank independence	40
Table 8.	Empirical studies on the relationship between central bank independence and inflation	44
Table 9.	Inflation and aspects of central bank independence	46
Table 10.	Average inflation in some OECD-countries under 'left-wing' and 'right-wing' governments	48
Table 11.	Empirical studies on the relationship between central bank independence and economic growth	50
Table 12.	Empirical studies on the relationship between central bank independence and other economic variables	54
Table 13.	Empirical studies on the determinants of central bank independence	58
Table 14.	Central banks and the supervision on financial institutions	63

## **FIGURES**

Figure 1.	Timing of events in the Rogoff model	13
Figure 2.	Timing of events in the Lohmann model	15

## **PREFACE**

In recent years academics and policymakers have shown increasing interest in the independence of central banks with respect to the formulation of monetary policy. In the European Union this was realized by the Treaty of Maastricht on the Economic and Monetary Union (EMU). According to the Treaty, with the entrance of the third stage of EMU a European Central Bank (ECB) should be established which will conduct the common monetary policy within the Union in a completely independent way. Also, some Central European countries, e.g. the Czech republic and Hungary, have chosen for an autonomous central bank.

Moreover, in most Anglo-Saxon countries the independence and accountability of the central bank is recently discussed too. The public debate in the United Kingdom seems to lead to a more independent position of the Bank of England, whereas the position of the U.S. Federal Reserve System has come under fire by criticism from Congress.

This study analyzes the pros and cons of an autonomous central bank from various perspectives. Both theoretical and empirical arguments in favour of central bank independence are discussed extensively. Furthermore, the well-known indices developed in the literature for measuring the independence of central banks are reviewed and criticized. Next, we investigate the ultimate determinants of central bank independence. At the end of our study, we try to answer the question whether an independent central bank is desirable.

We want to acknowledge a number of colleagues for many helpful comments and suggestions on previous drafts of this study. We are especially grateful to Onno de Beaufort Wijnholds, Alex Cukierman, Paul de Grauwe, Gert-Jan van 't Hag, Marco Hoeberichts, Lex Hoogduin, André Icard, Otmar Issing, Flip de Kam, Peter Kenen, Mervyn King, David Laidler, Manfred Neumann, Ad van Riet, Eric Schaling, Helmut Schlesinger, Pierre Siklos, Dave Smant, Carl Walsh, Nout Wellink, Tony Yates, Jean Zwahlen, and an anonymous referee. Of course, the views expressed in this study are solely the responsibility of the authors and should not be interpreted as reflecting the views of any of these scholars and policymakers or their institutions.

Tilburg/Groningen  
August 1995

Sylvester C.W. Eijffinger  
Jakob de Haan

## 1. INTRODUCTION

Under the Treaty of Maastricht, signed in December, 1991, price stability will be the only objective of the future European System of Central Banks (ESCB), which consists of the European Central Bank (ECB) and the national central banks of all Member States of the European Union. Furthermore, the Treaty spells out various provisions to ensure that the ESCB be independent. It is often argued that a high level of independence coupled with some explicit mandate for the central bank to aim for price stability constitute important institutional devices to maintain price stability. The position of the Deutsche Bundesbank is often mentioned as an example par excellence. The German central bank is relatively autonomous; at the same time, Germany has one of the best post World War II inflation records among OECD countries. As a matter of fact, the statutes of the ECB are largely modeled after the law governing the Bundesbank.

Most observers think that an independent central bank can give priority to a low level of inflation, whereas in countries with a more dependent central bank other considerations (like re-election perspectives of politicians, a low level of unemployment) may interfere with the objective of price stability. Still, impressionistic observation suggests that legal central bank independence may be neither necessary, nor sufficient to establish low inflation rates. While Japan, for instance, has a relatively dependent central bank, it has also an average inflation rate which belongs to the lowest within the whole OECD area. On the other hand, Greece has a relatively independent central bank according to Cukierman's (1992) ranking and quite high inflation. These observations are, however, not inconsistent with the view that, other things being the same, greater central bank independence is conducive to lower inflation rates (Cukierman, 1992).

This study critically reviews the discussion about central bank independence. Since the second half of the 1980s, on this topic quite a few theoretical and empirical studies have been published. It is noteworthy, that most authors do not provide a clear definition of central bank independence. According to Friedman (1962), central bank autonomy refers to a relationship between the central bank and the government, which can be compared with that between the judiciary and government. The judiciary only can rule on the basis of laws provided by the legislature, and the judiciary can only be forced to rule differently through a change of the law. In fact, central bank indepen-



dence refers to three areas in which the influence of government must be excluded or drastically curtailed (see also Hasse, 1990):

- independence in *personnel* matters;
- *financial* autonomy;
- *policy* independence.

In practice, it is not feasible to exclude government influence completely when appointments are made to such an important public institution. Governmental influence (personnel independence) can then be discerned on the basis of the following criteria:

- a) Representation of government. Does a representative of the government have a seat and a vote on the governing body of the central bank?
- b) Appointment procedures. Are appointments to the governing board purely made by the government or does the central bank also have a say in the matter?
- c) Term of office. The shorter the term of office is, the greater will be the influence of government on appointees, especially where re-election is permitted.
- d) Dismissal. Can appointments be revoked for other reasons than civil or criminal offences (e.g. if the central bank fails to meet policy objectives)?

A further way in which the government can exercise influence over the central bank exists if the government is able to finance its expenditure either directly or indirectly via central bank credits (financial independence). Direct access to central bank credits implies that monetary policy is subordinated to fiscal policy. Indirect access may result if the central bank is cashier to the government or if it is responsible for the management of government debt. In these cases restrictions may be necessary to prevent government interference.

Finally, policy independence is related to the room for manoeuvre in the formulation and execution of monetary policy. As pointed out by Debelle and Fischer (1994) and Fischer (1995) it may be useful to draw distinction between *goal* independence and *instrumental* independence. With respect to goal independence two related issues are important. First, the scope for the central bank to exercise its own discretion, and second, whether the central bank has monetary stability as its primary goal. If the central bank has been given various goals - like low inflation and low unemployment - it has been accorded the greatest possible scope for discretion. It could, for instance, decide that price stability was less important than output stability, and act accordingly. In that case the central bank has goal independence since it is free to set the final goals of monetary policy. The central bank's discretionary powers may be restricted by giving it either general or specific objectives with respect to price stability. Finally, a central bank must dispose over effective instruments in order to defend its objective(s). A bank that has instrumental independence

is free to choose the means by which it seeks to achieve its goals. It is clear that if government has to approve of the use of policy instruments, there is no instrument independence.<sup>1</sup> Nowadays, the Reserve Bank of New Zealand, whose goal is precisely described in a contract with the government, has no goal independence; however, it has instrument independence since it chooses the method by which it tries to achieve this goal.

In this survey we will use this distinction between various aspects of central bank independence in reviewing the literature. Our survey deals with four issues. In chapter 2 we start with a review of the theoretical case for central bank independence. In the economic literature various arguments have been put forward to explain why countries with a relatively independent central bank may have a better inflation performance than countries where politicians have control over the central bank. These arguments very often refer to one or more specific aspects of central bank independence. Although central bank independence may improve upon the inflation performance, it may also have less desirable consequences in terms of lower and more volatile economic growth rates.

Next, we discuss how central bank independence has been measured. Four widely used indices of central bank autonomy are critically reviewed in chapter 3. These independence measures have been developed by Alesina (1988, 1989), Grilli, Masciandaro and Tabellini (1991), Eijffinger and Schaling (1992, 1993a) and Cukierman (1992), respectively. Although these measures have been constructed in a similar way, it is shown that in fact they are rather divergent in their ranking of central banks. It is also shown that the measures vary considerably with respect to the various aspects of central bank independence that are taken into account in constructing them.

We continue with a review of empirical studies on the link between central bank autonomy and economic performance. Chapter four starts with a discussion of the relationship between central bank independence and the level and variability of inflation, followed by a review of the link with the level and variability of economic growth. Here we also deal with the question whether central bank independence reduces disinflation costs. Finally, we briefly dwell upon studies dealing with the link between central bank independence and other variables, like interest rates and government budget deficits.

Finally, chapter 5 deals with the question as to why central bank independence varies across countries or, in other words, the determinants of central bank independence. This issue has only

---

<sup>1</sup> It will be clear that if the central bank is obliged to finance budget deficits, there is also no instrument independence. In that sense financial independence and instrument independence are related; instrument independence is, however, much broader because it includes also the power to determine interest rates.

recently been put on the research agenda.

## 2. THEORETICAL CONSIDERATIONS ON CENTRAL BANK INDEPENDENCE

### 2.1 Inflation

Many observers believe that countries with an independent central bank have lower levels of inflation than countries with a central bank which comes under direct control of the government. Why would central bank independence, *ceteris paribus*, yield lower rates of inflation? In the literature three answers have been given to this question: public choice arguments, reasons which are based on the time inconsistency problem of monetary policy and the analysis of Sargent and Wallace (1981).

According to the 'older' *public choice view*, monetary authorities are exposed to strong political pressures to behave in accordance with the government's preferences.<sup>2</sup> Monetary tightening aggravates the budgetary position of government: the reduction in tax income brought by a temporary slow-down of economic activity, possibly lower receipts from 'seigniorage' (see below) and the short-run increase in the interest burden on public debt all worsen the deficit. So government may prefer 'easy money'. Indeed, there exists some evidence that even the relatively independent Federal Reserve caters to the desires of the President and/or the Congress. This evidence is either based on close inspection of the contacts between the polity and the central bank (see e.g. Havrilesky, 1993<sup>3</sup>, and Akhtar and Howe, 1991) or builds on tests whether monetary policy turns expansive before elections as predicted by Nordhaus's (1975) political business cycle theory (see e.g. Allen, 1986), or diverge under administrations with different political orientation, as predicted by Hibbs's (1977) partisan theory (see e.g. Alesina, 1988). At this stage, it suffices to

---

<sup>2</sup> As Buchanan and Wagner (1977, pp. 117-18) put it: "A monetary decision maker is in a position only one stage removed from that of the directly elected politician. He will normally have been appointed to office by a politician subject to electoral testing, and he may even serve at the pleasure of the latter. It is scarcely to be expected that persons who are chosen as monetary decision makers will be the sort that are likely to take policy stances sharply contrary to those desired by their political associates, especially since these stances would also run counter to strong public opinion and media pressures ... 'Easy money' is also 'easy' for the monetary manager ..".

<sup>3</sup> Havrilesky (1993) even argues that "the contemporary view is that the Administration, while granting significant leeway to the Fed, when necessary obtains the monetary policy actions that it desires" (p. 30).



conclude that, of course, the more independent a central bank is, the less it will be under the spell of political influences as outlined above. It will be clear that this argument of Buchanan and Wagner relates primarily to personnel independence and to policy independence.<sup>4</sup> The more influential government is in appointing board members, the more likely it will be that the central bank pursues the kind of policies desired by government.

A similar line of reasoning as in Buchanan and Wagner (1977) can be found in the literature originating with Kydland and Prescott (1977), Calvo (1978) and Barro and Gordon (1983). Central in this literature is the so-called *dynamic or time inconsistency problem*. Dynamic inconsistency arises when the best plan currently made for some future period, is no longer optimal when that period actually starts. Various models have been based upon this dynamic inconsistency approach (see e.g. Rogoff, 1985; Cukierman, 1992; Eijffinger and Schaling, 1993b and Schaling, 1995). Basically, in these models the government and the public are drawn into some setting of the prisoner's dilemma. The various models differ in their assumptions with regard to government incentives. Following Cukierman (1992, chapter 2), we will illustrate the dynamic inconsistency problem first for the case of monetary surprises aimed to increase employment. Subsequently, other government motives will be reviewed.

It is assumed here that deviations of employment from its natural level are positively related to unanticipated inflation. This follows from the existence of nominal wage contracts in conjunction with a real wage which is normally above the market-clearing real wage. Policymakers have an objective function that gives a positive weight to stimulating employment (e.g. because of re-election considerations, or for partisan reasons) and a negative weight to inflation. Prior to the determination of nominal contracts, the best rate of inflation for policymakers is zero. At the beginning of the period, employers and employees bargain over nominal wages, taking the expected rate of inflation into account. During this period government chooses a rate of monetary expansion that maximizes its objectives, taking inflationary expectations as given. The best rate of inflation is determined so as to minimize the combined costs of inflation and low employment.

---

<sup>4</sup> Neumann (1991) emphasizes the personnel independence of the governing board of the central bank: "The conditions of contract and of office would have to be set such that the appointee frees him- or herself from all former political ties or dependencies and accepts the central bank's objective of safeguarding the value of the currency as his or her professional leitmotif. We may call this a "Thomas-Becket" effect." (p. 103). Waller (1992b) develops a model for appointments to the central bank in the context of a two-party political system, in which the victor of the last election is allowed to nominate candidates, but the losing party is given the right to confirm the nominees. An interesting outcome of the model is that if society wants to minimize partisan monetary policy, it should increase the length of office of central bank policy board members relative to the length of the electoral interval.

Since the marginal costs of inflation and low employment are increasing, the minimizing rate of inflation is positive. However, since it is assumed that employers and employees know the objectives of the policymakers, they can deduce in advance what the rate of inflation will be, once they have settled their nominal wage contracts. They therefore adjust nominal wages so as to achieve the real wage that they originally aimed at. Consequently, employment remains at its natural level. So, government ends up with a higher rate of inflation, without employment being higher than its natural level.

The other sources of the time inconsistency problem originate with the public finances, and can be illustrated as follows. Define real government debt  $b$  as  $b = B/p$ , where  $B$  denotes nominal debt, and  $p$  is the price level. We may write the change in real debt as:

$$\Delta b = d + (i - \Delta p/p)b - \Delta M/p \quad (1)$$

where  $d$  is the real primary deficit,  $i$  is the nominal interest rate and  $M$  is the stock of base money. It follows from equation (1) that the government receives a capital gain if the actual inflation rate exceeds the inflation premium in the interest rate. The dynamic inconsistency of monetary policy arises, because the incentives for the government to inflate change before and after the public has settled for a nominal interest rate, taking into account their expected rate of inflation. Before the public commits itself, the central bank has an incentive to abstain from making inflation. After positions in government bonds have been taken, policymakers have an incentive to create inflation.

A third reason for the time inconsistency problem also originates in the finances of government and may be referred to as the 'revenue' or 'seigniorage' motive for monetary expansion (Barro, 1983). Seigniorage ( $S$ ) is generally defined as the amount of real resources bought by the government by means of new base money injections, or:

$$S = \Delta M/p = (\Delta M/M) (M/p) = (\Delta M/M) L(p^e) \quad (2)$$

where  $L$  denotes the demand for real base money balances, which in turn depends upon expected inflation  $p^e$ . The dynamic inconsistency of monetary policy arises here, because incentives for the government to inflate change before and after the public has chosen the level of real money balances. Before the public commits itself to a given level of real balances, government takes into consideration the downward effect that a higher rate of inflation has on real money balances. After this choice has been made, however, government takes the level of real money balances as given and will reoptimize (Cukierman, 1992, chapter 4).

No matter what exactly causes the dynamic inconsistency problem, in all cases the resulting rate of inflation is sub-optimal. This conclusion generally also holds in models with incomplete

information. Cukierman (1992, chapter 18), for instance, provides a model in which the public is not fully informed about the shifting objectives of the political authorities and in which there is no perfect control of information. Barro and Gordon (1983) conclude that the best solution for the time inconsistency problem consists of the introduction of fixed rules in monetary policy, i.e. the authorities commit themselves to certain policy rules. Once uncertainty is introduced and the level of output is affected by shocks, the case becomes one for a feedback rule, in which monetary policy optimally responds to shocks. The problem with rules, however, is the absence of some higher authority to enforce a commitment. Handing over authority to the central bank by political authorities may help here, since it can be regarded as an act of partial commitment (Rogoff, 1985; Neumann, 1991 and Cukierman, 1992, chapter 18). By delegating some of their authority to a relatively apolitical institution, politicians accept certain restrictions on their future freedom of action.<sup>5</sup> The degree of central bank independence, of course, only plays a meaningful role if the central bank puts different emphasis on alternative policy objectives than the government does. Two main differences have been pointed out in the literature (Cukierman, 1992, chapter 18). One relates to possible differences between the rate of time preference of political authorities and that of central banks. For various reasons, central banks are often more conservative and tend to take a longer view of the policy process than do politicians. The other difference concerns the subjective weights in the objective function of the central bank and that of the government. It is often assumed that central bankers are relatively more concerned about inflation than about other policy goals such as achieving high employment levels and adequate government revenues. If monetary policy is set at the discretion of a conservative central banker, a lower average time-consistent inflation rate will result.<sup>67</sup> From the foregoing analysis it will be clear that this argument for central bank independence is primarily related to policy independence. The best way to

---

<sup>5</sup> An alternative solution to the time inconsistency problem is reputation building (Canzoneri, 1985). Fratianni and Huang (1994) show, however, that in case of asymmetric information there is no assurance that reputation may work for the central bank in the Barro-Gordon model.

<sup>6</sup> Waller (1992a) analyses the appointment of a conservative central banker in a model that distinguishes between sectors which differ in their degree of competitiveness of the labor market. The main result of this paper is that, although agents in both sectors have the same preferences over inflation and output stability, in equilibrium nominal wage rigidity in the non-classical labor market causes output in this sector to be more variable than in the classical sector. Consequently, if the classical sector were allowed to choose the 'conservative' central banker, it would choose a more vigorous inflation fighter relative to the non-classical sector's choice.

<sup>7</sup> Lippi and Swank (1994) argue that the central banker's degree of conservatism (inflation aversion) is an efficient way to deal with the time inconsistency problem and granting (personnel) independence is an efficient way to cope with the credibility problem.

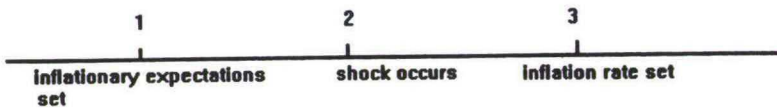


illustrate the argument is to present a 'stripped' version of Rogoff's model. In Rogoff's (1985) model, society can sometimes make itself better off by appointing a central banker who does not share the social objective function, but instead places "too large" a weight on inflation rate stabilization relative to output stabilization. In this simplified version, output is given by the Lucas supply function:

$$y_t = \pi_t - \pi_t^e + \mu_t \quad (3)$$

where  $\pi_t$  is inflation,  $\pi_t^e$  is expected inflation and  $\mu_t$  is a productivity shock with mean zero and variance  $\sigma_\mu^2$ . We set the natural level of output at zero and the parameters at one. The timing of events in the Rogoff model is as follows: first  $\pi_t^e$  is set (nominal wage contracts are signed), then the shock  $\mu_t$  occurs and finally the central banker sets  $\pi_t$  (see figure 1).

Figure 1. Timing of events in the Rogoff model



Society's loss function is given by

$$L_t = \frac{1}{2} \pi_t^2 + \frac{\chi}{2} (y_t - \hat{y})^2 \quad (4)$$

where the weight on output stabilization  $\chi > 0$  and  $\hat{y} > 0$ , so that the desired level of output,  $\hat{y}$ , is above the natural level.

Rogoff shows that it is optimal for society to choose an independent (conservative) central banker who assign "too large" a weight to inflation in his loss function:

$$I_t = \frac{1+\epsilon}{2} \pi_t^2 + \frac{\chi}{2} (y_t - \hat{y})^2 \quad (5)$$

where  $\epsilon$ , the additional weight on the inflation goal, lies between zero and infinity ( $0 < \epsilon < \infty$ ).

Substituting (3) in (5), taking first order conditions with respect to  $\pi_t$  and solving for rational expectations, we obtain:

$$\pi_t = \frac{\chi}{1+\epsilon} \hat{y} - \frac{\chi}{1+\epsilon+\chi} \mu_t \quad (6)$$

$$\pi^e = \frac{\chi}{1+\epsilon} \hat{y} \quad (7)$$

$$\pi^e = \frac{\chi}{1+\epsilon} \hat{y} \quad (8)$$

Policy rule (6) shows that the introduction of a conservative central banker ( $\epsilon > 0$ ) leads to a

lower inflationary bias  $\left[ \frac{\chi}{1+\epsilon} \hat{y} \right]$  and a lower variance of inflation  $\left[ \left( \frac{\chi}{1+\epsilon+\chi} \right)^2 \sigma_\mu^2 \right]$ . The

variance of output  $\left[ \left( \frac{1+\epsilon}{1+\epsilon+\chi} \right)^2 \sigma_\mu^2 \right]$  is, however, an increasing function of the conservativeness

of the central banker. This is the trade off between credibility and flexibility which is already apparent in the Rogoff model. It can be shown that the optimal value for  $\epsilon$ , in terms of social loss function (4), is positive but finite. This implies that it is optimal for society to appoint a conservative central banker.

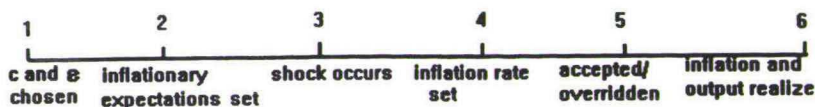
Rogoff makes the crucial assumption, that the central banker is completely independent and cannot be overridden *ex post*, when the inflationary expectations  $\pi_t^e$  have been set and the policy is to be carried out. This can lead to large losses for society when extreme productivity shocks  $\mu_t$  occur. Lohmann introduces the possibility to override the central banker at a strictly positive but *finite* cost. Therefore, society's loss function (4) changes to

$$L_t' = \frac{1}{2} \pi_t^2 + \frac{\chi}{2} (y_t - \hat{y}_t)^2 + \delta c \quad (4')$$

where  $\delta$  is a dummy that takes on the value of 1 when the central bank is overridden and 0 otherwise; and  $c$  is a cost that society incurs when the central bank is overridden. The central bank's loss function (5) stays the same.

The timing of events in the Lohmann model is as follows: In the first stage the central banker's additional weight  $\epsilon$  on the inflation goal is chosen as well as the cost  $c$  of overriding the central banker. Then the inflation expectations are set. In the third stage the productivity shock realizes. Then the central banker sets the inflation rate, which is either accepted or not. If it is not accepted, society overrides the central banker, incurs the cost  $c$  and resets the inflation rate. Finally, inflation and output realize (see figure 2).

Figure 2. Timing of events in the Lohmann model



In equilibrium, the central banker will not be overridden. In the case of an extreme productivity shock he will set the inflation rate so that society is indifferent between overriding or not. Rogoff's model is a special case of Lohmann's where  $c = \infty$ . Lohmann shows that the optimal central bank institution is characterized by  $0 < \varepsilon^* < \infty$  and  $0 < c^* < \infty$ .

An important result from the Rogoff model is that the reduction in the equilibrium inflation rate resulting after appointing a conservative and independent central banker generally comes at the expense of greater output variability from supply shocks, since the central banker offsets output shocks to a lesser extent than governments would do. Nevertheless, gains from lower inflation exceed losses due to decreased stability. Therefore, on net, society is made better off by appointing a conservative central banker. It is, however, not optimal in the Rogoff model to appoint a central banker whose only concern is low and stable inflation.

Apart from public choice and dynamic inconsistency considerations, there is a third argument to explain why central bank independence may matter for inflation. This argument has first been put forward by *Sargent and Wallace (1981)*. They distinguish between fiscal and monetary authorities. If fiscal policy is dominant - i.e. if the monetary authorities cannot influence the size of the government's budget deficit - money supply becomes endogenous. If the public are no longer able or willing to absorb additional government debt, it follows from equation (1) that monetary authorities will be forced to finance the deficit by creating money. If, however, monetary policy is dominant, the fiscal authorities will be forced to reduce the deficit (or repudiate part of the debt). It is clear that the more independent the central bank is, the less monetary authorities can be forced to finance deficits by creating money. It is clear that this argument relates to financial independence.

Apart from a *legislative approach* to create by law an independent central bank and to mandate it, also by law, to direct its policies towards achieving price stability, other mechanisms have been suggested to overcome the incentive problems of monetary policy. This so-called *contracting approach* regards design of monetary institutions as one that involves structuring a contract

between the central bank (the agent) and the government (the principal). The nature of the contract will affect the incentives facing the bank and will, thereby, affect monetary policy (Walsh, 1993). Persson and Tabellini (1993) suggest a targeting approach, where the political principals of the central bank impose an explicit inflation target and make the central bank leadership explicitly accountable for its success in meeting this target. Such a system exists since 1989 in New Zealand, where the governor of the Reserve Bank can, under certain circumstances, be dismissed if the inflation rate exceeds two percent (see below for further details).

It is interesting to note that it follows from the analysis of Persson and Tabellini (1993) that the optimal contract with the central bank implies no loss in terms of stabilization policy. As pointed out above, this result contrasts with the outcomes of most models where monetary policy is delegated to an independent central bank, where credibility is increased at the expense of an optimal output stabilization policy. Walsh (1993, 1995) and Persson and Tabellini (1993) show that the optimal central bank contract may serve to eliminate the inflation bias, while still preserving the advantages of stabilization. This conclusion holds even if the central bank has private information.<sup>8</sup>

A second general insight from the work of Persson and Tabellini (1993) is the importance of monetary policy announcements. If transparent and clearly understood, policy announcements create a reference point against which subsequent central bank behavior can be judged (see also Crockett, 1994). The 'accountability' of the central bank must refer to policy outcomes, so that sanctions can be imposed in case certain targets are not realized. One may argue that, from a democratic point of view, targeting as suggested by the contracting approach is perhaps to be preferred over the concept of a fully independent central bank with some explicit mandate for price stability (see below). The contracting approach is clearly related to instrument independence but not to goal independence.<sup>9</sup>

---

<sup>8</sup> Walsh (1995) also considers the situation in which candidates to head the central bank differ in their competency, the central bank's monetary policy stance is not observable, and the informational content of a publicly observable signal about an aggregate supply shock is affected both by the central bank's competency and by its implementation of given policies. In this model the principal can induce the central bank to behave as demanded, by using a contract that resembles an inflation targeting rule with a reporting requirement.

<sup>9</sup> According to McCallum (1995), the literature on institutional arrangements for central banks is flawed by two fallacies pertaining to fundamental presumptions of the analysis. The literature's standard interpretation is misleading in two ways: first, it underestimates the likelihood of good monetary policy performance by an independent central bank, and second, it misrepresents the beneficial effects stemming from contracts between the central bank and the government. In both ways, the literature tends to underestimate the benefits of central bank independence by partial insulation from political pressures.



## 2.2 Inflation variability

The preceding analysis suggests that central bank independence may reduce pre-election manipulation of monetary policy. In that case, central bank independence may also result in more stable money growth and, therefore, less inflation variability. There is a related argument why central bank independency may lead to less inflation variability. Politicians not only strive to remain in office as long as possible, they are also partisan and wish to deliver benefits to their constituencies (Hibbs, 1977). Some evidence indicates that the pattern of unemployment and inflation tends to be systematically related to the political orientation of governments. Whereas right-wing governments generally are thought to give a high priority to lower inflation, left-wing governments are often supposed to be more concerned about unemployment. Alesina (1988) reports that the unemployment rate in the US is generally higher under Republican administrations than it is under Democratic administrations, whereas the inflation rate is lower in case of a Republican president. Similar results have been reported by Tabellini and La Via (1987) and Havrilesky (1987). Existing evidence lends support to the view that the redistributive consequences of inflation provide an incentive for the left to endorse expansionary policies and for the right to fight inflation (Alesina, 1989). This implies that, if there is a regular change of government, inflation variability may be high, especially if the monetary authorities are dominated by elected politicians. However, a relatively independent central bank will not change its policy after a new government has been elected. So central bank independence may reduce inflation variability (Alesina, 1988).

Another reason why central bank independence may affect inflation variability has been put forward by Milton Friedman (1977). Friedman wanted to explain why there exists a positive correlation between the level of inflation and the variability of inflation across countries and over time for any given country. In Friedman's analysis a government may temporarily pursue a set of policy goals (output, employment) that leads to high inflation, which subsequently elicits strong political pressure to reduce the debasing of the currency. The relationship between the level and the variability of inflation has been extensively investigated. Recently, Chowdhury (1991) has reexamined this issue for a sample of 66 countries over the 1955-85 period. His results indicate the presence of a significant positive relationship between the rate of inflation and its variability.

## 2.3 Level and variability of economic growth

With respect to the effect of central bank independence on the *level of economic growth* two



opposing views have been expressed in the literature. Some authors have argued that the real interest rate depends upon money growth, i.e. they assume that the Fisher hypothesis does not hold due to the Mundell-Tobin effect.<sup>10</sup> A low level of inflation which is caused by restrictive monetary policy results in high real interest rates, which may have detrimental effects on the level of investment, and hence on economic growth (Alesina and Summers, 1993). There seems to be some evidence in support of the first part of the argument: countries with a low level of inflation have high ex post real interest rates (De Haan and Sturm, 1992).

There are, however, also some arguments which suggest that central bank independence may further economic growth. First, as outlined above, an independent central bank may be less prone to political pressures and therefore behave more predictably, which may enhance economic stability and reduce risk premia in interest rates, thereby stimulating economic growth (Alesina and Summers, 1993). Second, high levels of inflation may obstruct the price mechanism; it is likely that this will hinder economic growth. Many economists, especially those involved in central banking, believe however that even moderate rates of inflation impose significant economic costs on society (Fischer, 1993).<sup>11</sup> Recently, Grimes (1991) and Fischer (1993) have provided evidence in support of the view that inflation harms economic growth.<sup>12</sup> One channel through which this effect may operate is increased inflation uncertainty. As pointed out previously, there exists a strong link between the level and the variability of inflation. Strong variation may lead to high inflation uncertainty which, in turn, may damage economic growth. If central bank independence reduces the variability of inflation and promotes less inflation uncertainty, economic growth may prosper. Empirical studies on the links between inflation variability and inflation uncertainty, and economic growth provide, however, only mixed support for this point of view. Using annual data for 24 countries Logue and Sweeney (1981) find, for instance, no evidence for a significant negative impact of inflation variability on real growth. A similar conclusion is reached by Jansen (1989). Engle (1983) found little evidence for a link between the relatively high rates of inflation experienced by the United States in the 1970s and inflation uncertainty. However, Cukierman and

---

<sup>10</sup> A rise in expected inflation will lead, according to Mundell (1963), to substitution of liquid assets by long-term financial assets and, according to Tobin (1965), to substitution of liquid assets by physical capital goods, lowering the marginal efficiency of capital and, thereby, also the expected (ex ante) real interest rates.

<sup>11</sup> Fischer (1994) points out that the relationship between inflation and economic growth may be non-linear. Furthermore, the link between inflation and growth for low levels of inflation (1-3 percent) is very difficult to determine empirically.

<sup>12</sup> See, however, also Karras (1993) who argues that the correlation reported by Grimes (1991) is a consequence of the cyclical character of both variables.

Wachtel (1979) report a positive correlation between the rate of inflation and the dispersion of inflation forecasts gathered from the Michigan and Livingston inflation surveys. Furthermore, Evans (1991) has published evidence which is consistent with the point of view that uncertainty about the long-term prospects for inflation is strongly linked to the actual rate of inflation.

Concerning the impact of central bank independence on the *variability of economic growth*, again various theoretical positions have been delineated. On the one hand, it is likely that recessions occur, if the central bank introduces restrictive measures to combat inflation. In this view inflation has become too high, since in previous periods the monetary authorities were too lax. An independent central bank striving for price stability will not that easily let inflation run out of control, and therefore will not follow such a stop-go policy. Consequently, fluctuations in real output will be smaller (Alesina and Summers, 1993). On the other hand, the models of Rogoff (1985) and Eijffinger and Schaling (1993b) conclude that when the central bank gives priority to price stability, the variability of income will be greater than in the case where the central bank also strives for stabilization of the economy.

By now, it will have become clear, that only empirical research can prove which view is most in accordance with the data. In chapter 4 this issue will be addressed.

## **2.4 Objections against central bank independence**

It follows from the foregoing analysis that various theoretical arguments have been given in support of central bank autonomy. Chapter 4 will show that countries with a relatively independent central bank have, on average, a better inflation performance than countries where the central bank comes under more direct control of the government. Furthermore, various indications suggest that central bank independence does not imply sacrifices in terms of lower output growth or higher unemployment. Two objections have been raised against central bank independence: lack of *democratic accountability* and potential damage to *policy coordination* (Goodhart, 1994). The final sections of this chapter will deal with both these issues.

### **Accountability**

An important problem is how central bank independence relates to democratic accountability.<sup>13</sup> Some authors have argued that monetary policy is just like other instruments of economic policy,

---

<sup>13</sup> It is interesting to note that this issue is discussed mainly in the Anglo-Saxon countries (Fischer, 1994 and Eijffinger, 1994).

like fiscal policy, and should accordingly be fully determined by democratically elected representatives. Such an approach implies, however, a too direct involvement of politicians with monetary policy. Nevertheless, in every democratic society monetary policy ultimately has to be under the control of democratically elected politicians. Some way or another, the central bank has to be accountable. Parliament is, of course, responsible for central bank legislation. In other words, the 'rules of the game' (i.e. the objective of monetary policy) are settled in accordance with normal democratic procedures, but the 'game' (monetary policy) is delegated to the central bank. Since parliament can alter this legislation, the central bank remains under the ultimate control of parliament. Furthermore, in case the specified objective is not realized, the central bank or the politician who bears final responsibility through his power to overrule the bank's policy, could be made accountable.

Central bank independence and democratic accountability can be implemented in various ways. Different countries have organised things differently. On the basis of three relatively independent central banks - the Deutsche Bundesbank, the Nederlandsche Bank and the Reserve Bank of New Zealand - this will be exemplified now. Five aspects of the division of responsibilities between the government and the central bank are important here:<sup>14</sup>

1. The ultimate objective(s) of monetary policy. The Reserve Bank of New Zealand only has one formal objective: price stability. So there is no goal independence for the central bank. The Bundesbank has a similar prime objective which is, however, not as specific (formally referred to as defence of the value of the currency).<sup>15</sup> In addition the Bundesbank has the obligation to offer general support to the government's economic policy in instances in which this does not prejudice the primary objective of price stability (BBankG 1957, section 12). However, this subsidiary statutory objective is de facto not very important. The objective of the Nederlandsche Bank is to regulate the value of the Guilder so as to enhance welfare (Bank Law 1948, section 9.1). Nowadays, this objective is interpreted as a stable exchange rate of the Guilder vis-à-vis the Dmark.
2. Precision of target specification. The governor of the Reserve Bank of New Zealand has to agree with the government on a tight target range for inflation for the next three years. The Bundesbank is not under any obligation to agree, obey or announce any such targets. Since 1974 the bank announces the targeted rate (or zone) for money growth, which implies an inflation target. The federal government is responsible for decisions about the exchange rate.

---

<sup>14</sup> See Roll et al. (1993).

<sup>15</sup> See, for instance, Casear (1981) and Kennedy (1991).



This has been a reason for many conflicts between the Bundesbank and the government (Marsh, 1992).

3. Statutory basis for independence. The governor of the central bank of New Zealand must agree with the government about a target for inflation, but is free to choose his instruments (instrument independence; Debelle and Fischer, 1994). The central bank in Germany is completely independent of any instructions from government. It may consult the government but it has no obligation to agree. Under section 13 of the BBankG 1957 government representatives have the right to attend meetings of the Zentralbankrat, but not to vote. The Dutch Bank Law does not contain any specific articles on the statutory basis for independence.
4. Overriding the central bank. In New Zealand the governor of the central bank can be dismissed in case he fails to deliver the inflation target (obligation ad hominem). The contract contains some clearly identified escape clauses (like a rise in indirect taxes, or change in exchange rate regime). In Germany the government can suspend decisions of the Bundesbank for a maximum of two weeks (BBankG 1957, section 13). This temporary veto has never been formally deployed. Only through a change in the relevant legislation by a simple majority in parliament the Bundesbank can be overruled by the government. The Zentralbankrat is responsible for monetary policy (collective responsibility). The Netherlands have a fairly unique central bank legislation. According to section 26 of the Bank Law of 1948, the minister of Finance has the right to give a so-called 'instruction' to the bank with regard to monetary policy.<sup>16</sup> The right to give instructions makes the minister responsible for monetary policy vis-à-vis parliament.<sup>17</sup>
5. Appointment of bank officials. Both the minister and the board of the central bank must ratify the appointment of the governor of the Reserve Bank of New Zealand (double veto). Board appointments are made by the finance minister. The deputy governor is appointed by the board, on recommendation of the governor. The Centralbank Council (Zentralbankrat) is the governing board of the Bundesbank. Apart from the so-called Directorate (Direktorium) the presidents of the nine Landeszentralbanken are members of the Zentralbankrat. The Direktorium comprises of the president, the vice-president and nowadays a maximum of six

---

<sup>16</sup> This right is some kind of an 'ultimum remedium' and has never been applied. In his memoirs, Zijlstra, who was president of the Nederlandsche Bank between 1967 and 1981, reminisces that prime minister Den Uyl (1974-1977) considered to use this instrument after the bank had introduced credit restrictions in 1977. See Zijlstra (1992).

<sup>17</sup> This construction is no longer allowed under the Maastricht Treaty. In the third phase of EMU, which according to the Treaty on European Union should start no later than 1999, the right of the minister of Finance to give instructions to the central bank must be abolished.

other members, which are appointed by the president of the Federal Republic on nomination of the federal government.<sup>18</sup> The Zentralbankrat is consulted in this process. The presidents of the Landeszentralbanken are nominated by the Bundesrat (the upper federal chamber), based on recommendations from governments of the Länder. The Zentralbankrat is then again consulted. The president and the director-secretary of the Dutch central bank are appointed by the minister of Finance, on the basis of a recommendation list containing only two names, which has been decided upon in a combined meeting of the governing board and the supervisory board of the Bank (Bank Law, section 23). The other members of the governing board are also appointed by the minister, on the basis of a recommendation list containing three names, again decided upon by the governing and supervisory boards. The so-called Royal Commissioner is responsible for supervision on behalf of the government; he is also appointed by the minister (Bank Law, sections 30; 31).

---

<sup>18</sup> Until unification each of the eleven western Länder had its own central bank; their presidents were member of the Zentralbankrat, as were the members of the Direktorium, which could maximally consist of ten persons, including the president and the vice-president of the Bundesbank. After unification the number of Länder representatives was reduced to nine and the maximum total for the Directorate to eight. See Smith (1994).

**Table 1. Alternative approaches to central bank independence and accountability**

	Deutsche Bundesbank	Res. Bank New Zealand	Nederlandsche Bank
Policy objective:			
price stability	primary objective	sole objective	if welfare enhancing
supporting government economic policy	secondary objective	--	--
government override	only implicit (new law)	provision in current law	right to give instruction
Policy targets:			
obligatory	no	yes	no
agreed with government	no	yes	no
escape clauses	no	yes	no
time horizon	no	three years	no
Responsibility:			
laid upon	central bank council	governor of the central bank	implicitly with minister
monitoring	only implicit	dismissal of governor for failure	through Royal Commissioner

Source: based upon Roll et al. (1993) and the Dutch Central Bank Law, 1948

Table 1 summarizes the preceding analysis. It follows from this table that central bank independence in a democratic society can be implemented in different ways. According to the Maastricht Treaty the European Central Bank (ECB) will become responsible for monetary policy within the European Economic and Monetary Union. An important objection that has been raised against the ECB is its lack of accountability (Gormley and De Haan, 1995). Indeed, the statutes of the ECB imply that the democratic accountability of the ECB is poorly arranged in comparison with the accountability of the central banks of the countries examined in this survey. This is also the case in comparison with the Bundesbank, since the mandate of the ECB can only be changed through an amendment of the Treaty, which requires unanimity. In contrast, the Bundesbank always has to take into account the possibility of a change of the law. Through this mechanism the Bundesbank will, in the long run, follow a policy which is in line with the preferences of democratically elected politicians. In the Netherlands this political approval is arranged differently,

but in this country the central bank also pursues policies which generally enjoy broad political and popular support.

### **Coordination of policies<sup>19</sup>**

Apart from the lack of democratic accountability, potential problems regarding the coordination of economic policies have been put forward as an important argument against central bank independence. Whereas most theoretical models discussed so far, make no clear distinction between monetary and fiscal policy, other theoretical studies concentrate on the conflicts that can arise when monetary and fiscal policy are delegated to independent institutions. Government controls fiscal policy and the central bank controls monetary policy. Both policymakers set goals for the economy and chose their own priorities. The government and the central bank can either cooperate in implementing their policies or prefer not to cooperate. In the analysis of Andersen and Schneider (1986) three different models of the economy are distinguished. The first model is Keynesian in which even anticipated policy affects the level of output and inflation. In the second model, which Andersen and Schneider refer to as Keynesian-New Classical, anticipated monetary policy is neutral; it can only affect inflation. In the third, New Classical model both anticipated monetary and fiscal policy only affect inflation and do not influence output. Both the government and the central bank establish targets for inflation and output. Andersen and Schneider compare the economic outcomes under cooperation with those under non-cooperation. Although the equilibrium level of output and the rate of inflation vary depending on the model used, in all three models the cooperative solution is Pareto superior to the non-cooperative solution. Furthermore, this result is invariant to the structure of non cooperation, i.e. Nash or Stackelberg. Andersen and Schneider (1986) conclude that "two independent policymakers do not automatically guarantee a policy outcome which is preferred to other outcomes under different institutional solutions" (p. 188). Similar conclusions have been drawn by other authors (see e.g. Hughes Hallett and Petit, 1990 and Blake and Westaway, 1993).

However, several comments are in order (see Pollard, 1993). First, in many of these models a third 'player', i.e. trade unions or the general public, is not taken into account.<sup>20</sup> The perception of economic subjects of the credibility of announced policies is, however, very important for

---

<sup>19</sup> This section draws heavily from Pollard (1993).

<sup>20</sup> This is not true for the model of Blake and Westaway (1993), which is similar to that of Barro and Gordon (1983). The conclusion of these authors is that "it is unlikely to be sensible to appoint a monetary authority with an ability to make credible policy commitments if at the same time it is following objectives which differ markedly from those of government itself" (p. 79).



macroeconomic outcomes, as we have already seen. Second, in most of these studies the sustainability of fiscal policy is not examined. As pointed out before, this issue is analyzed by Sargent and Wallace (1981) who have shown that, if the government embarks on a path of unsustainable deficits, the central bank might eventually be forced to inflate to cover the deficit. If the public realizes that the government debt is on such a path, it will expect inflation to increase which may cause inflation to increase well before some debt limit has been reached. Third, uncertainty about the macroeconomic models used by the policymakers is not taken into account. Frankel and Rockett (1988) have argued that this model uncertainty may eventually yield negative outcomes in case the policymakers cooperate. Finally, in many models analyzing coordination of monetary and fiscal policy central bank independence is equated with non-cooperation between the fiscal and monetary authorities in policy implementation. This definition differs from the concept underlying empirical indices for central bank independence as discussed in the following chapter. As pointed out by Pollard (1993), these different definitions of independence may partly explain the diverging results of the theoretical models discussed above and of empirical studies reviewed in chapter 4.

In a paper of Debelle (1993) some of the shortcomings of this literature are dealt with. This author differentiates between fiscal and monetary authorities in a model in which also private sector agents (labor and firms) are distinguished.<sup>21</sup> He shows that apart from central bank independence, the objectives of the fiscal authorities also influence the inflation rate. Like in many other theoretical models, central bank independence here is defined as the relative weight the central bank places on inflation relative to output (i.e. how 'conservative' is the central bank?). Central bank autonomy may reduce inflation, but also lead to lower social welfare, depending upon society's loss function.<sup>22</sup> In other words, the optimal degree of conservatism of the central bank depends on the society's aversion to inflation and output fluctuations. In chapter 5 we will deal with the determinants of central bank independence.

---

<sup>21</sup> The model draws on Alesina and Tabellini (1987). A similar model is presented by Debelle and Fischer (1994).

<sup>22</sup> Output is produced by labor, whose nominal wage is predetermined; firms maximize profits and can hire the amount of labor they demand at the predetermined nominal wage. Social welfare is assumed to depend upon inflation, the difference between the actual and the natural rate of production, and the difference between the target and the actual level of government spending. The fiscal authorities have a similar loss function with different weights. Government spending is not included in the loss function of the monetary authorities. In the simplest version of the model it is assumed that government spending can only be financed by seigniorage. It is immediately now clear why central bank autonomy may result in lower social welfare, since a more independent central bank will yield lower inflation, but also a lower level of output and a lower level of government spending.



### **3. MEASURES OF CENTRAL BANK INDEPENDENCE**

It is rather difficult to measure the degree of legal independence of various central banks, let alone the degree of their actual independence of the government. Cukierman (1992) has pointed out that actual, as opposed to formal independence, not only hinges on legislation, but also on a myriad of other factors like informal arrangements with government, the quality of the personnel of the bank, and the personal characteristics of key individuals in the bank. Obviously, these other factors are virtually impossible to quantify. Most existing research has, therefore, focused on legal independence and is restricted to industrial countries. In section 3.1 four widely used legal measures of central bank independence are discussed, while section 3.2 presents a critical comparison of these indicators. In section 3.3. some non-legal indicators of central bank independence are reviewed.

#### **3.1 Legal measures of central bank independence**

Table 2 presents four measures of central bank independence, as developed by Alesina (1988, 1989), Grilli, Masciandaro and Tabellini (1991), Eijffinger and Schaling (1992, 1993a) and Cukierman (1992), respectively. For the various indices the following rule applies: the higher the score, the more independent the central bank is. The measures of Alesina and Eijffinger-Schaling range from 1 to 4, and from 1 to 5, respectively. The index of Grilli, Masciandaro and Tabellini is the total of their indicators for political and economic independence (see below for further details). The lowest actual score is 3, the highest value amounts to 13. The value for their index of political independence is shown in parentheses. This measure ranges between 0 to 6. The index of Cukierman varies between 0 and 1.

**Table 2. Legal indices for central bank independence**

	Alesina	Grilli, Masciandaro and Tabellini <sup>a</sup>	Eijffinger-Schaling	Cukierman (LVAU)
Australia	1	9 (3)	1	0.31
Austria	-	9 (3)	3 <sup>b</sup>	0.58
Belgium	2	7 (1)	3	0.19
Canada	2	11 (4)	1	0.46
Denmark	2	8 (3)	4 <sup>b</sup>	0.47
Finland	2	-	3 <sup>b</sup>	0.27
France	2	7 (2)	2	0.28
Germany	4	13 (6)	5	0.66
Greece	-	4 (2)	-	0.51
Iceland	-	-	-	0.36
Ireland	-	7 (3)	-	0.39
Italy	1.5	5 (4)	2	0.22
Japan	3	6 (1)	3	0.16
Netherlands	2	10 (6)	4	0.42
New Zealand	1	3 (0)	3 <sup>b</sup>	0.27
Norway	2	-	2 <sup>b</sup>	0.14
Portugal	-	3 (1)	2 <sup>b</sup>	-
Spain	1	5 (2)	3 <sup>b</sup>	0.21
Sweden	2	-	2	0.27
Switzerland	4	12 (5)	5	0.68
United Kingdom	2	6 (1)	2	0.31
United States	3	12 (5)	3	0.51

<sup>a</sup> The measure of Grilli, Masciandaro and Tabellini is the index for political and economic independence. Their index for political independence is shown in parentheses.

<sup>b</sup> These extensions of the Eijffinger-Schaling index are based upon Eijffinger and Van Keulen (1995). The ranking of these countries refers to relatively new central bank laws (adjusted during the last ten years), except for Denmark.

Although the various indicators are all based on a similar approach, it follows from table 2 that they show sometimes very different outcomes. For instance, according to the measure of Grilli, Masciandaro and Tabellini the Greek central bank has little autonomy, whereas this bank is relatively independent according to the ranking of Cukierman (1992).

The *measure of Alesina (1988, 1989)* is primarily based on a paper by Bade and Parkin (1988), which was never published, classifying central banks into four groups, with a score of 1 (most dependent) to 4 (most independent). Bade and Parkin analyze central bank laws applying the following criteria:

1. is the central bank the final authority?;
2. is there no government official (with or without voting power) on the bank policy board?;
3. are more than half of the policy board appointments made independently of the government?

For central banks with the highest degree of autonomy the second question is answered in the negative, and the questions 1 and 3 in the affirmative. Bade and Parkin (1988) find the following ordering: type 1: Australia; type 2: Belgium, Canada, France, Italy, the Netherlands, Sweden and the United Kingdom; type 3: Japan, United States; and type 4: Germany and Switzerland. The numerical values of the Alesina index are identical to those of the Bade-Parkin index, except for the case of Italy. This different evaluation is based on the divorce ('divorzio') between the Treasury and the Banca d'Italia in 1981, after which the Banca d'Italia was no longer obliged to absorb all excess supply of short-term Treasury bills. This step decreased the scope for monetary financing of government deficits and increased the independence of the Italian central bank. On the basis of information from Fair (1980) and Masciandaro and Tabellini (1988), Alesina adds the following countries: Denmark, New Zealand, Norway and Spain.

The *index of Grilli, Masciandaro and Tabellini (1991)* consists of two parts: political and economic independence. The first yardstick measures the capacity to choose the final goal of monetary policy; the second yardstick proxies for the capacity of the central bank to choose its instruments of monetary policy independently. The degree of political independence is determined using eight criteria:

1. is the governor not appointed by the government?;
2. is the governor appointed for more than five years?;
3. are all policy board members not appointed by the government?;
4. is the policy board appointed for more than 5 years?;
5. is there no mandatory participation of a government representative in the policy board?;
6. is government approval of monetary policy required?;

7. are there statutory requirements that the bank pursues monetary stability among its goals?;
8. are there legal provisions that strengthen the bank's position in case of conflict with the government?

Germany and the Netherlands score highest on this political independence index. Grilli et al. also look at economic independence. The numerical coding for this measure is determined on the basis of the following eight items:

1. is the direct credit facility not automatic?;
2. is the direct credit facility based upon the market interest rate?;
3. is the direct credit facility temporary?;
4. is the direct credit facility of a limited amount?;
5. does the central bank not participate in primary market for public debt?;
6. is the discount rate determined by the central bank?;
7. is banking supervision not entrusted to the central bank?;
8. is banking supervision not entrusted to the central bank alone?

Again, the Deutsche Bundesbank appears to be the most independent central bank.<sup>23</sup>

With respect to the last two criteria of the economic independence measure some additional comments are in order. In the debate on the question of whether central banks should be entrusted with prudential supervising powers, various arguments have been put forward in support of both views (see Roll et al. (1993) and De Beaufort Wijnholds and Hoogduin (1994)). The most important argument in favor of separating monetary policy and prudential supervision functions is based on the fear that the central bank's anti-inflationary stance would be undermined by a large injection of liquidity, aimed at keeping one or more important financial institutions from going under. However, even if banking supervision is performed by another agency, the central bank will have to intervene in case one of the larger banks may go bankrupt. De Haan and Sturm (1992) therefore conclude that whether or not a central bank is entrusted with banking supervision, has little impact on its independence.

On the basis of the following features *Eijffinger and Schaling* (1992, 1993a) have developed an alternative measure for central bank autonomy:<sup>24</sup>

---

<sup>23</sup> According to Alesina and Grilli (1992), the European Central Bank receives exactly the same scores as the Bundesbank applying both the political and the economic independence yardsticks.

<sup>24</sup> Recently, Eijffinger and Van Keulen (1995) have extended their sample of twelve countries with another eleven countries generally based on recently introduced central bank laws. These eleven countries have adjusted their central bank laws mostly during the last ten years, except for Denmark.

1. is the bank the sole final policy authority; is this authority not entrusted to the central bank alone, or is it entrusted completely to the government?
2. is there no government official (with or without voting power) on the bank policy board?
3. are more than half of the policy board appointments made independently of the government?

If the central bank has the sole responsibility for monetary policy, a country gets a double score. In case of joint responsibility it gets a normal score and if only government is responsible it gets no score. In case of an affirmative answer to questions 2. and 3., a country receives a normal score. Eijffinger and Schaling add one to the total score - so that the least independent central bank gets a score of one, and the most independent bank receives a score of five.

The *measure of Cukierman (LVAU)* is also based upon interpretation of various elements of central bank laws. These legal characteristics are grouped into four clusters:

1. the appointment, dismissal, and term of office of the chief executive officer (CEO) of the bank, usually the governor:
  - a) term of office (too);
  - b) who appoints CEO (app)?
  - c) dismissal of CEO (diss);
  - d) may CEO hold other offices in government (off)?;
2. the policy formulation cluster:
  - a) who formulates monetary policy (monpol)?;
  - b) who has final word in resolution of conflict (conf)?;
  - c) role in the government's budgetary process (adv);
3. the objectives of the central bank (obj);
4. limitations on the ability of the central bank to lend to the public sector:
  - a) advances (Ila);
  - b) securitized lending (Ils);
  - c) terms of lending (ldec);
  - d) potential borrowers from the bank (lwidth);
  - e) how are limits defined (ltype)?;
  - f) maturity of loans (lmat);
  - g) which interest rate is being applied (lint)?;
  - h) is the central bank prohibited from buying or selling government securities in the primary market (lprim)?

For each of these variables Cukierman discerns various possibilities, which get a numerical coding



between zero and one. For instance, in the third cluster the following possibilities exist: price stability is the major or only objective and in case of conflict the central bank has the final word (1); price stability is the only objective (0.8); price stability is one goal, with other compatible objectives (0.6); price stability is one goal, together with other, potentially conflicting objectives (0.4); the charter does not state any objective (0.2); and, finally: stated objectives do not include price stability (0). The numerical coding is shown in parentheses.

It follows from the foregoing analysis that Cukierman applies a certain weighing scheme. To assess the overall independence of a central bank, this author has computed two alternative indices. An unweighted index (LVAU), calculated as a simple average of the codings of the variables obtained in a first round of aggregation (see below), and a weighted index. The first round of aggregation includes the following procedure. The variables in the first cluster have been aggregated into a single variable using the unweighted mean of the various criteria. The three criteria in the second cluster are combined into a new variable by computing a weighted mean (the weights are: 0.25; 0.5 and 0.25, respectively). The last four variables in the fourth cluster are aggregated into a single variable, using the unweighted mean. This gives a total of eight variables (the three new ones and the five remaining variables). Cukierman's index LVAU is the unweighted average of these variables. In Cukierman, Webb and Neyapti (1992) a weighted average of these variables (LVAW) is presented.

### **3.2 A comparison of legal independence measures**

Although all measures are, in principle, very similar, they yield rather different outcomes. This impression is confirmed by table 3 which shows Kendall's rank correlation coefficients of the various measures. The Spearman rank correlation is shown in parentheses. Especially the very low correlation between the measure of Grilli, Masciandaro and Tabellini and Cukierman on the one hand, and the Eijffinger-Schaling index on the other may be noted.

**Table 3. Rank correlation coefficients of indices of central bank independence**

	Alesina	Grilli, Masciandaro and Tabellini	Eijffinger-Schaling	Cukierman (LVAU)
Alesina	1	0.58 (0.69)	0.71 (0.78)	0.38 (0.44)
Grilli, Masciandaro and Tabellini	-	1	0.36 (0.48)	0.52 (0.63)
Eijffinger-Schaling	-	-	1	0.20 (0.35)
Cukierman (LVAU)	-	-	-	1

Kendall rank correlation coefficients (Spearman rank correlation coefficients in parentheses).

There are at least two explanations for these diverging outcomes. First, the interpretation of the relevant bank laws differs. In general one could say that for those countries that some author is most familiar with, different rankings will occur. For instance, Alesina (1988, 1989) disagreed with Bade-Parkin's ranking for Italy. However, this did not lead to an upgrade of the Banca d'Italia, but to a lower ranking. Eijffinger and Schaling (1992) conclude that, apparently, Alesina (1988, 1989) has used implicitly a fourth criterium for Italy, namely: is the central bank obliged to accommodate the government budget deficit? However, Alesina does not apply this criterion to the other countries in his sample.

In discussing the index of Grilli, Masciandaro and Tabellini, Malinvaud (1991) argues that the Banque de France is given a higher degree of independence than it actually has, since the governor could be removed any time by decision of the French government. In a similar vein, we have some doubts with respect to Cukierman's (1992) interpretation of the Dutch central bank ('Bankwet 1948'), which we are most familiar with. Table 4 shows the various codings of Cukierman and our interpretation of the law. In parentheses our numerical codings are presented. It follows from this table that in our view the Dutch central bank is considerably more independent than Cukierman's coding would suggest.<sup>25</sup>

<sup>25</sup> The Dutch central bank legislation is apparently hard to interpret. Also Roll et al. (1993) are clearly wrong when they state that there is a "17-member Council that advises minister of guidelines that Bank should follow in policy" (p. 27).

**Table 4. Cukierman's legal variables: the Dutch case**

Variable: (see p.PM for description)	Cukierman's coding:	Interpretation:	Comments: (our coding is given in parentheses)
too	0.75	8 > too > 6	board members appointed for seven years; appointment is renewable
app	0.00	CEO appointed by minister of finance	correct, but on the basis of a list, containing only two names, which is drafted by the governing and supervisory boards of the bank (0.75)
diss	0.17	dismissal for policy reasons at executive branch's discretion	only in case the minister has given a so-called "instruction", which the governing board rejects, the board can be dismissed; such an instruction has never been given (0.83)
off	1.00	CEO prohibited from holding other office	correct
monpol	0.33	CB has only advisory capacity	incorrect: central bank has full freedom in formulating and implementing monetary policy, except for the (theoretical) possibility pointed out above (1.00)
conf	0.20	government has final authority in case of conflict, but subject to process and protest by central bank	correct, but this process has never occurred, since it is linked with the "instruction" procedure
adv	0.00	central bank is not given active role in the formulation of government's budget	correct, but one may wonder whether this has anything to do with central bank autonomy; indeed it may be argued that if the cb is involved this may threaten its independence
obj	0.80	price stability mentioned as only goal	the wording of the law also implies external stability
lla	0.67	relatively strict limits (cash amount)	correct; collateral is necessary
lls	0.00	no limits	correct, but this type of credit is not provided
ldec	0.00	executive branch decides the terms	incorrect: the law specifies the terms (0.66)
lwidth	1.00	only central government can borrow	not entirely correct, since Amsterdam and Social Insurance Bank may also borrow
ltype	1.00	limits specified as cash amount	correct as far as article 20 of the Bank Law is concerned; however, additional liquidity may be provided which is limited in terms of a percentage of total government revenues
lmat	0.00	no upper bound	incorrect: maturity is limited to one year
lint	0.00	no interest rate charge	correct
lprim	0.00	not prohibited from buying government securities in primary market	correct



A second reason for the diverging outcomes of various indicators is that various measures focus on different aspects of central bank independence. Eijffinger and Schaling (1993a) criticize the measure of Grilli, Masciandaro and Tabellini (1991). The rather large number of criteria that these authors apply erode the weight of the important criteria, e.g. the objectives for the central bank and appointing procedures ('watering down'). The indicator of Cukierman may also be criticized in this respect. His aggregation procedures imply that the criteria which are in our view most important in determining central bank autonomy (i.e. the variables in clusters 1 and 3) get a relatively low weight.

More generally, one could compare these indices with respect to the four aspects of central bank independence as outlined in the Introduction. Table 5 compares the various indices that have been discussed. It follows from this table the various indicators focus upon different aspects of central bank independence. As the various measures differ and show a low correlation it is very dubious to construct an indicator for central bank independence based on an average of various independence measures as, for instance, Alesina and Summers (1993) and Fratianni and Huang (1994) have done.

**Table 5. Aspects of central bank independence: a comparison of five indicators**

Measure:	Bade-Parkin (BP)	Alesina (AL)	Grilli, Mascian- daro, Tabellini (GMT)	Eijffinger- Schaling (ES)	Cukierman (LVAW)
maximum total score:	4	4	16	5	1.00
personnel independence	2/3	2/4	6/16	2/4	2/10
financial independence	--	1/4	5/16	--	5/10
policy independence	1/3	1/4	5/16	2/4	3/10
of which:					
- instrument independence			3/16		3/20
- goal independence			2/16		3/20

### 3.3 Non-legal measures of central bank independence

On the basis of a *questionnaire* under "qualified individuals in various central banks" Cukierman (1992) has developed a measure for central bank independence.<sup>26</sup> Both an unweighted (QVAU) and a weighted (QVAW) variant of this indicator is available. The questionnaire contained questions on the following issues: (1) legal aspects of independence; (2) actual practice when it differs from the stipulation of the law; (3) monetary policy instruments and the agencies controlling them; (4) intermediate targets and indicators and (5) final objectives of monetary policy and their relative importance. Unfortunately, the responding number of central bankers was rather limited. Furthermore, an obvious methodological drawback of the questionnaire method is that central bankers may benefit from providing a too positive impression of their independence. One may doubt whether personnel of central banks is the most suited audience for a questionnaire on central bank autonomy.<sup>27</sup> However, to the best of our knowledge, a similar survey has never been organised among other participants in financial markets.

Cukierman (1992) and Cukierman, Webb and Neyapti (1992) have also developed a yardstick for central bank autonomy based on the actual *average term of office* of central bank governors in different countries during the period 1950-1989. This indicator is based on the presumption that, at least above some threshold, a higher turnover of central bank governors indicates a lower level of independence. The idea behind this measure is that, even if the central bank law is quite explicit, it may not be operational if there is a different tradition. A striking example is Argentina, where the legal term of office of the central bank governor is four years, but where there it is also an informal tradition that the governor will resign whenever there is change of government, or even a new finance minister. Consequently, the actual average term of office of the governor of the central bank amounted to only ten months during the 1980s. This example suggests that the turnover rate of central bank governors may be a good indicator for the degree of central bank autonomy.<sup>28</sup> Table 6 presents the average turnover rate of central bank governors for 55 countries during the

---

<sup>26</sup> See Cukierman (1992), pp. 386-391 and pp. 412-414.

<sup>27</sup> Indeed, one could argue that the difference between the legal independence measure and the indicator based upon the questionnaire gives some impression of the degree of overrating of their independence by central bankers. For instance, for Italy the score for LVAU is 0.22, whereas the score for QVAU amounts to 0.76.

<sup>28</sup> However, a long term in office may also indicate a low level of independence as a relatively subservient governor will tend to stay longer in office than a governor who stands up to the executive branch. Cukierman (1992) argues that this may be true for countries with exceptionally low turnover rates such as Iceland, Denmark and the United Kingdom.

forty years ending in 1989, for both OECD countries and some developing countries. From table 2 two conclusions can be drawn. First, the turnover rate differs greatly across countries and varies between 0.03 (Iceland) and 0.93 (Argentina). Second, the average and standard deviation of the turnover rate in developing countries are much higher than the corresponding measures for OECD countries. The average turnover rate in the industrial countries amounts to 0.13; the average for the developing countries is 0.28. The highest turnover rate in the OECD countries (excluding Turkey) is 0.2 for Spain and Japan. So, this measure of central bank autonomy hardly discriminates between central banks of industrialized countries. This is not the case for four legal measures of central bank independence. These indices are based upon various aspects of central bank laws and which will be discussed in greater detail in the remainder of this chapter.

OECD Countries:		Developing Countries:	
Belgium	0.13	Argentina	0.93
Canada	0.10	Bahamas	0.19
Denmark	0.05	Barbados	0.11
Finland	0.13	Botswana	0.41
France	0.15	Chili	0.45
Germany	0.10	Colombia	0.20
Greece	0.18	Costa Rica	0.58
Iceland	0.03	Egypt	0.31
Ireland	0.15	Ethiopia	0.20
Italy	0.08	Ghana	0.28
Japan	0.20	Honduras	0.13
Luxembourg	0.08	India	0.33
Netherlands	0.05	Israel	0.14
New Zealand	0.15	Kenya	0.17
Norway	0.08	Lebanon	0.19
Spain	0.20	Malaysia	0.13
Sweden	0.15	Malta	0.28
Switzerland	0.13	Mexico	0.15
Turkey	0.40	Nigeria	0.19
United Kingdom	0.10	Panama	0.24
United States	0.13	Peru	0.33
		Philippines	0.13
		Singapore	0.37
		South Africa	0.10
		South Korea	0.43
		Tanzania	0.13
		Thailand	0.20
		Uganda	0.34
		Uruguay	0.38
		Venezuela	0.30
		Zaire	0.23
		Zambia	0.38
		Zimbabwe	0.15
Average:	0.13	Average:	0.28
Standard deviation:	0.08	Standard deviation:	0.17

Source: Cukierman (1992); the (previously) communist countries are not included.



Cukierman and Webb (1994) have gone one step further. They argue that the frequency of central bank governor transfers reflect both the frequency of political change (e.g. regimes shifts, or a new head of government) and the fraction of political changes that are followed by changes of the central bank governor. They therefore develop an indicator of the *political vulnerability* of the central bank, which is defined as the fraction of political transitions that are followed promptly (i.e. within 6 months) by a replacement of the central bank governor. For the period 1950-89 they calculate that the average political vulnerability index amounts to 0.24. For industrial countries it is 0.10, while the index for developing countries is 0.34. Again, one should be careful in interpreting this index. De Haan (1995a) shows that the score for the Netherlands of 0.10 of the political vulnerability index is the result of pure coincidence.

#### 4. EMPIRICAL EVIDENCE ON THE CONSEQUENCES OF CENTRAL BANK INDEPENDENCE

This chapter takes a look into the empirical evidence regarding the link between central bank independence on the one hand and various economic variables, like inflation and economic growth, on the other. Table 7 summarizes all studies that we are aware of, in which one or more of the independence indicators are used which are explained in the previous chapter. The second column shows the indicators of central bank independence used, while the third and fourth column present the sample of countries and the estimation period, respectively. The final column of table 1 contains the economic variables that are included in these studies.

One conclusion that follows from table 7 is that most studies are confined to industrial countries. Only Cukierman (1992), Cukierman, Webb and Neyapti (1992), Cukierman et al. (1993), Cukierman and Webb (1994) and De Haan and Siermann (1995) also include LDCs in their analysis. Another insight that follows from table 7 is that many authors focus on one measure of central bank independence only, so that it is not clear whether conclusions drawn are 'measure specific'. As the independence indicators employed focus on different aspects of central bank independence (see chapter 3), it is important to use various indicators, even if the sample only includes industrial countries. Some studies compare the results when several indicators are used, thereby examining the robustness of empirical results. As will be shown below, some outcomes are indeed depending on which indicator of central bank independence is used.

**Table 7. Empirical studies on the consequences of central bank independence**

Study:	Measure used <sup>a</sup> :	Countries:	Estimation period:	Variables examined:
Bade and Parkin (1988)	BP	12 OECD countries	1972-1986	inflation, inflation variability
Alesina (1988, 1989)	AL	16 OECD countries	1973-1985	inflation, inflation variability
Grilli, Masciandaro and Tabellini (1991)	GMT	18 OECD countries	1950-1989 and subperiods	inflation, budget deficit, output growth, and variability of growth
De Haan and Sturm (1992)	AL, GMT, ES	14, 18 and 11 OECD countries	1961-1987 and subperiods	inflation, inflation variability, output growth, growth variability, budget deficit, central bank credit to government
Cukierman (1992)	LVAW, TOR and QVAW	70 countries	1950-1989 and subperiods	inflation, central bank credit to public sector
Cukierman, Webb and Neyapti (1992)	LVAW, TOR and QVAW	72 countries	1950-1989 and subperiods	inflation, inflation variability, central bank credit to public sector
De Long and Summers (1992)	average of AL and GMT	16 OECD countries	1955-1990	growth of output per worker
De Haan, Knot and Sturm (1993)	GMT	18 OECD countries	1979-1989	disinflation costs
Pollard (1993)	average of AL and GMT	16 OECD countries	1973-1989	budget deficit and variance of deficits
Alesina and Summers (1993)	average of AL and GMT	16 OECD countries	1955-1988 (1973-1988)	inflation, inflation variability, GNP growth, variability of growth, level and variance of unemployment, level and variance of interest rate
Eijffinger and Schaling (1993b)	BP, AL, GMT, ES	12 OECD countries	1972-1991 and subsamples	inflation, inflation variability, output growth, variability of growth
Havrilesky and Granato (1993)	AL	18 OECD countries	1955-1987	inflation
Cukierman et al. (1993)	LVAW, TOR	around 50 countries	1960-1989	per capita growth rate, private investment, productivity growth, interest rates
Debelle and Fischer (1994)	GMT and components thereof	18 OECD countries	1960-1992	inflation, disinflation costs
Fratianni and Huang (1994)	average of nine indicators	15 OECD countries	1960-1990	inflation, inflation variability, output growth, variability of growth
Eijffinger, Van Rooij and Schaling (1994)	BP, AL, GMT, ES, EMP <sup>b</sup>	10 OECD countries	1977-1990	inflation, inflation variability, output growth, variability of growth, level and variance of interest rate

De Haan and Eijffinger (1994)	AL, GMT, ES, LVAW	12, 18 and 21 OECD countries	1972-1991 and 1977-81 and 1982-91	inflation, inflation variability, output growth, variability of growth
Cukierman and Webb (1994)	political vulnerability	64 countries	1950-1989	inflation, inflation variability, output growth, level and variance of interest rate
Walsh (1994)	LVAW, GMT	11 EC countries	1973-1991/92	disinflation costs
Posen (1994)				disinflation costs
Eijffinger and Van Keulen (1995)	BP, AL, GMT, ES	11 countries, including 3 Eastern European	1982-1993	inflation, inflation variability
Cargill (1995)	LVAW	20 OECD countries	various subperiods of 1962-1991	inflation
Al-Marhubi and Willett (1995)	LVAW, GMT, AL	21 OECD countries	1973-1989	inflation
De Haan (1995b)	components of LVAW	21 OECD countries	1973-1989	inflation, inflation variability
Gärtner (1995)	GMT, average of AL and GMT, LVAW	9 (16) OECD countries	1960-1988	disinflation costs
De Haan and Siermann (1995)	TOR	43 LDCs	1950-1989	inflation

BP is the index of Bade-Parkin; AL is the index of Alesina; GMT is the index of Grilli, Masciandaro and Tabellini; ES is the index of Eijffinger-Schaling; TOR is the turnover rate of central bank governors; LVAW is Cukierman's legal independence index, while QVAW is the index of Cukierman which is based upon a questionnaire.

See p. 47 for an explanation of this variable.

#### 4.1 The level and variability of inflation

Table 8 summarizes the conclusions of studies dealing with the relationship between central bank independence and inflation. The well-known inverse relationship between central bank independence and the level of inflation is supported by most empirical studies. An exception is Cargill (1995), who argues that this statistical association is not robust and depends on countries and time periods included and on the regression specification. However, this argument is not very



convincing as Cargill uses only one measure of central bank independence.<sup>29</sup> Furthermore, one would expect different results under fixed and under floating exchange rate regimes (see also Cukierman, 1995). Under the Bretton-Woods system of fixed exchange rates, countries were committed to an exchange rate target and had little room to conduct an autonomous domestic monetary policy. Thus, the relation between central bank independence and inflation is likely to be much less straightforward before 1973. Regression analysis by Grilli, Masciandaro and Tabellini (1991) and De Haan and Sturm (1992) supports this view.<sup>30</sup> Indeed, one could argue that if no evidence of a relationship between independence and inflation is found in the Bretton Woods period, while there exists such a link for the post-Bretton Woods era, this would strengthen the argument that central bank independence is a primary determinant of a country's inflation performance (Pollard, 1993). Still, many authors are not very careful in distinguishing between exchange rate regimes.

Despite the overwhelming evidence in support of a negative relationship between central bank independence and inflation, it should, however, be noted that a negative correlation does not necessarily imply causation. The correlation between both variables could be explained by a third factor, e.g. the culture and tradition of monetary stability in a country, explaining both an independent central bank and low inflation.<sup>31</sup> Similarly, there may exist a two-way causality between inflation and central bank independence. It is likely that less independence contributes to higher inflation. However, high inflation may also affect independence. As will be explained in more detail in the following chapter, it can be argued that high inflation leads to more or less central bank independence. On the one hand, high inflation may lead to political pressure for low

---

<sup>29</sup> Cargill (1995) also presents the outcomes of various model specifications, without analyzing which specification is to be preferred from an econometric perspective, which is also not very convincing.

<sup>30</sup> Similarly, one would expect that the Exchange Rate Mechanism of the EMS (ERM) might affect outcomes. Ungerer (1990) characterizes the first phase of the EMS (1979-1982) as a period of 'initial orientation' full of frequent and, sometimes, large realignments of central rates. However, from 1982 onwards, the EMS enters a second phase of 'consolidation' (1982-1987), and - after the accord of Basle-Nyborg - moves into a third phase of 're-examination' (1987-present). Consequently, the negative correlation between central bank independence and inflation is expected to be less clear cut during the second and third subperiod than during the first subperiod, because of the priority EMS countries gave at that time to exchange rate stability. Regression analysis by Eijffinger and Schaling (1993b) and De Haan and Eijffinger (1994) supports this view.

<sup>31</sup> The standard example is the case of Germany, where the hyperinflation in the 1920s led to a culture and tradition of monetary stability. See Bresciani-Turroni (1953). The determinants of central bank independence will be discussed more extensively in the next chapter.

inflation, while on the other hand it may encourage processes that make it easier for the government to influence monetary policy, thereby reducing actual independence. This issue of two-way causality is also not addressed in most studies. Cukierman (1992) and Cukierman, Webb and Neyapti (1992) deal with this issue by using two-stage least squares and instrumental variables. They conclude that there is a vicious circle between inflation and low levels of inflation. When sufficiently sustained, inflation erodes central bank independence. Then low independence contributes to higher inflation. De Haan and Van't Hag (1995) conclude, however, that high levels of inflation in the past lead eventually to more central bank independence.

Most studies summarized in table 8 are confined to industrial countries. The work of Cukierman (1992), Cukierman, Webb and Neyapti (1992) and Cukierman and Webb (1994) and De Haan and Siermann (1995) refers to a broader group of countries. These authors found no significant link between legal central bank independence and inflation for the group of developing countries. In their opinion, this is a consequence of the fact that these countries have "less regard for the law." For industrial countries there is an inverse relationship with the legal independence measure and inflation. If the turnover rate of central bank governors is used as a measure of actual independence, there appeared to be a significant, negative relationship for developing countries.<sup>32</sup> Similar results are found by Cukierman and Webb (1994) if the political vulnerability of the central bank is used as indicator for central bank independence.

Most empirical studies consist of simple cross-section estimates in which the average inflation rate is 'explained' by some measure of central bank independence. However, some authors include other explanatory variables as well. Grilli, Masciandaro and Tabellini (1991) and De Haan and Sturm (1992) include some indicators for political instability. This does not deprive the coefficient of the central bank independence indicators from their significance. Similarly, Havrilesky and Granato (1994) take measures of the strength of corporatist structures into account, while Al-Marhubi and Willett (1995) in addition employ indicators for openness, degree of exchange rate fixity and budget deficits. Again, the coefficients of the various indicators for central bank independence remain significant.

---

<sup>32</sup> Although there are only 22 observations available referring to the 1980s, the independence index based on the questionnaire with central bankers also has the predicted sign and is very significant statistically.

**Table 8. Empirical studies on the relationship between central bank independence and inflation**

Study:	Inflation:	Inflation variability:	Comments:
Bade and Parkin (1988)	inverse relationship	no relationship	--
Alesina (1988, 1989)	inverse relationship	less partisan volatility in countries with independent central bank	not robust, as explained in the text
Grilli, Masciandaro and Tabellini (1991)	significant negative relationship, except for 1950s and 1960s	--	other variables included
De Haan and Sturm (1992)	significant negative relationship, except for 1960s	significant negative, except for 1960s	other variables included
Cukierman (1992)	LVAW significant for OECD countries, but not for LDCs; TOR significant in LDCs	--	--
Cukierman, Webb and Neyapti (1992)	LVAW significant for OECD countries, but not for LDCs; TOR significant in LDCs	idem	--
Alesina and Summers (1993)	significant negative relationship	significant negative relationship	--
Eijffinger and Schaling (1993b)	significant negative relationship except for GMT (political)	no relationship, except for GMT (political)	variance measured on monthly basis
Havrilesky and Granato (1993)	significant negative relationship	--	measures for corporatist structure also taken into account
Debelle and Fischer (1994)	instrument independence and statutory requirement for price stability are significant, while variables relating to appointment procedures are not	--	--
Fратиanni and Huang (1994)	significant negative relationship	idem	--
Eijffinger, Van Rooij and Schaling (1994)	significant negative relationship, except for GMT	no relationship, except for GMT	--
De Haan and Eijffinger (1994)	significant negative relationship	mixed results	results depending on the number of countries



Cukierman and Webb (1994)	political vulnerability of central bank has significant positive impact on inflation	idem	political instability also included in regressions
Eijffinger and Van Keulen (1995)	no significant relationship for total sample of countries	no relationship	for countries where central bank law has been in force more than 5 years, there is a negative association between independence and inflation (for GMT and ES)
Cargill (1995)	no robust relationship	--	statistical association is not robust and depends on countries included and regression specification
Al-Marhubi and Willett (1995)	significant negative relationship	--	measures for corporatist structure and other factors that may influence inflation also taken into account
De Haan (1995b)	significant negative relationship with proxy for instrument independence	idem	--
De Haan and Siermann (1995)	TOR has significant positive impact on inflation	--	political instability also taken into account

Although there are many empirical studies on the relationship between central bank independence and inflation, only two studies try to differentiate between the various aspects of central bank autonomy. Debelle and Fischer (1994) decompose the independence measure of Grilli, Masciandaro and Tabellini (1991) into goal independence, instrument independence, and personnel independence.<sup>33</sup> They conclude that lack of goal independence (i.e. a mandate for price stability) and instrument independence are most closely tied to inflation performance, while personnel independence is not significantly related to inflation. Similarly, De Haan (1995b) has decomposed the legal independence measure of Cukierman (1992) and relates its components to inflation. Using pooled time series and cross-section data for a sample of 21 industrial countries, he concludes that only instrument independence matters for inflation performance.<sup>34</sup> Table 9 reproduces some

<sup>33</sup> Goal dependence is measured as the presence of a statutory requirement that the central bank pursue monetary stability among its goals. Personnel independence is measured as Grilli, Masciandaro and Tabellini's index of political independence, excluding the statutory requirement. Finally, instrument independence is Grilli, Masciandaro and Tabellini's index of economic independence minus the bank supervision criterion.

<sup>34</sup> The proxy for personnel independence is the sum of all variables in the first cluster of variables as distinguished by Cukierman (1992) and which have been explained in some detail in chapter 3. The proxy for instrument independence is the sum of the variables in the second cluster,



results from these studies.

**Table 9. Inflation and aspects of central bank independence**

	goal independence	instrument independence	personnel independence	financial independence
Debelle and Fischer (1994)	-1.76 (1.02)	-1.02 (2.04)*	-0.41 (0.91)	--
	-2.28 (1.42)	-1.02 (2.04)*	--	--
De Haan (1995b)	2.33 (1.12)	-2.27 (-2.01)*	-0.16 (-0.26)	-0.58 (-0.95)
	2.13 (1.10)	-3.02 (-3.83)**	-0.36 (-0.58)	--

T-statistics are in parentheses. One and two asterisks denote significance at 5% and 1% level, respectively.

As explained above, most empirical studies on the relationship between central bank independence and inflation consist of cross-section regressions. There are also some studies in which a somewhat different approach is followed. Capie, Mills and Wood (1994) investigated the relationship between the level of inflation and central bank independence for twelve countries: Austria-(Hungary), Belgium, Brazil, Canada, England (the United Kingdom), France, (West-) Germany, India, Italy, Japan, New Zealand, Spain, Sweden and the United States. Based on the degree of policy influence, beginning between 1871 and 1916 and ending in 1987, they classified central banks in these countries in three categories ('independent', 'dependent' and 'unclassified'). During all periods - before the First World War, in the Interbellum, during and after the Bretton-Woods system - the nations with an independent central bank are continuously in the group of low-inflation-countries. Sometimes this group also includes countries with a dependent central bank.

---

except for whether the central bank has an active role in the formulation of government's budget, which has little to do with central bank independence. Goal independence is Cukierman's (1992) score for the third cluster; according to Cukierman (1992, p. 377): "It proxies the ... independence of the CB to elevate the target of price stability above other objectives. In Rogoff's terminology, it measures how strong is the 'conservative bias' of the CB as embodied in the law". Financial independence is proxied by the sum of most variables in the fourth cluster as discerned by Cukierman (1992).

Capie, Mills and Wood conclude, therefore, that independence is a sufficient, but not a necessary condition for low inflation.

Johnson and Siklos (1992) use reaction functions of central banks, with the money market interest rate as policy variable. If central bank independence can be measured by the change in interest rates, there are little differences across central banks considered. Their analysis covers seventeen industrial countries during the period from 1960 till 1990.

Eijffinger, Van Rooij and Schaling (1994) apply a panel data approach to the reaction functions of central banks of ten industrial countries during the 1977-1990 period, with present and past inflation and real economic growth as explanatory variables of changes in money market rates. They find a country-specific factor that these authors interpret as the degree of empirical central bank independence. Regression analysis of average inflation on their empirical index of central bank independence (EMP) confirms that having an independent central bank will lead to lower inflation.

What is the empirical relationship between central bank independence and the *variability of inflation*?

Inflation variability is positively correlated with the level of inflation. Chowdhury (1991) has investigated the relation between the level and variability of inflation in 66 countries for the period from 1955 to 1985. He concludes that during this period there exists a significant, positive correlation between both variables. Consequently, if a high degree of central bank independence results in lower levels of inflation, greater independence could also lead to less variability of inflation. Indeed, many authors conclude that the variability of inflation - generally measured as the standard deviation of inflation - shows an inverse relationship with central bank independence, which is in line with Rogoff's (1985) model.

There is another way to consider the impact of central bank independence on inflation variability. As has been pointed out in chapter 2, partisan considerations will lead to inflation variability if there is a regular change of government and if the monetary authorities are dominated by elected politicians. In contrast, a relatively independent central bank will not change its policy after a new government has been elected. So central bank independence may reduce inflation variability over longer time periods. Table 10 updates and extends a table provided by Alesina (1988), in which he analyses whether central bank independence has influence on inflation differences under 'right-wing' and 'left-wing' governments. Only countries that during the 1980s witnessed a government change where a 'right-wing' government was replaced by a 'left-wing' government, or vice versa, and where a meaningful comparison is possible, are included in table 4.

The first three rows in table 10 give an 'update' of the table provided by Alesina (1988). This author concludes that inflation shows less variation between governments with different political orientations in countries with a relatively independent central bank. The lower part of the table presents our extension. It follows that Alesina's conclusion is highly dependent on the set of countries included in the analysis. If Australia, New Zealand and Norway are also included, the results are less clear cut. First, under 'left-wing' governments in Australia, New Zealand and Norway the inflation rate is lower than under 'right-wing' governments. Second, the inflation differentials seem to be hardly related to central bank independence. Norway, for instance, has a relatively dependent central bank according to the index of Cukierman (1992), while its inflation differentials are similar to those of Australia and New Zealand.

**Table 10. Average inflation in some OECD-countries under 'left-wing' and 'right-wing' governments**

Country:	Government:		Inflation difference:	Central Bank Independence <sup>a)</sup> :	
	Period: Inflation:			Grilli, Masciandaro Tabellini	Cukierman
Germany	Social Democrats 1975-82 4.8	Christian Democrats 1983-92 2.4	2.4	13	0.66
United Kingdom	Labor 1975-79 15.4	Conservatives 1980-92 6.8	8.6	6	0.31
United States	Carter (Democrat) 1977-80 8.4	Reagan-Bush (Republican) 1981-92 4.7	3.7	12	0.51
Australia	Frazer (liberal) 1976-83 10.3	Hawk (Labor) 1984-90 7.2	3.1	9	0.31
New Zealand	Muldoon (National Party) 1976-84 13.6	Lange/Palmer/Moore (Labor) 1985-90 10.5	3.1	3	0.27
Norway	Willoch (conserv) 1982-86 7.9	Brundlandt (soc-dem) 1987-92 4.9	3.0	n.a.	0.14

a) These measures are discussed in greater detail in the previous chapter. In general the following rule applies: the higher the score, the more independent the central bank is. The highest value of the index of Grilli, Masciandaro and Tabellini (1991) amounts to 13, whereas the maximum value of the index of Cukierman (1992) is 0.68.



## 4.2 Economic growth and disinflation costs

In the foregoing analysis two arguments have been discussed why central bank independence may stimulate economic growth in the longer run. These arguments are (1) less uncertainty about inflation, and (2) the better functioning of the price mechanism. Empirical research by Grimes (1991), Fischer (1993) and Barro (1995) suggests that inflation reduces economic growth.<sup>35</sup> This may be explained by the positive correlation between the level and variability of inflation. Greater variation in the rate of inflation can imply increasing uncertainty about inflation and may, thereby, lead to lower economic growth. This relationship between inflation variability and economic growth is, however, not supported by most studies. Logue and Sweeney (1981) find no significant influence of inflation variability on real growth rates. The same conclusion is also drawn by Jansen (1989).

Various studies have examined directly whether central bank independence is related to economic growth. Table 11 summarizes these studies. It follows from this table that various authors conclude that central bank independence is not related to economic growth (or unemployment). Despite the fact that a high degree of central bank independence is associated with lower inflation in the long run, it follows from table 11 that a policy of disinflation is apparently not associated with high costs or great benefits in terms of long-run economic growth. Indeed, one may be tempted to conclude that the absence of a long-run tradeoff between inflation and growth implies that the establishment of central bank independence is a free lunch. On the other hand, it should be recalled that price stability is, in general, regarded as an essential condition for sustainable economic growth and that, accordingly, central bank independence would lead to a higher level of economic growth. From this point of view, lack of a significant, positive relation between growth and independence would, therefore, be rather disappointing. There are, however, two studies that report a positive relationship between central bank autonomy and economic growth. De Long and Summers (1992) found a positive relationship between central bank independence and GDP per worker for their sample of OECD countries. Cukierman et al. (1993) find that economic growth in the industrial countries is not correlated with central bank independence, even after corrections have been made for other factors which may influence economic growth. Using the frequency of president changes as a proxy for independence, they find however, a positive relation between this variable and economic growth in developing countries.

A next question is, of course, whether there exists a relationship between central bank independence and the *variation of economic growth*. Theory predicts different outcomes. According

---

<sup>35</sup> This conclusion is, however, contradicted by a recent study of Karras (1993).



to Rogoff (1985), independent central banks purchase a lower level of inflation at the price of a higher variability of real economic growth. In contrast, Alesina and Summers (1993) argue that an autonomous central bank will be less inclined to conduct a 'stop-go' policy which may limit fluctuations in economic growth. It follows from table 11 that a higher degree of central bank independence is not associated with greater variation of real economic growth rates.

**Table 11. Empirical studies on the relationship between central bank independence and economic growth**

Study:	Economic growth	Variability of growth	Disinflation costs
Grilli, Masciandaro and Tabellini (1991)	no relationship	no relationship	--
De Haan, and Sturm (1992)	no relationship	no relationship	--
De Long and Summers (1992)	positive relationship, while controlling for other factors	--	--
Alesina and Summers (1993)	no relationship	no relationship	--
De Haan, Knot and Sturm (1993)	--	--	no relationship
Eijffinger and Schaling (1993b)	no relationship	no relationship	--
Cukierman et al. (1993)	no relationship if legal index is used, but significant relationship if TOR is employed	negative relation between variability and independence proxied by TOR	--
Fratianni and Huang (1994)	no relationship	no relationship	--
Eijffinger, Van Rooij and Schaling (1994)	no relationship	no relationship	--
De Haan and Eijffinger (1994)	no relationship	no relationship	--

Cukierman and Webb (1994)	political vulnerability of central bank has significant negative impact on growth	--	--
Debelle and Fischer (1994)	--	--	significant positive relationship
Walsh (1994)	--	--	significant positive relationship
Posen (1994)	--	--	significant positive relationship
Gärtner (1995)	--	--	significant positive relationship

The greater credibility attributed to independent central banks is often thought to reduce the costs of subsequent policies designed to cut inflation. Increased central bank independence would tend to shift the short-run Phillips curve inwards to the origin. Walsh (1994) has pointed out, however, that central bank independence may also affect the slope of the Phillips curve. If, for instance, independent central banks tend to foster an economic environment that produces nominal wage contracts of longer duration or with less indexation due to smaller inflation variability, nominal rigidities in the economy will increase, thereby flattening the slope of the Phillips curve. The effect on the slope of the short-run trade-off between unemployment and inflation will raise the real economic costs of a policy to diminish inflation. This could in turn reduce, and potentially offset, the reduced costs of disinflation attributed to the gain in credibility that comes with increased independence.

Another argument why there may be a positive relationship between central bank independence and the costs of disinflation has been put forward by Gärtner (1995). In a framework of staggered wage contracts and relative-wage considerations, disinflation must start slowly and only pick up as the bulk of wage contracts has been renegotiated to keep disinflation costs at a minimum (see also Taylor, 1983). As more independent central banks are likely to disinflate faster, they will face higher disinflation costs.

So, the net effect on the costs of disinflation is an empirical question. De Haan, Knot and Sturm (1993) have analyzed whether central bank independence reduces the disinflation costs (measured as the cumulated unemployment rate over the period 1980-89 relative to its average level over 1973-79). They were not able to find any supporting evidence. Three more recent

studies have also analyzed the effects of central bank independence on the costs of disinflation. Debelle and Fischer (1994) compare the output costs of recessions in Germany and the United States. It appears that the output cost of German recessions are similar to those of US recessions. The sacrifice ratio (output lost due to the reduction of inflation) in Germany is larger than that for the US for all recent recessions, despite the widely assumed "credibility bonus" of the Bundesbank. Debelle and Fischer also report a positive and significant relationship between the GMT index of central bank independence and output losses. Similar results are reported by Gärtner (1995), who has also used other indicators for central bank independence.<sup>36</sup> Posen (1994) also concludes that the costs of disinflation are not lower in countries with independent central banks, even when differences in contracting behavior are taken into account. All this evidence implies that output losses suffered during recessions have on average been larger, as the independence of the central bank increases. As Debelle and Fischer argue, this suggests that there is no credibility bonus in the labor markets for more independent central banks: they have to prove their toughness by continually being tough. Similar results have been reported by Walsh (1994) for various European Union (EU) member states. EU countries with greater central bank independence appear also to face higher costs of disinflation. Walsh has pointed out that this positive correlation could arise because inflation is more costly to reduce at lower levels of inflation, and central bank independence is associated with lower levels of inflation. However, this author also reports evidence that even after controlling for average inflation in a cross section regression of EU countries, the relationship between the trade-off parameter and central bank independence is positive and significant. According to Walsh, this evidence suggests that greater central bank independence as required under the Maastricht Treaty may lead to a rise in EMU of the costs associated with policies designed to reduce inflation. Still, one should bear in mind that the causality may run the other way round. In other words, perhaps countries with flat short-run aggregate supply curves are more likely to establish independent central banks. Walsh has noticed that flat supply curves make disinflation more costly, but they also raise the temptation to stimulate the economy and thus increase the inflationary bias of discretionary policy. This issue will be taken up in chapter 5.

### 4.3 Other variables

It follows from the preceding analysis that greater central bank independence is associated with

---

<sup>36</sup> Gärtner's results are, however, not in line with Taylor's (1983) model, as there is no relationship between central bank independence and the speed of disinflation.

lower inflation rates. Through the Mundell-Tobin effect this may result in higher (ex post) real interest rates. De Haan and Sturm (1992) find some limited support for the Mundell-Tobin effect: low inflation countries have, usually, high (ex post) real interest rates. It could, however, also be argued that a more, independence dampens inflationary uncertainty and, by the Mascaro-Meltzer effect, brings down (ex post) real interest rates.<sup>37</sup> These opposite effects on the real interest rate might also explain why the net effect on economic growth turns out to be insignificant. Alesina and Summers (1993) examined the link between central bank independence and the (ex post) real interest rate and found no clear relationship. Nevertheless, these authors discovered a negative correlation between central bank independence and the variability of (ex post) real interest rates.

**Table 12. Empirical studies on the relationship between central bank independence and other economic variables**

Study:	Interest	Budget deficit	Central bank credit
Grilli, Masciandaro and Tabellini (1991)	--	negative, but insignificant effect	--
De Haan and Sturm (1992)	--	mixed results (AL and GMT sometimes significant; ES not)	only significant for GMT
Cukierman (1992)	--	--	TOR significant in sample including all countries
Cukierman, Webb and Neyapti (1992)	--	--	TOR significant in sample including all countries
Alesina and Summers (1993)	no relationship, but lower variance of interest rates	--	--
Pollard (1993)	--	no significant relationship with level, but significant lower variance of deficits	--

<sup>37</sup> According to Mascaro and Meltzer (1983), monetary and inflationary uncertainty - measured by the variability of (unexpected) money growth and inflation, respectively - will result in a risk premium which risk-averse investors demand to compensate for this uncertainty and, thereby, in a higher (ex ante) real interest rate. See also Bomhoff (1983).



Eijffinger, Van Rooij and Schaling (1994)	significant negative relationship for BP, AL, ES and EMP; no relationship with variance (except for EMP)	--	--
Cukierman and Webb (1994)	significant negative relationship with political vulnerability of central bank	--	--

Is there, finally, some relationship between central bank independence and (the monetary accommodation of) budget deficits of the government? One would expect that an independent central bank is in a better position to resist the pressure of its government to accommodate budget deficits by means of monetary financing. Moreover, the government has a strong incentive, in the case where budget deficits are financed on the capital market, to reduce the deficit because of future interest payments. Parkin (1987) investigated the relationship between central bank independence and the government deficit as a ratio of Gross National Product in the long run for a sample of twelve countries during the period 1955-1983. The two countries with the most independent central bank - i.e. Germany and Switzerland - appear to have almost no government deficits in the period considered by Parkin.

Masciandaro and Tabellini (1988) examined for five countries - Australia, Canada, Japan, New Zealand and the United States - the budget deficit as a ratio of Gross Domestic (National) Product during the period 1970-1985. They found that New Zealand with - until recently - the most dependent central bank had the highest average deficit over this period, while the United States with - according to Masciandaro and Tabellini - the most independent central bank had a deficit equal to the deficit of the remaining three countries.

Grilli, Masciandaro and Tabellini (1991) find for their measure also a negative correlation between the deficit and the degree of independence in the period 1950-1989, which is however not significant. Their results are supported by De Haan and Sturm (1992), in particular for the subperiod 1979-1987.<sup>38</sup> Pollard (1993) finds some negative correlation between central bank

<sup>38</sup> It should, however, be stressed that in case of the GMT index there is the danger of circular reasoning because the (modified) GMT index comprises at least four elements of monetary accommodation of government deficits. Therefore, the empirical evidence found by Grilli,

independence and the deficit-to-GDP ratio that appears, however, not to be significant. Quite strangely, Pollard discovers a significant, negative relationship with the variance of the budget deficit, as a percentage of GDP.

Our prudent conclusion is, that an independent central bank cannot restrain its government from creating budget deficits, but that it may have some restrictive influence on fiscal policies pursued by its government.

What should we make of the preceding review of empirical studies on the relationship between central bank independence and macroeconomic variables, like inflation and growth? Is it true, as Grill, Masciandaro and Tabellini (1991, p. 375) claim, that "having an independent bank is almost like having a free lunch; there are benefits but no apparent costs in terms of macroeconomic performance"? Although there is overwhelming evidence that central bank independence and inflation are negatively related, one should be careful in jumping to this conclusion. As has been pointed out, there is only limited support for the view that central bank independence stimulates economic growth, while central bank independence also does not reduce disinflation costs. Furthermore, central bank independence may be endogenous, in the sense that countries with a commitment to price stability may have a greater propensity for central bank independence. If true, the mere establishment of a central bank with a commitment to price stability will not bring inflation benefits to a country. In the following chapter we will analyse the determinants of central bank independence.

---

Masciandaro and Tabellini and De Haan and Sturm is not surprising at all.

## 5. THE DETERMINANTS OF CENTRAL BANK INDEPENDENCE

The previous chapters have made it clear that the degree of central bank independence varies strongly among OECD countries. The question arises which factors ultimately determine the degree of central bank independence. It is quite remarkable, that the literature dealing with this question is, so far, hardly developed.

Before discussing some determinants of central bank independence in greater detail, we start by a broad review of the recently developed theory.

Cukierman (1994) presumes that the delegation of monetary policy to (partly) independent central banks is used as a '(partial) commitment device'. By specifying the objectives of the central bank more or less tightly and by giving it broader or narrower powers, politicians determine the extent of their commitment to a policy rule. The stronger their commitment and, thus, the more independent a central bank is, the more costly it will be for politicians to override decisions of the central bank. Cukierman wants to identify the economic and political factors that induce politicians to delegate more or less authority to the central bank. Attempts to use monetary policy to stimulate economic activity and finance public expenditure will lead to a (suboptimally) high inflation rate. This inflationary bias may be reduced in by giving the central bank independence, i.e. a mandate to strive for price stability as the single policy goal. Such policy action leads to more credibility of monetary policy which, in turn, is reflected in lower inflationary expectations and, thereby, lower (capital market) interest rates and more moderate wage demands. From the politician's viewpoint, the costs of an independent central bank consist mainly of the loss of flexibility in monetary policy making. The *balance between flexibility and credibility*, depending on the relevance of various economic and political factors to delegate authority, determines the optimal degree of central bank autonomy in a country. Inspired by this theoretical model, Cukierman has formulated a number of propositions on the economic and political determinants of central bank independence which will be discussed in the next sections of this chapter.

Eijffinger and Schaling (1995) combine the model of wage and employment determination of Alogoskoufis (1994) with the Rogoff (1985) model. They assume two types of agents, i.e. wage-setters (the union) and the central bank. Wage-setters unilaterally choose the nominal wage rate, whereas the central bank controls the inflation rate. The timing of events in the model is as follows. In the first stage, wage-setters sign nominal wage contracts for a certain period, e.g. one year. In the second stage, stochastic shocks to productivity occur. Because of their randomness,

these shocks cannot be known at the time the wage contracts are signed. In the third stage, the central bank observes the values of the productivity shocks and - contingent on the chosen monetary regime - reacts to the shocks accordingly. In the fourth and final stage, employment is determined by competitive firms. Based on this model, Eijffinger and Schaling derive a number of propositions with respect to the economic and political determinants of central bank independence that will also be reviewed in this chapter.

Based on these or other theoretical considerations, various economic and political determinants of central bank independence have been formulated. Such determinants can be categorized as follows:<sup>39</sup>

1. the equilibrium or natural rate of unemployment;
2. the stock of government debt;
3. political instability;
4. supervision of financial institutions;
5. financial opposition to inflation;
6. public opposition to inflation; and
7. other determinants.

Table 13 summarizes empirical studies on the determinants of central bank independence. The several column shows the measure(s) of central bank independence used. The third and fourth column present the sample of countries and the estimation period, respectively. The last column contains the economic and political variables examined in these studies.

### **5.1 The equilibrium level of unemployment**

The first determinant of central bank independence may be the average employment-motivated inflationary bias in a country. This inflationary bias can be approximated empirically by the

---

<sup>39</sup> Of course, these seven determinants are not mutually exclusive and may (partly) overlap.



**Table 13. Empirical studies on the determinants of central bank independence**

Study:	Measure(s) used:	Countries:	Estimation period:	Variables examined:
Cukierman (1992)	LVAU and LVAW	14 middle income countries	1972-1979 and 1980-1989	political instability (party and regime)
Posen (1993a)	LVAU	17 OECD countries	1950-1989	financial opposition to inflation (FOI)
De Haan and Van 't Hag (1994)	GMT, LVAU and SUMLV	19 (16) OECD countries 21 (18) OECD countries 17 OECD countries 16 (13) OECD countries	1980-1988 1980-1989 1950-1898 1900-1940	natural rate of unemployment (NAIRU), government debt ratio, frequency of (significant) government changes, banking supervision, universal banking, very long-term inflation
Cukierman and Webb (1994)	political vulnerability	64 OECD and developing countries	1950-1989	four types of political instability (high and low level)
De Haan and Siermann (1994)	TOR	43 developing countries	1950-1989 and subperiods	political instability (party and regime)
Moser (1994)	average of GMT and LVAW	22 OECD countries	1967-1990	political system index (PSI), standard deviation of output growth
Eijffinger and Schaling (1995)	AL, GMT, ES and LVAU (latent variables method)	19 OECD countries	1960-1993 (for NAIRU: 1960-1988)	natural rate of unemployment (NAIRU), relative number of years of socialist (left-wing) government, variance of output growth, compensation of employees paid by resident producers

equilibrium or natural rate of unemployment.<sup>40</sup> Cukierman (1994) shows that the larger the average employment-motivated inflationary bias in a country is, the higher are the costs for the government to override the central bank, and therefore, the more independent the central bank will be. Because in the case of nominal wage contracts, unexpected inflation has positive effects on the level of both production and employment, a higher equilibrium or natural rate of unemployment implies that surprise inflation is more valuable for government.<sup>41</sup>

De Haan and Van 't Hag (1994) have tested this hypothesis, using two measures of Cukierman (LVAU and SUMLV)<sup>42</sup> and the index of Grilli, Masciandaro and Tabellini (GMT). Proxies for inflationary bias are the equilibrium rate of unemployment, as estimated by Layard, Nickell and Jackman (1991) for nineteen OECD countries, and the difference between the actual and the equilibrium rate of unemployment during the 1980s. In simple cross-country regressions with each measure of central bank independence as dependent variable, the coefficients of both proxies proved to be insignificant.

On the basis of a game-theoretical model, Eijffinger and Schaling (1995) propose that the higher the natural rate of unemployment is, the higher the optimal degree of central bank independence will be. The intuition behind this proposition is as follows. A higher natural rate of unemployment leads to a higher time-consistent rate of inflation and, consequently, to an increase in society's credibility problem. Hence, with an unaltered relative weight placed on inflation stabilization versus unemployment stabilization, the monetary authorities's commitment to fighting inflation is now too low. Eijffinger and Schaling tested this proposition, using estimates of the NAIRU by Layard, Nickell and Jackman (1991) as proxies for the natural rate of unemployment, for nineteen industrial countries during the period 1960-1988. They employed a latent variables method (LISREL) in order to distinguish between the actual (legal) and optimal degree of central bank independence in these countries. As measures for actual central bank autonomy, the indices of Alesina, GMT, Eijffinger-Schaling (ES) and Cukierman (LVAU) were chosen. These authors

---

<sup>40</sup> In this case the natural degree of unemployment is referred to as the non-accelerating inflation rate of unemployment or, briefly, NAIRU. Of course, this implies that the desired unemployment rate is being held constant and, thus, that the inflationary bias is driven by the difference between the desired and natural unemployment rate. This assumption is questionable.

<sup>41</sup> An analysis with an endogenous NAIRU and its implications for the optimal degree of central bank independence is given by Schaling (1995).

<sup>42</sup> The index SUMLV measures the *total* score of sixteen legal variables of Cukierman (1992) with respect to (1) the appointment, the dismissal and the term of office of the central bank president, (2) the solution for conflicts between the government and the central bank, (3) the policy goals of the central bank, and (4) the legal limitations for the government to borrow with the central bank.

found an insignificant coefficient for the natural rate of unemployment.

Therefore, we may conclude that empirical studies do not provide support for any relationship between the equilibrium or natural rate of unemployment and the degree of central bank independence.

## **5.2 Government debt**

The stock of government debt is another potential determinant of central bank independence. The larger the sum government wants to borrow on the capital market, the more weight is placed on lower inflationary expectations and, thus, on lower nominal capital market interest rates. The benefits of a once-and-for-all reduction of the real value of government debt by unexpected inflation do not outweigh in this case the costs of permanently higher interest payments as a consequence of lower credibility. Cukierman (1994) has argued that the larger the debt, the more politicians tend to delegate authority to the central bank and the more independent the central bank will be. Moreover, when capital markets are deep it is likely, in his opinion, that governments will try to raise more funds through the capital market and, thereby, will delegate more authority to the central bank. According to Cukierman, this conclusion is supported by the observation that the most independent central banks are established in countries with well-developed capital markets, such as Germany and the United States. Counter-examples are Japan and the United Kingdom which have relatively dependent central banks.

This hypothesis has also been empirically investigated by De Haan and Van 't Hag (1994) for several measures of independence (LVAU, SUMLV and GMT) during the period 1980-1989. Using gross government debt as a percentage of GDP in their regression analysis, these authors again found no significant coefficient for the debt ratio.

## **5.3 Political instability**

The influence of political instability on central bank independence is, at first sight, less obvious than the impact of factors discussed so far.<sup>43</sup> On the one hand, it could be argued that, when politicians in office are faced with a greater probability that they will be removed from office, they have a stronger interest in delegating authority to the central bank as an apolitical institution, in

---

<sup>43</sup> For the effect of political instability on variables like the (increase of) the stock of government debt and seigniorage, we refer to Persson and Svensson (1989), Alesina and Tabellini (1990), Tabellini and Alesina (1990), Cukierman, Edwards and Tabellini (1992) and De Haan and Sturm (1994).



order to restrict the range of policy actions available to the opposition in case the latter will come into office. This implies that greater political instability leads to a more independent central bank. On the other hand, we might argue that the incumbent politicians will fortify their hold on the central bank, if there is a greater probability of government change, and will eventually overrule central bank decision making. The short-term benefits of surprise inflation can, thereby, exceed its long-term costs. It follows that greater political instability would result in a more dependent central bank.

Cukierman (1992) sees, however, no contradiction between the two hypotheses. According to this author, it is possible to combine both hypotheses into one single, internally consistent hypothesis. In countries with a sufficiently high degree of national consensus, greater political instability may be associated with increased independence of the central bank, whereas the reverse can apply for countries with a relatively low level of national consensus. Cukierman has tested this combined hypothesis using two indices of political instability - constructed by Haggard, Kaufman, Shariff and Webb (1991) - for fourteen middle income countries over the 1970s and 1980s. The first index, party political instability (PIP), measures the degree of political instability under a given regime - the frequency and extent of changes from a left-wing to a right-wing government, and reverse - and refers to a relatively high level of national consensus. The second index, regime political instability (PIR) - i.e. the number of changes from an authoritarian to a democratic regime, and vice versa -, reflects the degree of political instability in case of a relatively low level of national consensus. Regression analysis by Cukierman for legal independence measures (LVAU and LVAW) during the periods 1972-1979 and 1980-1989 shows that the first index (PIP) has the expected, positive sign and the second index (PIR) the expected, negative sign. If estimated separately, both indices of political instability are not significant at conventional levels. When the two indices are combined into one regression, the signs remain as before and the indices of political instability become both significant at a 98% level of confidence. This result may however be questioned, as legal measures of central bank independence may not be a very good proxy for actual central bank independence in developing countries. Recently, two studies have employed non-legal measures of central bank independence.

Cukierman and Webb (1994) use a measure of political vulnerability - i.e. the fraction of times that political transition is followed by a change of central bank governor - as a dependent variable and four types of political instability as explanatory variables for a mixture of developed and developing countries during the period 1950-1989. Only high-level political instability (change in regime) and the dummy for developing countries proved to be significant.

Using data on the turnover rate of central bank governors for 43 developing countries for four



periods (1950-59, 1960-71, 1972-79 and 1980-89) as provided by Cukierman, Webb and Neyapti (1992), De Haan and Siermann (1994) have estimated the relationship between central bank independence and political instability. Proxies for political stability are the number of regular and irregular government transfers (coups). In their regressions only the variable 'coups' exerts a significantly negative effect on central bank independence. The coefficient of the proxy for party political instability is positive, but not significantly different from zero.

In a recent study, Cukierman (1994) states that the larger the political instability is, the higher the degree of central bank independence will be ".... provided political polarization is sufficiently large" (p. 65). The intuition behind this proposition is that the ruling party prefers a more independent central bank, when the prospects for its re-election are slim. As the probability of re-election shrinks, benefits of central bank independence increase in terms of restricting public expenditure by the other (opposition) party. This hypothesis of Cukierman is investigated by De Haan and Van 't Hag (1994) for three different measures of central bank autonomy (LVAU, SUMLV and GMT) during the 1970s and 1980s with regression analysis based on 21 (for GMT: 18) industrial countries. These authors used both the frequency of government changes (CHANGE), as well as the frequency of significant government changes (SIGNIFICANT) - i.e. in case another party or coalition comes to office - as indices of political instability. For the first index all three measures of central bank independence showed a significant, negative relationship; the second is not significant. So, greater political instability leads to a more dependent central bank. Therefore, we may conclude that the empirical results regarding political instability are mixed, but the various studies are very hard to compare properly as they refer to different groups of countries, diverging measures of central bank independence and various proxies for political instability.

#### **5.4 Supervision of financial institutions**

A political-economic determinant of the degree of central bank independence can also be the supervision of financial institutions ('banking supervision'). Goodhart and Schoemaker (1993) analyzed the supervision of financial institutions in 26 countries. Table 19 shows that in approximately half of these countries the central bank is also responsible for the supervision of financial institutions and, thus, that the function of supervisory agency is combined (C) with the responsibility for monetary policy. In the other half of the countries there is a separated (S) responsibility between the central bank and the Ministry of Finance, or other supervisory agencies.

From table 14, in conjunction with table 2, it may be inferred that the supervision of financial institutions has little impact on the independence of central banks. Practical policy in these

countries, as a matter of fact, does not allow clear-cut conclusions regarding the relationship between a combined or separated responsibility for financial supervision and monetary policy, on the one hand, and central bank independence, on the other. Hence, we will discuss the main

**Table 14. Central banks and the supervision on financial institutions**

Country	Supervisory Agency			Combined or Separated
	Central Bank	Ministry of Finance	Other	
Australia	X			C
Austria		X		S
Belgium			Banking and Finance Commission	S
Brazil	X			C
Canada		X		S
Denmark			Finance Inspectorate (Industry Ministry)	S
Finland	X	X		S
France	X		Commission Bancaire	C
Germany			Bundesaufsichtsamt für das Kreditwesen	S
Greece	X			C
Hong Kong	X			C
Ireland	X			C
Italy	X			C
Japan	X	X		S
Luxembourg	X			C
Netherlands	X			C
New Zealand	X			C
Norway		X		S
Philippines	X			C
Portugal	X			C
Spain	X			C
Sweden			Swedish Financial Supervisory Authority	S
Switzerland			Federal Banking Commission	S
United Kingdom	X			
United States	X		Comptroller of the Currency, FDIC and State Governments	C
Venezuela			Superintendency of Banks	S

Source: Goodhart and Schoemaker (1993)

arguments *for* and *against* a *separation* of both *responsibilities*, according to CEPR (1991) and Goodhart and Schoemaker (1993).

The first argument in favor of a separation of financial supervision and the conduct of monetary policy is the possibility of a conflict of interests between both activities. A central bank, responsible for supervision of the financial system and, thus, also for failures of financial institutions, could be tempted to admit lower (money market) interest rates or higher money growth than would be desirable from the perspective of price stability, in order to avoid such failures.<sup>44</sup> A separation of responsibilities could, thereby, increase the autonomy of the central bank. A second argument to separate the authority on financial stability from that on monetary stability is the bad publicity usually associated with failures or rescue operations. This bad publicity could harm the reputation of the central bank in its function as a supervisory agency. A loss of reputation may also affect the credibility of monetary policy. Separated responsibilities could, therefore, underpin the independence of the central bank in practice.

The following arguments can be fielded against a separation of financial supervision and the conduct of monetary policy. First, the central bank plays a crucial role in the smooth operation of the payments system and the associated financial risks. To limit these risks, it is reasonable that the central bank wishes to supervise and regulate the participants of the payments system. Furthermore, the central bank has a function as 'lender of last resort' for the financial system and has in that capacity the task to supply instantly enough liquidity in the case of structural liquidity problems or, even, rescue operations. This, again, would argue for a combined responsibility.

De Beaufort Wijnholds and Hoogduin (1994) distinguish between general or macro-supervision, and specific or micro-supervision. These authors consider the arguments for a separation of responsibilities, such as a potential conflict of interest to be, only applicable to the micro-supervision situation, because of the close contacts with individual banks. They conclude that it appears possible to maintain central bank autonomy both when micro (prudential) supervision and monetary policy are separated, as well as in cases where they are combined. The choice between separation and combination depends on the structure of the banking system and the conduct of monetary policy in a country which is in turn associated with the relative size of its economy. In smaller open industrial countries - e.g. the Netherlands - with an exchange rate target, the probability of a conflict of interest between both activities seems, in their opinion, to be considerably lower than in the case of large industrial countries with a monetary target, such as

---

<sup>44</sup> As an example Goodhart and Schoenmaker (1993) refer to the recent 'savings and loan crisis' in the United States and its influence on the policy of the Federal Reserve System. It is also stated that the Federal Reserve is smoothing interest rates because of financial stability. See in this respect chapter 7 of Cukierman (1992).



Germany.<sup>45</sup>

Empirical evidence on the relationship between financial supervision and central bank independence provides no uniform conclusion. Heller (1991) compares the average rate of inflation - as a proxy of the degree of central bank independence - of countries with central banks which have no, partial or complete responsibility for financial supervision. Central banks without any supervisory authority generate, according to Heller, the lowest inflation and those with complete supervisory authority the highest inflation. Consequently, he favors a separation of both responsibilities. In contrast, De Haan and Van 't Hag (1994) find no empirical relationship between two of the three different measures of independence and an index measuring the degree of banking supervision (CBO). This index is taken from Posen (1993a) and includes also the central bank restrictions on lending rates and on the amount of bank credit to the private sector. Only for one measure of independence (LVAU) there appears to be a significant, negative relation with the index for the degree of banking supervision. This result also contrasts with the view put forward by Posen, to which we will now turn.

### **5.5 Financial opposition to inflation**

Posen (1993a, 1993b) advocates a new view of monetary policy and central bank independence which are, in his opinion, determined by the degree of financial opposition to inflation, and the effectiveness of the financial sector to mobilize - through the political system - its opposition against inflation. According to Posen, the causal relationship between central bank independence and low inflation is illusory. His position is based on empirical research for seventeen industrial countries during the post-war period. Posen holds that central bank autonomy does not have a noticeable effect on cross-country differences in inflation rates. He argues that there is a third factor which explains the negative correlation between central bank independence and the level of inflation: financial opposition to inflation (FOI) in a country.

This author thinks that monetary policy is driven by a coalition of political interests in society, because central banks will only be prepared to take strong anti-inflationary actions when there is a coalition of interests politically capable of protecting their anti-inflationary policy. In industrial countries, the financial sector represents such a (powerful) coalition of interests. Therefore, Posen developed a measure of effective financial opposition to inflation predicting both the degree of

---

<sup>45</sup> The explanation of this could be that an exchange rate target is more visible than a monetary target and expresses, thereby, a stronger commitment of the central bank. See for this argument also Herrendorf (1995).



central bank independence and the rate of inflation in the various countries.<sup>46</sup> Posen has tested four propositions regarding indicators explaining and measuring financial opposition to inflation:

1. countries with financial sectors having universal banking are expected to have a stronger financial opposition to inflation than those without;
2. countries with less regulatory power (supervision) of the central bank over the financial sector are expected to have more financial opposition to inflation;
3. countries with federal systems of government are expected to have a more effective financial opposition to inflation; and
4. countries with less fractionalization of the political party system are expected to have a more influential financial opposition to inflation.

According to Posen (1993a), these indicators constitute the ultimate determinants of central bank independence and the level of inflation. He claims to have found clear statistical evidence in support of a causal link between FOI on the one side and central bank independence (i.e. Cukierman's LVAU) and lower inflation rates on the other, for the period 1950-1989. However, De Haan and Van 't Hag (1994) have tested the proposition of Posen on universal banking by means of a dummy variable for the presence (1) or not (0) of a universal banking system. Only for one (LVAU) of the three independence indices they find a significant, positive relationship with the dummy for universal banking. As explained before, these authors report a similar finding with respect to the relationship between prudential supervision and central bank independence. So it seems that Posen's conclusion is sensitive with respect to the measure of central bank independence used.

Cukierman (1992) states that countries with *broad financial markets* and a substantial amount of *financial intermediation* are more likely to grant high levels of independence to their central banks.<sup>47</sup> He argues that possible disruptions due to less central bank autonomy and more inflation (uncertainty) in the process of intermediation between savings and investment are proportional to the size of the financial sector in a country. Consequently, Cukierman concludes that countries with large financial markets are more likely to have more independent central banks than do those with narrow financial markets. This conclusion is, in his opinion, supported when comparing the size of financial markets and the ranking of central banks by overall independence

---

<sup>46</sup> As stated by Posen (1993a): "This implies as well that *CB independence and low rates of inflation should occur together, without a causal link between them*, because they both are reflections of effective FOI" (p. 47).

<sup>47</sup> See Cukierman (1992), p. 449. Of course, the broadness of financial markets and the degree of financial intermediation are (strongly) associated with the deepness of capital markets.

(for DCs: LVAU, and for LDCs: LVAU and TOR) during the 1980s. Countries with large financial markets - e.g. France, Germany, the United Kingdom and the United States - have relatively independent central banks, whereas those with narrow (internal) financial markets - such as most LDCs - have relatively dependent central banks. Nevertheless, we are of the opinion that a two-way causal relationship exists between the size of financial markets and independence: high autonomy and low inflation will also foster the development of financial markets.

## 5.6 Public opposition to inflation

Another important determinant of central bank independence is public support for the objective of price stability or, analogous to the former determinant, the public opposition to inflation.<sup>48</sup> It is quite obvious, that this determinant may not be analyzed apart from the financial opposition to inflation - as defined by Posen (1993a, 1993b) - but that it has, a much broader meaning. The experience of the public with very high inflation or even hyperinflation in the past is, generally, seen as the cause of such public opposition to inflation. This implies that there can be a two-way causal relationship between central bank independence and the level of inflation: on the one hand, an independent central bank may foster low inflation in the medium and long run, but on the other hand, high inflation may result in the very long run in the creation of an autonomous central bank. There seems to be, a threshold value for the level of inflation above which public opposition to inflation in a country will be mobilized and taken into account by the politicians. Cukierman (1992) argues, however, that when sufficiently sustained, inflation erodes central bank independence after a while. Society becomes accustomed to inflation (wages are for instance indexed) thereby reducing opposition to inflation and the public pressure for an independent central bank.

Using cross-country OLS regressions with the average level of inflation between 1900 and 1940 as explanatory variable of three different measures of central bank independence (LVAU, SUMLV and GMT) in sixteen (for GMT: thirteen) industrial countries, De Haan and Van 't Hag (1994) have shown that there is a significant positive relationship between very long-term inflation and independence.<sup>49</sup>

---

<sup>48</sup> See in this respect Neumann (1991), Bofinger (1992), Debelle (1993), Issing (1993, 1994), Eijffinger (1994) and Fischer (1994). Issing (1993) notes that "... it is no coincidence that it is the Germans, with their experience of two hyperinflations in the 20th century, who have opted for an independent central bank which is committed to price stability" (p. 18).

<sup>49</sup> De Haan and Van 't Hag (1994) have also ran regressions with average inflation during the period 1950-1980 as explanatory variable, but are faced with identification problems as a consequence of the very limited variation in legal central bank independence between 1950-

Not referring to the very long run, but to the medium and long run, Eijffinger and Schaling (1995) come on the basis of their game-theoretical model to the following proposition: the stronger society's preferences for unemployment stabilization relative to inflation stabilization are, the higher the optimal degree of central bank independence will be. The underlying intuition of this proposition is as follows. If society becomes more concerned with unemployment, the time-consistent rate of inflation goes up. Therefore, society's credibility problem becomes more pressing. With an unaltered relative weight placed on inflation stabilization, the balance between credibility and flexibility needs to be adjusted in favor of an increased commitment of the authorities to fight inflation. Eijffinger and Schaling have tested this proposition with the number of years of socialist (left-wing) dominated government over the total period studied (WLEFT) as a proxy for society's preference for unemployment versus inflation stabilization. Using a latent variables method (LISREL) to make a distinction between the actual (legal) and optimal degree of central bank independence, they investigated the Alesina-, GMT-, ES- and Cukierman's LVAU-index, measuring actual central bank autonomy for nineteen industrial countries, during the period 1960-1993. These authors found a positive relation between society's preferences for unemployment relative to inflation stabilization and the optimal degree of central bank independence, although it was not significant.

In general, the conclusion may be drawn that central bank independence is strongly associated with society's fundamental support for the objective of price stability. Notwithstanding the theoretical and empirical arguments for an independent central bank as discussed before, not every society and, thus, not every government will be prepared to accept such an autonomous position of its central bank.

## **5.7 Other determinants**

Recent literature on determinants of central bank independence, also mentions economic and political factors which cannot be categorized under the former headings. We will discuss these determinants only briefly here.

Moser (1994) tries to identify the conditions under which an independent central bank can be credibly supplied by politics. In his model he analyzes the interaction between a central bank and two political decision bodies. Delegation is only credible if there are at least two veto players in the legislative process and if they disagree to some extent about monetary policy. Moser constructs

---

1980, and 1980-1989.



a *political system index* (PSI) that reflects differences in commitment ability of the political systems.<sup>50</sup> Controlling for a potential effect of external real shocks, he finds a significant, positive effect of his political system index on an average of the GMT and LVAU measures of independence for 22 OECD countries during the period 1967-1990. Apparently, countries with extensive checks and balances are associated with more independent central banks.

Based on their game-theoretical model, Eijffinger and Schaling (1995) propose that the higher the *variance of productivity shocks*, the lower the optimal degree of central bank independence will be. The intuition here is that if the variance of productivity shocks increases, *ceteris paribus*, the economy becomes more unstable and, thus, the need for active stabilization policy becomes greater. With an unaltered relative weight placed on inflation stabilization, the balance between credibility and flexibility will shift towards more monetary accommodation by the authorities. Eijffinger and Schaling tested this proposition with the variance of annual output growth (VPROD) to approximate the variance of productivity shocks. Distinguishing legal independence (AL, GMT, ES and LVAU) from optimal independence with the latent variables method (LISREL), they found the expected, negative relation between the variance of productivity shocks and the optimal degree of central bank independence for nineteen industrial countries during the period 1960-1993. However, the coefficient was insignificant.

Furthermore, Eijffinger and Schaling (1995) state that the steeper the *slope of the Phillips curve* is, the higher the optimal degree of central bank independence will be. If the slope of the Phillips curve increases, the benefits of unanticipated inflation rise. Therefore, it becomes more tempting for the government to inflate the economy and, *ceteris paribus*, society's credibility problem gains in importance. With constant relative weights on inflation stabilization, the balance between credibility and flexibility needs to shift towards more commitment to fight inflation. This proposition has been tested by Eijffinger and Schaling with the compensation of employees paid by resident producers as a ratio of GDP (SLOPE) as a proxy for the slope of the Phillips curve. Using the latent variables method, a significant positive relationship was found between the slope of the Phillips curve and the optimal degree of central bank independence for nineteen industrial countries in the period 1960-1993.<sup>51</sup>

---

<sup>50</sup> This political system index ranges from a value of one for pure unicameral legislatures and bicameral legislatures with both chambers being equally composed to a value of four for strong bicameral systems, i.e. systems with equal power and unequal composition. The last are characterized by a high degree of federalism.

<sup>51</sup> The latent variables method also enables Eijffinger and Schaling (1995) to estimate the optimal degree of central bank independence and, thereby, to compare it with the actual (legal) degree of independency. They conclude that some countries - notably Germany and Switzerland - are



## 6. CONCLUDING COMMENTS

In this survey, we have discussed, in a critical way, the theoretical and empirical literature on central bank autonomy and added some new estimates of the relation between central bank independence on the one hand, and inflation and economic growth on the other. From our discussion of various measures of central bank independence, it became evident that all measures have their limitations. It became also apparent that the concept of central bank independence as used in most theoretical studies, diverges somewhat from proxies of central bank independence as used in the empirical literature. Further research on the reliability of, and alternatives for, the various measures is clearly needed.

Is the only good central bank a bank that can say 'no' to the politicians?<sup>52</sup> An independent central bank is *not* a *sufficient* and/or a *necessary* condition for price stability. The examples of Japan and Greece, mentioned in the introduction, make this amply clear. In accordance with the theoretical literature and previous empirical studies, we conclude, however, that a country with an independent central bank, *ceteris paribus*, will have a lower rate of inflation than a country where politicians can steer the central bank's policy. Attaining lower inflation rates bears no costs in terms of lower long-term economic growth. So, in principle, we may answer the above mentioned question positively. The tendency towards greater central bank autonomy which can, presently, be perceived in many countries should, in our opinion, thus be regarded positively. Nevertheless, with respect to this conclusion some important caveats are in order.

First, the *absence* of a significant *influence* of the various measures of central bank independence on the rate of *economic growth* can also be interpreted in a less positive way. Stable monetary policy aimed at low inflation is, usually, considered to be an important condition for sustainable economic growth. However, neither our results, nor other empirical studies show that central bank autonomy favors for economic growth and employment. Moreover, there is no proof that countries with a relatively independent central bank have lower costs of disinflation than those with a more dependent central bank. Indeed, most studies suggest that central bank independence is associated with *higher disinflation costs*.

Second, the tendency towards central bank autonomy may conflict with the goal of *accountability* of central banks. In the short run, there seems to be a trade off between central bank

---

characterized by a higher than optimal degree of independence and others - Australia, Norway, Sweden and the United Kingdom - by a lower than optimal degree.

<sup>52</sup> Quotation from *The Economist* of February 10th, 1990.

independence and accountability. In our view, such a trade off does, however, not exist in the longer run. A central bank, continuously conducting a policy which lacks broad political support, will sooner or later be overridden. At the same time, our conclusion underscores the importance of broad public support for a central bank's autonomy and its anti-inflationary policy. Although the determinants of central bank independence have only recently been investigated, current research leads us to the conclusion that every society gets the central bank it deserves. This conclusion implies also that just a change of the central bank law is insufficient to guarantee structurally lower levels of inflation. Only in case of wide-spread and overwhelming support for anti-inflation policy by an independent central bank, will inflation effectively be reduced. The policy to give, for example, the Banque de France a more independent position is backed both by the government, as well as by the opposition parties. After the failed experiment of an expansionary policy in France at the beginning of the 1980s, governments of alternating political composition have chosen for a monetary policy strongly focussed on Germany. In such circumstances, the development towards an independent central bank is a logical step.

It is, however, doubtful whether there is enough support for a restrictive monetary policy in some Southern European countries. More central bank autonomy is, then, no sufficient guarantee for a permanently lower level of inflation in these countries, because a lack of support for anti-inflationary policy will, probably, result in less central bank independence in the longer term.

## REFERENCES

- Akhtar, M.A. and H. Howe (1991), The Political and Institutional Independence of US Monetary Policy, *Banca Nazionale del Lavoro Quarterly Review*, No. 178, 343-389.
- Alesina, A. (1988), Macroeconomics and Politics, *NBER Macroeconomic Annual 1988*, Cambridge: Cambridge University Press.
- Alesina, A. (1989), Politics and Business Cycles in Industrial Democracies, *Economic Policy*, No. 8, April 1989, 55-98.
- Alesina, A. and V. Grilli (1992), The European Central Bank: reshaping monetary politics in Europe, in: M.B. Canzoneri, V. Grilli and P.R. Masson (eds.), *Establishing a Central Bank: Issues in Europe and Lessons from the US*, Cambridge: Cambridge University Press.
- Alesina, A. and L.H. Summers (1993), Central Bank Independence and Macroeconomic Performance: Some Comparative Evidence, *Journal of Money, Credit, and Banking*, 25, 151-162.
- Alesina, A. and G. Tabellini (1987), Rules and Discretion with Non-Coordinated Monetary and Fiscal Policies, *Economic Inquiry*, 25, 619-630.
- Alesina, A. and G. Tabellini (1990), A Political Theory of Fiscal Deficits and Government Debt in a Democracy, *Review of Economic Studies*, 57, 403-414.
- Allen, S.D. (1986), The Federal Reserve and the Electoral Cycle, *Journal of Money, Credit, and Banking*, 18, 57-98.
- Andersen, T.M. and F. Schneider (1986), Coordination of Fiscal and Monetary Policy under Different Institutional Arrangements, *European Journal of Political Economy*, 169-191.
- Alogoskoufis, S. (1994), On Inflation, Unemployment and the Optimal Exchange Rate Regime, in: F. van der Ploeg (ed.), *Handbook of International Macroeconomics*, Oxford: Blackwell, pp. 192-223.
- Barro, R.J. (1983), Inflationary Finance under Discretion and Rules, *Canadian Journal of Economics*, 16, 1-16.
- Barro, R.J. and D. Gordon (1983), Rules, Discretion, and Reputation in a Positive Model of Monetary Policy, *Journal of Monetary Economics*, 12, 101-121.
- Barro, R.J. (1995), Inflation and Economic Growth, *Bank of England Quarterly Bulletin*, 35, May, 166-176.

Bade, R. and M. Parkin (1988), *Central Bank Laws and Monetary Policy*, Unpublished Manuscript, University of Western Ontario.

Beaufort Wijnholds, J.A.H. de (1992), *Of Captains, Pilots and Judges, The World-wide Tendency Towards Central Bank Autonomy*, Inaugural Lecture as Professor of Money and Banking at the University of Groningen, Groningen: University of Groningen.

Beaufort Wijnholds, J.A.H. de, and L.H. Hoogduin (1994), Central Bank Autonomy: Policy Issues, in: J.A.H. de Beaufort Wijnholds, S.C.W. Eijffinger and L.H. Hoogduin (eds.), *A Framework for Monetary Stability*, Dordrecht/Boston/London: Kluwer Academic Publishers, 75-95.

Blake, A.P. and P.F. Westaway (1993), Should the Bank of England be Independent?, *National Institute Economic Review*, No. 143, 72-80.

Bofinger, P. (1992), Discussion, in: M.B. Canzoneri, V. Grilli and P.R. Masson (eds.), *Establishing a Central Bank: Issues in Europe and Lessons from the US*, Cambridge: Cambridge University Press, 77-80.

Bomhoff, E.J. (1983), *Monetary Uncertainty*, Amsterdam/New York/Oxford: North-Holland.

Bresciani-Turoni, C. (1953), *The Economics of Hyperinflation*, London: Allen and Unwin.

Buchanan, J.M. and R.M. Wagner (1977), *Democracy in Deficit*, Homewood.

Burdekin, R.C. and L.O. Laney (1988), Fiscal Policy Making and the Central Bank Institutional Constraint, *Kyklos*, 41, 647-662.

Burdekin, R.C. and M.E. Wohar (1990), Monetary Institutions, Budget Deficits and Inflation, *European Journal of Political Economy*, 6, 531-551.

Calvo, G. (1978), On the Time Inconsistency of Optimal Policy in a Monetary Economy, *Econometrica*, 46, 1411-1428.

Canzoneri, M.B. (1985), Monetary Policy Game and the Role of Private Information, *American Economic Review*, 75, 1056-1070.

Capie, F.H., C. Goodhart, S. Fischer and N. Schnadt (1994), *The Future of Central Banking*, Cambridge: Cambridge University Press.

Capie, F.H., T.C. Mills and G.E. Wood (1994), Central Bank Independence and Inflation Performance: An Exploratory Data Analysis, in: P.L. Siklos (ed.), *Varieties of Monetary Reforms: Lessons and Experiences on the Road to Monetary Union*, Dordrecht/Boston/London, Kluwer Academic Publishers.



Casear, R. (1981), *Die Handlungsspielraum von Notenbanken*, Baden-Baden.

CEPR (1991), *Monitoring European Integration: The Making of Monetary Union*, London: Centre for Economic Policy Research.

Chowdhury, A.R. (1991), The Relationship between the Inflation Rate and its Variability: The Issues Reconsidered, *Applied Economics*, 23, 993-1003.

Crockett, A.D. (1994), Rules versus Discretion in Monetary Policy, in: J.A.H. de Beaufort Wijnholds, S.C.W. Eijffinger and L.H. Hoogduin (eds.), *A Framework for Monetary Stability*, Dordrecht/Boston/London: Kluwer Academic Publishers, 165-184.

Cukierman, A. (1992), *Central Bank Strategy, Credibility, and Independence*, Cambridge: MIT Press.

Cukierman, A. (1993), Central Bank Independence, Political Influence and Macroeconomic Performance: A Survey of Recent Developments, *Cuadernos de Economía*, 30, No. 91 (December 1993), 271-291.

Cukierman, A. (1994), Commitment through Delegation, Political Influence and Central Bank Independence, in: J.A.H. de Beaufort Wijnholds, S.C.W. Eijffinger and L.H. Hoogduin (eds.), *A Framework for Monetary Stability*, Dordrecht/Boston/London: Kluwer Academic Publishers, 55-74.

Cukierman, A., S. Edwards and G. Tabellini (1992), Seignorage and Political Instability, *American Economic Review*, 82, 537-555.

Cukierman, A., S.B. Webb and B. Neyapti (1992), Measuring the Independence of Central Banks and its Effects on Policy Outcomes, *The World Bank Economic Review*, 6, 353-398.

Cukierman, A., P. Kalaitzidakis, L.H. Summers and S.B. Webb (1993), Central Bank Independence, Growth, Investment, and Real Rates, *Carnegie-Rochester Conference Series on Public Policy*, 39, 95-140.

Cukierman, A., and S.B. Webb (1994), Political Influence on the Central Bank: International Evidence, *Center Discussion Paper Series*, Tilburg University, No. 94100, Forthcoming in: *The World Bank Economic Review*.

Cukierman, A., P. Rodriguez and S.B. Webb (1995), *Central Bank Autonomy and Exchange Rate Regimes: Their Effects on Monetary Accommodation and Activism*, Paper for the Center Conference on 'Positive Political Economy: Theory and Evidence', January 23-24, 1995, Tilburg, The Netherlands.

Darby, M.R. (1984), Some Pleasant Monetarist Arithmetic, *Federal Reserve Bank of Minneapolis*

*Quarterly Review*, Spring, 15-20.

Debelle, G. (1993), *Central Bank Independence: A Free Lunch?*, Unpublished Manuscript, Department of Economics, MIT, Oktober.

Debelle, G. and S. Fischer (1994), How Independent Should a Central Bank Be?, Federal Reserve Bank of San Francisco, *Working paper* 94-05, Forthcoming; J.C. Fuhrer (ed.), *Goals, Guidelines and Constraints Facing Monetary Policymakers*, Federal Reserve Bank of Boston, Conference Series No. 38, Boston, 1995, 195-221.

De Long, J.B. and L.H. Summers, Macroeconomic Policy and Long-Run Growth, *Federal Reserve Bank of Kansas City Economic Review*, Fourth Quarter, 5-29.

Demopoulos, C.D., G.M. Katsimbris and S.M. Miller (1987), Monetary Policy and Central-Bank Financing of Government Budget Deficits, *European Economic Review*, 31, 1023-1050.

Eijffinger, S.C.W. and E. Schaling (1992), Central Bank Independence: Criteria and Indices, *Research Memorandum*, Department of Economics, Tilburg University, No. 548, A shorter version is also published in: *Kredit and Kapital*, Special Issue, No. 13, 1995.

Eijffinger, S.C.W. and E. Schaling (1993a), Central Bank Independence in Twelve Industrial Countries, *Banca Nazionale del Lavoro Quarterly Review*, No. 184, 1-41.

Eijffinger, S.C.W. and E. Schaling (1993b), Central Bank Independence: Theory and Evidence, *CentER Discussion Paper Series*, Tilburg University, No. 9325, Forthcoming in: *European Journal of Political Economy*.

Eijffinger, S.C.W. (1994), A Framework for Monetary Stability - General Report, in: J.A.H. de Beaufort Wijnholds, S.C.W. Eijffinger and L.H. Hoogduin (eds.) *A Framework for Monetary Stability*, Dordrecht/Boston/London: Kluwer Academic Publishers, 309-330.

Eijffinger, S.C.W., M. van Rooij and E. Schaling (1994), Central Bank Independence: A Paneldata Approach, *CentER Discussion Paper Series*, Tilburg University, No. 9493, Forthcoming in: *Public Choice*.

Eijffinger, S.C.W. and M. van Keulen (1995), Central Bank Independence in Another Eleven Countries, *Banca Nazionale del Lavoro Quarterly Review*, No. 192, 39-83.

Eijffinger, S.C.W. and E. Schaling (1995), *The Ultimate Determinants of Central Bank Independence*, Paper for the CentER Conference on 'Positive Political Economy: Theory and Evidence', January 23-24, 1995, Tilburg, The Netherlands.

Eizenga, W. (1987), The Independence of the Deutsche Bundesbank and the Nederlandsche Bank

with Regard to Monetary Policy; A Comparative Study, *SUERF Papers on Monetary Policy and Financial Systems*, No. 2.

Engle, R.F. (1983), Estimates of the Variance of U.S. Inflation Based upon the ARCH Model, *Journal of Money, Credit, and Banking*, 15, 286-301.

Epstein, G. and J. Schor (1986), The Divorce of the Banca d'Italia and the Italian Treasury: A Case Study of Central Bank Independence, *Discussion Paper, Harvard Institute of Economic Research*, No. 1269, September.

Evans, M. (1991), Discovering the Link between Inflation Rates and Inflation Uncertainty, *Journal of Money, Credit, and Banking*, 23, 169-184.

Fair, D. (1980), *Relationships between Central Banks and Governments in the Determination of Monetary Policy*, SUERF Working Paper.

Fischer, S. (1993), The Role of Macroeconomic Factors in Economic Growth, *Journal of Monetary Economics*, 32, 485-512.

Fischer, S. (1994), The Costs and Benefits of Disinflation, in: J.A.H. de Beaufort Wijnholds, S.C.W. Eijffinger and L.H. Hoogduin (eds.), *A Framework for Monetary Stability*, Dordrecht/Boston/London: Kluwer Academic Publishers, 31-42.

Fischer, S. (1995), Central Bank Independence Revisited, *American Economic Review, Papers and Proceedings*, 85, 201-206.

Fratianni, M. and H. Huang (1994), Reputation, Central Bank Independence and the ECB, in: P.L. Siklos (ed.), *Varieties of Monetary Reforms: Lessons and Experiences on the Road to Monetary Union*, Dordrecht/Boston/London: Kluwer Academic Publishers.

Frankel, J.A. and K. Rockett (1988), International Macro-economic Policy Coordination When Policymakers Do Not Agree on the True Model, *American Economic Review*, 78, 318-340.

Friedman, M. (1962), Should There Be an Independent Monetary Authority, in: L.B. Yeager (ed.), *In Search of a Monetary Constitution*, Boston: Harvard University Press.

Gärtner, M. (1995), Time-Consistent Monetary Policy Under Output Persistence, *University of St. Gallen, Discussion Paper*.

Goodhart, C.A.E. (1994), Game Theory for Central Bankers: A Report to the Governor of the Bank of England, *Journal of Economic Literature*, 32, 101-114.

Goodhart, C. and D. Schoemaker (1993), *Institutional Separation between Supervisory and*

*Monetary Authorities*, Paper presented on the Conference on Prudential Regulation, Supervision and Monetary Policy, Bocconi University, Milaan.

Gormley, L.W. and J. de Haan (1995), *The Democratic Deficit of the European Central Bank*, Working Paper, University of Groningen.

Grilli, V., D. Masciandaro and G. Tabellini (1991), Political and Monetary Institutions and Public Financial Policies in the Industrial Countries, *Economic Policy*, No. 13, 341-392 (including Discussion by E. Malinvaud).

Grimes, A. (1991), The Effects of Inflation Growth: Some International Evidence, *Weltwirtschaftliches Archiv*, 127, 631-644.

Haan, J. de and J.E. Sturm (1992), The Case for Central Bank Independence, *Banca Nazionale del Lavoro Quarterly Review*, No. 182, 305-327. Reprinted in: M. Parkin (ed.), *The Theory of Inflation*, Aldershot: Edward Elgar Publishing Ltd, 1994.

Haan, J. de, K. Knot and J.E. Sturm (1993), On the Reduction of Disinflation Costs: Fixed Exchange Rates or Central Bank Independence, *Banca Nazionale del Lavoro Quarterly Review*, No. 187, 429-443.

Haan, J. de and J.E. Sturm (1994), Political and Institutional Determinants of Fiscal Policy in the European Community, *Public Choice*, 80, 157-172.

Haan, J. de and G.J. van 't Hag (1994), *Variation in Central Bank Independence across Countries: Some Provisional Empirical Evidence*, Working Paper, Department of Economics, University of Groningen, Forthcoming in: *Public Choice*, 1995.

Haan, J. de and S.C.W. Eijffinger (1994), De Politieke Economie van Central Bank Onafhankelijkheid: Theorie en Praktijk van Centrale Bank Autonomie, *Rotterdamse Monetaire Studies*, 13, No. 2.

Haan, J. de and C.L.J. Siermann (1994), *Central Bank Independence, Inflation and Political Instability*, Working Paper, Department of Economics, University of Groningen, Forthcoming in: *Journal of Policy Reform*.

Haan, J. de (1995a), *Comment on: A. Cukierman, P. Rodriguez and S.B. Webb, Central Bank Autonomy and Exchange Rate Regimes: Their Effects on Monetary Accommodation and Activism*, Comment for the CentER Conference on 'Positive Political Economy: Theory and Evidence', January 23-24, 1995, Tilburg, The Netherlands.

Haan, J. de (1995b), *Why Does Central Bank Independence Yield Lower Inflation?: A Taxonomy of Arguments and Empirical Evidence*, Working Paper, Department of Economics, University of



Groningen.

Hall, P.A. (1994), Central Bank Independence and Coordinated Wage Bargaining: Their Interaction in Germany and Europe, forthcoming in: *German Politics and Society*.

Haggard, S., R. Kaufman, K. Shariff and S. Webb (1991), *Politics, Inflation and Government Deficits in Middle-Income Countries*, Unpublished Manuscript, World Bank.

Hasse, R.H. (1990), *The European Central Bank: Perspectives for the Further Development of the European Monetary System*, Gütersloh: Bertelsmann Foundation.

Havrilesky, T. (1987), A Partisan Theory of Fiscal and Monetary Regimes, *Journal of Money, Credit, and Banking*, 19, 308-325.

Havrilesky, T. (1993), *The Pressures on American Monetary Policy*, Dordrecht/Boston/London: Kluwer Academic Publishers.

Havrilesky, T. and J. Granato (1993), Determinants of Inflationary Performance: Corporatist Structures vs Central Bank Autonomy, *Public Choice*, 76, 249-261.

Heller, H.R. (1991), Prudential Supervision and Monetary Policy, in: J.A. Frenkel and M. Goldstein (eds.), *International Financial Policy: Essays in Honour of Jacques J. Polak*, Washington, D.C.: International Monetary Fund.

Herrendorf, B. (1995), Exchange Rate Pegging, Transparency and Imports of Credibility, *EUI Working Papers in Economics*, European University Institute, Florence, No. 95/15.

Hibbs, D.A. (1977), Political Parties and Macroeconomic Policy, *American Political Science Review*, 23, 1467-1488.

Hughes Hallett, A. and M.L. Petit (1990), Cohabitation or Forced Marriage? A Study of the Costs of Failing to Coordinate Fiscal and Monetary Policies, *Weltwirtschaftliches Archiv*, 662-689.

Issing, O. (1993), *Central Bank Independence and Monetary Stability*, Occasional Paper No. 89, London: Institute of Economic Affairs.

Issing, O. (1994), Monetary Policy Strategy in the EMU, in: J.A.H. de Beaufort Wijnholds, S.C.W. Eijffinger and L.H. Hoogduin (eds.), *A Framework for Monetary Stability*, Dordrecht/Boston/London: Kluwer Academic Publishers, 135-148.

Jansen, D.W. (1989), Does Inflation Uncertainty Affect Output Growth? - Further Evidence, *Federal Reserve Bank of St. Louis Review*, 71, July/August, 43-54.

- Johnson, D.R. and P.L. Siklos (1992), *Empirical Evidence on the Independence of Central Banks*, Unpublished Manuscript, Wilfrid Laurier University, Ontario, Canada.
- Karras, G. (1993), Money, Inflation, and Output Growth: Does the Aggregate Demand-Aggregate Supply Model Explain the International Evidence?, *Weltwirtschaftliches Archiv*, 129, 662-674.
- Kennedy, E. (1991), *The Bundesbank*, London: Pinter Publishers.
- Kydland, F.W. and E.C. Prescott (1977), Rules Rather than Discretion: The Inconsistency of the Optimal Plans, *Journal of Political Economy*, 85, 473-491.
- Layard, R., S. Nickell and R. Jackman (1991), *Unemployment, Macroeconomic Performance and the Labour Market*, Oxford: Oxford University Press.
- Lippi, F. and O.H. Swank (1994), On the Optimal Degree of Central Bank Independence: Trading Off Credibility Versus Flexibility, *Institute for Economic Research, Discussion Paper*, Erasmus University.
- Logue, D.E. and R.J. Sweeney (1981), Inflation and Real Growth: Some Empirical Results, *Journal of Money, Credit, and Banking*, 13, 497-501.
- Lohmann, S. (1992), Optimal Commitment in Monetary Policy: Credibility versus Flexibility, *American Economic Review*, 82, 273-286.
- Marsh, D. (1992), *The Bundesbank. The Bank That Rules Europe*, London: Heinemann.
- Mascaro, A. and A.H. Meltzer (1983), Long- and Short-Term Interest Rates in a Risky World, *Journal of Monetary Economics*, 12, 485-518.
- Masciandaro, D. and G. Tabellini (1988), Fiscal Deficits and Monetary Institutions: A Comparative Analysis, in: H. Cheng (ed.), *Challenges to Monetary Policy in the Pacific Basin Countries*, Dordrecht: Kluwer Academic Publishers.
- McCallum, B.T. (1995), Two Fallacies Concerning Central-Bank Independence, *American Economic Review, Papers and Proceedings*, 85, 207-211.
- Mishkin, F.S. (1981), The Real Interest Rate: An Empirical Investigation, *Carnegie-Rochester Conference Series on Public Policy*, 15, 151-200.
- Moser, P. (1994), The Supply of Central Bank Independence, *University of St. Gallen, Discussion Paper*.
- Mueller, D.C. (1989), *Public Choice II*, Cambridge: Cambridge University Press.

- Mundell, R.A. (1963), Inflation and Real Interest, *Journal of Political Economy*, 71, 280-283.
- Neumann, M.J.M. (1991), Precommitment by Central Bank Independence, *Open Economies Review*, 2, 95-112.
- Parkin, M. (1987), Domestic Monetary Institutions and the Deficit, in: J.M. Buchanan, C.K. Rowley and R.D. Tollison (eds.), *Deficits*, Oxford: Basil Blackwell, 310-337.
- Persson, T. and L. Svensson (1989), Why a Stubborn Conservative Would Run a Deficit? Policy with Time Consistent Preferences, *Quarterly Journal of Economics*, 104, 325-345.
- Persson, T. and G. Tabellini (1990), *Macroeconomic Policy, Credibility and Politics*, London: Harwood Academic Publishers.
- Persson, T. and G. Tabellini (1993), Designing Institutions for Monetary Stability, *Carnegie-Rochester Conference Series on Public Policy*, 39, 53-84.
- Petit, M.L. (1989), Fiscal and Monetary Policy Coordination: A Differential Game Approach, *Journal of Applied Econometrics*, 161-179.
- Pollard, P.S. (1993), Central Bank Independence and Economic Performance, *Federal Reserve Bank of St. Louis Review*, 75, July/August, 21-36.
- Posen, A. (1993a), Why Central Bank Independence Does Not Cause Low Inflation: There Is No Institutional Fix for Politics, in: R. O'Brien (ed.) *Finance and the International Economy: 7*, Oxford: Oxford University Press.
- Posen, A. (1993b), Central Banks and Politics, *Amex Bank Review*, 20, No. 9, 5.
- Posen, A. (1994), Central Bank Independence and Disinflationary Credibility: A Missing Link, *Brookings Discussion Papers in International Economics*, No. 109, August.
- Rogoff, K. (1985), The Optimal Degree of Commitment to an Intermediate Monetary Target, *Quarterly Journal of Economics*, 110, 1169-1190.
- Roll, E. et al. (1993), *Independent and Accountable. A New Mandate for the Bank of England*, The Report of an Independent Panel Chaired by Eric Roll, Centre for Economic Policy Research, October.
- Sargent, N.J. and N. Wallace (1981), Some Unpleasant Monetarist Arithmetic, *Federal Reserve Bank of Minneapolis Quarterly Review*, 5, 1-17.
- Schaling, E. (1993), On the Economic Independence of the Central Bank and the Persistence of

Inflation, *CentER Discussion Paper Series*, Tilburg University, No. 9336.

Schaling, E. (1994), Wage Formation, Intermediate Monetary Targeting and the Optimal Degree of Central Bank Independence, *Working Paper Tilburg University*.

Schaling, E. (1995), *Institutions and Monetary Policy: Credibility, Flexibility and Central Bank Independence*, Aldershot: Edward Elgar Publishing Ltd.

Smith, E.O. (1994), *The German Economy*, London: Routledge.

Swinburne M. and M. Castello-Branco (1991), Central Bank Independence: Issues and Experience, in: P. Downes and R. Vaez-Zadeh (eds.), *The Evolving Role of Central Banks*, Washington, D.C.: International Monetary Fund, 414-444.

Tabellini, G. (1988), Monetary and Fiscal Policy Coordination with a High Public Debt, in: F. Giavazzi and L. Spaventa (eds.), *High Public Debt: The Italian Experience*, Cambridge: Cambridge University Press.

Tabellini, G. and A. Alesina (1990), Voting on the Budget Deficit, *American Economic Review*, 80, 37-49.

Tabellini, G. and V. La Via (1989), Money, Deficit and Public Debt in the United States, *Review of Economics and Statistics*, 71, 15-25.

Ungerer, H. (1990), The EMS, 1979-1990, Policies-Evolution-Outlook, *Konjunkturpolitik*, 36, 329-362.

Waller, C.J. (1992a), The Choice of a Conservative Central Banker in a Multisector Economy, *American Economic Review*, 82, 1006-1012.

Waller, C.J. (1992b), A Bargaining Model of Partisan Appointments to the Central Bank, *Journal of Monetary Economics*, 29, 411-428.

Walsh, C.E. (1993), Optimal Contracts for Independent Central Bankers: Private Information, Performance Measures and Reappointment, Federal Reserve Bank of San Francisco, *Working Paper* 93-02.

Walsh, C.E. (1994), Central Bank Independence and the Costs of Disinflation in the EC, Federal Reserve Bank of San Francisco, *Working paper* 94-04, Forthcoming in: B. Eichengreen, J. Frieden and J. von Hagen (eds.), *Monetary and Fiscal Policy in an Integrated Europe*, Berlin/Heidelberg: Springer Verlag, 1995.

Walsh, C.E. (1995), Optimal Contracts for Central Bankers, *American Economic Review*, 85, 150-



167.

Zijlstra, J. (1992), *Per Slot van Rekening*, Amsterdam: Uitgeverij Contact.

<b>No.</b>	<b>Author(s)</b>	<b>Title</b>
94115	H. Uhlig and N. Yanagawa	Increasing the Capital Income Tax Leads to Faster Growth
9501	B. van Aarle, A.L. Bovenberg and M. Raith	Monetary and Fiscal Policy Interaction and Government Debt Stabilization
9502	B. van Aarle and N. Budina	Currency Substitution in Eastern Europe
9503	Z. Yang	A Constructive Proof of a Unimodular Transformation Theorem for Simplices
9504	J.P.C. Kleijnen	Sensitivity Analysis and Optimization of System Dynamics Models: Regression Analysis and Statistical Design of Experiments
9505	S. Eijffinger and E. Schaling	The Ultimate Determinants of Central Bank Independence
9506	J. Ashayeri, A. Teelen and W. Selen	A Production and Maintenance Planning Model for the Process Industry
9507	J. Ashayeri, A. Teelen and W. Selen	Computer Integrated Manufacturing in the Chemical Industry: Theory & Practice
9508	A. Mountford	Can a Brain Drain be Good for Growth?
9509	F. de Roon and C. Veld	Announcement Effects of Convertible Bond Loans Versus Warrant-Bond Loans: An Empirical Analysis for the Dutch Market
9510	P.H. Franses and M. McAleer	Testing Nested and Non-Nested Periodically Integrated Autoregressive Models
9511	R.M.W.J. Beetsma	The Political Economy of a Changing Population
9512	V. Kriman and R.Y. Rubinstein	Polynomial Time Algorithms for Estimation of Rare Events in Queueing Models
9513	J.P.C. Kleijnen, and R.Y. Rubinstein	Optimization and Sensitivity Analysis of Computer Simulation Models by the Score Function Method
9514	R.D. van der Mei	Polling Systems with Markovian Server Routing
9515	M. Das	Extensions of the Ordered Response Model Applied to Consumer Valuation of New Products
9516	P.W.J. De Bijl	Entry Deterrence and Signaling in Markets for Search Goods
9517	G. Koop, J. Osiewalski and M.F.J. Steel	The Components of Output Growth: A Cross-Country Analysis

<b>No.</b>	<b>Author(s)</b>	<b>Title</b>
9518	J. Suijs, H. Hamers and S. Tijs	On Consistency of Reward Allocation Rules in Sequencing Situations
9519	R.F. Hartl and P.M. Kort	Optimal Input Substitution of a Firm Facing an Environmental Constraint
9520	A. Lejour	Cooperative and Competitive Policies in the EU: The European Siamese Twin?
9521	H.A. Keuzenkamp	The Econometrics of the Holy Grail: A Critique
9522	E. van der Heijden	Opinions concerning Pension Systems. An Analysis of Dutch Survey Data
9523	P. Bossaerts and P. Hillion	Local Parametric Analysis of Hedging in Discrete Time
9524	S. Hochgürtel, R. Alessie and A. van Soest	Household Portfolio Allocation in the Netherlands: Saving Accounts versus Stocks and Bonds
9525	C. Fernandez, J. Osiewalski and M.F.J. Steel	Inference Robustness in Multivariate Models with a Scale Parameter
9526	G.-J. Otten, P. Borm, T. Storcken and S. Tijs	Decomposable Effectivity Functions
9527	M. Lettau and H. Uhlig	Rule of Thumb and Dynamic Programming
9528	F. van Megen, P. Borm, and S. Tijs	A Perfectness Concept for Multicriteria Games
9529	H. Hamers	On the Concavity of Delivery Games
9530	V. Bhaskar	On the Generic Instability of Mixed Strategies in Asymmetric Contests
9531	E. Canton	Efficiency Wages and the Business Cycle
9532	J.J.G. Lemmen and S.C.W. Eijffinger	Financial Integration in Europe: Evidence from Euler Equation Tests
9533	P.W.J. De Bijl	Strategic Delegation of Responsibility in Competing Firms
9534	F. de Jong and T. Nijman	High Frequency Analysis of Lead-Lag Relationships Between Financial Markets
9535	B. Dutta, A. van den Nouweland and S. Tijs	Link Formation in Cooperative Situations
9536	B. Bensaïd and O. Jeanne	The Instability of Fixed Exchange Rate Systems when Raising the Nominal Interest Rate is Costly

No.	Author(s)	Title
9537	E.C.M. van der Heijden, J.H.M. Nelissen and H.A.A. Verbon	Altruism and Fairness in a Public Pension System
9538	L. Meijdam and H.A.A. Verbon	Aging and Public Pensions in an Overlapping-Generations Model
9539	H. Huizinga	International Trade and Migration in the Presence of Sector-Specific Labor Quality Pricing Distortions
9540	J. Miller	A Comment on Holmlund & Lindén's "Job Matching, Temporary Public Employment, and Unemployment"
9541	H. Huizinga	Taxation and the Transfer of Technology by Multinational Firms
9542	J.P.C. Kleijnen	Statistical Validation of Simulation Models: A Case Study
9543	H.L.F. de Groot and A.B.T.M. van Schaik	Relative Convergence in a Dual Economy with Tradeable and Non-Tradeable Goods
9544	C. Dustmann and A. van Soest	Generalized Switching Regression Analysis of Private and Public Sector Wage Structures in Germany
9545	C. Kilby	Supervision and Performance: The Case of World Bank Projects
9546	G.W.J. Hendrikse and C.P. Veerman	Marketing Cooperatives and Financial Structure
9547	R.M.W.J. Beetsma and A.L. Bovenberg	Designing Fiscal and Monetary Institutions in a Second-Best World
9548	R. Strausz	Collusion and Renegotiation in a Principal-Supervisor-Agent Relationship
9549	F. Verboven	Localized Competition, Multimarket Operation and Collusive Behavior
9550	R.C. Douven and J.C. Engwerda	Properties of $N$ -person Axiomatic Bargaining Solutions if the Pareto Frontier is Twice Differentiable and Strictly Concave
9551	J.C. Engwerda and A.J.T.M. Weeren	The Open-Loop Nash Equilibrium in LQ-Games Revisited
9552	M. Das and A. van Soest	Expected and Realized Income Changes: Evidence from the Dutch Socio-Economic Panel
9553	J. Suijs	On Incentive Compatibility and Budget Balancedness in Public Decision Making
9554	M. Lettau and H. Uhlig	Can Habit Formation be Reconciled with Business Cycle Facts?



No.	Author(s)	Title
9555	F.H. Page and M.H. Wooders	The Partnered Core of an Economy
9556	J. Stennek	Competition Reduces X-Inefficiency. A Note on a Limited Liability Mechanism
9557	K. Aardal and S. van Hoesel	Polyhedral Techniques in Combinatorial Optimization
9558	R.M.W.J. Beetsma and A.L. Bovenberg	Designing Fiscal and Monetary Institutions for a European Monetary Union
9559	R.M.W.J. Beetsma and A.L. Bovenberg	Monetary Union without Fiscal Coordination May Discipline Policymakers
9560	R. Strausz	Delegation of Monitoring in a Principal-Agent Relationship
9561	A. Lejour	Social Insurance and the Completion of the Internal Market
9562	J. Bouckaert	Monopolistic Competition with a Mail Order Business
9563	H. Haller	Household Decisions and Equilibrium Efficiency
9564	T. Chou and H. Haller	The Division of Profit in Sequential Innovation Reconsidered
9565	A. Blume	Learning, Experimentation, and Long-Run Behavior in Games
9566	H. Uhlig	Transition and Financial Collapse
9567	R.C.H. Cheng and J.P.C. Kleijnen	Optimal Design of Simulation Experiments with Nearly Saturated Queues
9568	M.F.J. Steel	Posterior Analysis of Stochastic Volatility Models with Flexible Tails
9569	M.P. Berg	Age-Dependent Failure Modelling: A Hazard-Function Approach
9570	F. Verboven	Testing for Monopoly Power when Products are Differentiated in Quality
9571	B. Melenberg and A. van Soest	Semiparametric Estimation of Equivalence Scales Using Subjective Information
9572	J. Stennek	Consumer's Welfare and Change in Stochastic Partial-Equilibrium Price
9573	E. van Damme	Game Theory: The Next Stage
9574	B. Gupta	Collusion in the Indian Tea Industry in the Great Depression: An Analysis of Panel Data

<b>No.</b>	<b>Author(s)</b>	<b>Title</b>
9575	A.B.T.M. van Schaik and H.L.F. de Groot	Unemployment and Endogenous Growth
9576	A.J.T.M. Weeren, J.M. Schumacher and J.C. Engwerda	Coordination in Continuously Repeated Games
9577	A. van den Nouweland, S. Tijs and M. Wooders	Axiomatizations of Lindahl and Ratio Equilibria in Public Good Economies
9578	Richard F. Hartl and Peter M. Kort	Capital Accumulation of a Firm Facing an Emissions Tax
9579	S. Eijffinger and E. Schaling	Optimal Commitment in an Open Economy: Credibility Vs. Flexibility
9580	Willem J.H. Van Groenendaal	Estimating Net Present Value Variability for Deterministic Models
9581	M. Perry and P.J. Reny	A General Solution to King Solomon's Dilemma
9582	H. Huizinga and S.B. Nielsen	Capital Income and Profits Taxation with Foreign Ownership of Firms
9583	T. Berglund and R. Kabir	What Explains the Difference Between the Futures' Price and its "Fair" Value? Evidence from the European Options Exchange
9584	F. Janssen, T. de Kok and F. van der Duyn Schouten	Approximations for the Delivery Splitting Model
9585	E. Canton	Labour Supply Shocks and Neoclassical Theory
9586	E. Ley, M. Steel	A Model of Management Teams
9587	S. Eijffinger, J. de Haan	The Political Economy of Central Bank Independence

P.O. BOX 90153, 5000 LE TILBURG, THE NETHERLAND

**Bibliotheek K. U. Brabant**



**17 000 01424823 2**