# Does central bank independence reflect monetary commitment properly? Methodical considerations*

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## 1. Introduction

Without doubt, inflation has a political economy background. Obviously, the policymakers lack instruments for other policy areas such as employment policy or fiscal policy, or face distortions so that objectives in these areas cannot be met without the help of monetary policy. Thus, monetary policy often suffers from the well-known inconsistency problems which create a need for political constraints. Macroeconomic theory shows that monetary policy without commitment has an inherent inflationary bias. If the public becomes aware of the latter it will not trust monetary policy announcements. Credibility of monetary policy then can be regained by commitment. From the point of view of the policymaker, commitment is a means of raising the costs of inflation.

One means to generate credibility and, hence, stability is to guarantee central bank independence (CBI). Theoretical considerations based on the literature covering this topic as well as empirical evidence have shown that there is a – weakly significant – correlation between CBI and macroeconomic performance. A second means, suggested by a number of studies on CBI and macroeconomic perform-

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* Financial support by the Otto Wolff-Stiftung is gratefully acknowledged. Jörg Wiegratz provided very valuable research assistance. Thanks are also due to Bettina Becker, Juergen B. Donges, John Wood and two anonymous referees for very helpful comments.

ance, is to appoint central bankers who are more conservative with respect to price stability than the government.[1]

This paper takes a different perspective on the issue of commitment. Commitment, it is argued, is a set of rules, or alternatively a monetary regime introduced by the government. Central bank independence is too narrowly defined to cover all aspects of commitment. We suggest that this is an important reason for the weak empirical correlation between CBI and the macroeconomic performance, in particular the incompatible results for industrialised and developing countries. In addition, we stress the point that conservativeness of a central banker does not necessarily protect the economy from inflation. The preferences of the central banker in charge should not be decisive for the degree of price stability. Rather, it is the quality of the monetary regime that is responsible for monetary policy reflecting the preferences of society.

The paper is organised as follows. In Section 2, we discuss the nature of commitment by briefly comparing different approaches. The relevant problem of who commits to a monetary regime is analysed in Section 3. It is argued that contracts for central bankers do not solve the underlying principal-agent-problem of monetary policy. The fourth section is dedicated to the definition of a comprehensive commitment. In sections 5 and 6, we compare different legal measures of CBI with a new index of commitment which avoids some of the problems of CBI. Section 7 provides a first empirical assessment of the index of commitment. Conclusions round off the paper.

## 2. The nature of commitment

In what follows, we briefly discuss three ways to approach commitment. In the macroeconomic literature, commitment, in general, is not defined as a monetary regime. Rather, it is argued that the government can commit credibly to a certain inflation rate, e.g. $\pi^* = 0$,

[1] However, CBI and conservativeness are not independent of each other: high CBI does not necessarily lead to low inflation if the government appoints a central banker with a similar inflationary bias. On the same token, a conservative, but dependent central banker will similarly not necessarily deliver low inflation. For an elaboration of the argument see Berger, de Haan and Eijffinger (2000, pp. 3-7).

which then is called a policy rule (e.g. Barro and Gordon 1983, p. 106). For the purpose of showing that credible commitment to rules leads to lower inflation and less output volatility in a theoretical positive analysis, this restriction is appropriate. However, to explain how to generate credibility through commitment, such an inflation target has shortcomings: it is left to the policymakers how to meet it. Without enforcement, commitment cannot become credible (North 1993, p. 12, McCallum 1995, p. 210, and Bofinger 1991, p. 24). Therefore, commitment has to be more than an announcement of an inflation target.

Moreover, it is sometimes argued that, instead of defining an inflation target, the government can try to build up a reputation as being 'dry' (Vickers 1986). In this case, it is not necessary to create a rule. The government is subject to reputational forces inducing it to create a sustainably low inflation rate. The government looses reputation in case of an increase in the inflation rate, which may even lead to a lost general election. Therefore, the government has the incentive to consider price stability. Eventually, this process yields a so-called reputational equilibrium with a sustainable inflation rate which is normally above zero (Barro and Gordon 1983, pp. 110-14). Again it is left open how the government will protect itself from abusing the freedom left to it if the assignment problem (Tinbergen 1952) cannot be solved.

Taking into account the political economy background of inflation, we define commitment as a deliberately chosen monetary regime,[2] not as a certain inflation rate, money growth rate and the like (Brennan and Buchanan 1981, p. 65). It contains rules about internal monetary policy and external monetary relations, which are inseparable (Johnson 1972). A monetary regime is clearly defined, any attempts to renege can be identified by the public (given rational expectations) and may lead to political difficulties for the government. From a normative point of view, such a monetary regime has to meet at least two – closely related – conditions in order to be sustainable. First, it should reflect the preferences of the members of society. We assume that on a constitutional level, all individuals would prefer a

[2] Although in the following we will call the monetary authority a central bank (as it is the dominant monetary institution in the world), a monetary regime can take any known form, such as central bank system, currency board system or dollarisation.

monetary regime that ensures stability when informed about the costs of inflation.[3] One could go even further and define monetary commitment as a constitutional decision that has to be made unequivocal. This definition, however, restricts the scope of possible commitments. Too many different interests oppose a consensus. Under normal circumstances and for pragmatic reasons, the government, being a legal agent of the principal 'public', has to decide on a monetary regime. To sum up: a monetary rule should have constitutional quality, but written with a small 'c' rather than a capital 'C' (Hetzel 1997, pp. 50f). Monetary policy is part of the economic order, but details are not laid down in the constitution.

Second, the monetary regime must be independent of time and the monetary policymaker in charge. Therefore, suggestions to choose a central banker who has a reputation of being conservative compared to society (Rogoff 1985) do not solve the problem; without a rule there is no certainty that the central banker will withstand pressures exerted on him by the government to finance an excessive deficit in the public budget. Moreover, even if this central banker pursued a stability-oriented policy, there would be the danger of her/his successor being less conservative. Therefore, the central banker in charge should not be able to define the objectives of monetary policy. If the central bank is free to choose its policy objective, the democratic legitimacy is low (Prast 1996). Rather, a central bank is an agency which operates to meet the monetary objectives (ideally price stability) set by society or its legal representatives. Thus, independence of a central bank can only imply meeting a (politically) given objective with independently chosen instruments (Debelle and Fischer 1995).[4] Thus the quality of monetary policy, i.e. the inflation rate, must not depend on the motives behind the behaviour of the policymaker: whether or not inflation is low should not depend on the preferences of the individuals governing the central bank. In other words: "No form of organization, of course, can obtain wise policy

[3] This does not exclude that in a special economic situation the majority may prefer strong money growth to stimulate demand. The rule is a means to keep a long-term perspective.

[4] Fischer contradicts himself on that point. In his 1995 paper (p. 202) he argues that central bank independence ensures that the preferences of the central banker rather than those of the public determine monetary policy. However, in another paper, Fischer (1994, p. 37) argues that the degree of commitment (central bank independence) reflects the preferences of society.

from men who have no wisdom in them. But poor organization can obtain unwise policy from men who have wisdom in them" (Hart 1948, p. 515). To sum up: what determines monetary policy has to reflect society's preferences rather than the central banker's preferences.

## 3. Who commits to stability?

A branch of the literature has proposed special contracts or restrictions for central bankers meant to guide their behaviour. It is argued that even central bank independence would not be an incentive strong enough to create a stable currency. Suggestions are made to restrict the discretionary power of central bankers, for instance by granting partial independence (Lohmann 1992), by giving a monetary rule the status of a law (Scheide 1993) or by making contracts with central bankers (Walsh 1995) limiting their personal income (up to dismissal) in case they miss a certain politically given inflation target.[5]

As Wood (1997) has demonstrated, these contracts for central bankers will only make sense if the government itself is committed to stability. In other words: it is not enough to restrict the discretionary power of central bankers. An inflation prone government would not punish the central banker if she/he broke the rule or contract. Hence, the problem is not solved by a contract, but only relocated (McCallum 1995, p. 210, and 1997). The low relevance of contracts for monetary policymakers with the government can be shown with historical as well as contemporary examples (Wood 1997, Jordan 1995/6).

The literature on optimal contracts adds to this critique. Using the contracting approach under different assumptions, Chortareas and Miller (2000) as well as Da Empoli (2000) theoretically show that it may be impossible to define an optimal contract. The former use the concept of common agency to show that if a contract between the government and the central bank is possible, a second (implicit) contract between an interest group and the central bank is also possible, dominating the first contract. Da Empoli shows that a central banker

[5] Such a contract has been introduced in New Zealand in 1992; see Kirchgässner (1996).

who either has several tasks, e.g. monetary policy and financial market supervision, or is seeking a post in private business after his contract ends, is always tempted to renege on the contract.

Another convincing argument against restricting the independence of monetary policymakers by special arrangements is given by McCallum (1995 and 1997). He argues that there is no reason to assume that monetary policymakers will necessarily act in favour of discretionary monetary policy that would lead to surprise inflation. Given that their perspective is a long-term one, it would pay them to act rule bound and to stabilise expectations. Under rational expectations, the public will adjust its expectations if in each period the actual inflation rate equals the pre-announced one. This argument is particularly convincing if society's preference is mirrored in the pre-announced inflation rate. To sum up: as long as the government commits and sticks to a certain policy rule, it is not necessary to force a precommitment technology upon the central bank.

This leads to the question of who is the principal and who is the agent in monetary policy. Those who argue in favour of a contract, interpret the government as the principal. The central bank is seen as the agent (Walsh 1995). However, as long as the government has the incentive to abuse monetary policy to meet objectives other than price stability, the government itself has to be interpreted as the agent. Society is the principal, for it has an interest in stability as opposed to the government which has more than one objective and sometimes faces a lack of policy instruments. Thus, commitment always means commitment to stability by the government via constructing a monetary regime. It is impossible that another agent than the government commits itself to a certain monetary policy rule.

## 4. Elements of legal commitment

In this section, the elements defining a monetary policy regime are discussed. Two aspects are relevant. First, legal commitment has to be distinguished from actual behaviour. They are not identical. To assess how governmental commitment, be it central bank independence or another concept, determines macroeconomic performance, it is nec-

essary to concentrate on the legal aspects. This is particularly important for empirical work: if actual behaviour were employed to explain policy outcomes, e.g. inflation rates, it would be possible for both to be determined by the same exogenous variable. The results would be distorted. This can be avoided by using legal commitment as explanans.[6]

Second, legal commitment by the government as society's agent has more than one dimension. It depends on several factors which can be grouped as follows: internal restrictions as set by central bank legislation, external constraints such as convertibility restrictions, exchange rate arrangements and the like as well as additional features regarding tasks of the central bank. To analyse commitment, one should be as comprehensive as possible. In the following, we introduce 10 criteria (consisting of 13 components) that theoretically determine the degree of legal commitment:[7]

1) *Stated objectives of monetary policy.* Monetary policy cannot raise employment and revenues if rational expectations are prevalent. Instead, only inflation is fuelled by employment or fiscal orientation of monetary policy. Nevertheless, central banks often face demands by the public or by politicians to use monetary policy instruments to boost the economy and to solve fiscal problems. A clear definition of the objective of monetary policy in the legal foundation of the monetary regime, namely price stability, makes it easier to refuse these demands. Thus, commitment varies with the kind and number of legally prescribed objectives (component *obj*). It is highest when the monetary authorities are obliged by law to only consider price level stability.[8] The obligation to support the economic policy of the government or to take employment into account as well as stability results in much less commitment. It is lowest if no objective is defined.

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[6] It is important to note that any concept of commitment is not necessarily identical to the credibility of the monetary policy. For a similar reasoning see Forder (1998).

[7] The components refer to the comparison of the measures of CBI in Section 5 (Table 1), the index of commitment introduced in Section 6 (Table 2) and the empirical assessment in Section 7.

[8] Of course, this is a value judgement: we assume that in general, societies prefer low inflation over higher one. Given the costs of inflation (Laidler and Parkin 1975, pp. 786-94), this judgement seems justified. The whole literature on this issue is based on it. See also Section 2.

2) *Locus of legal commitment.* The commitment to stability has to be put into a legal framework. This legal framework can be fixed on different constitutional levels. At the upper end of the scale, monetary policy can be integrated into the constitution which can only be changed by a qualified majority in parliament or by a referendum. At the lower end of the scale, the monetary regime can be implemented by a governmental decree which of course can be changed much more easily than the constitution. In the latter case the government is a great deal less committed to stability than in the first. The more difficult a change of the regime is for the government, the higher is the commitment (component *const*).

3) *Discretionary power belonging to the government.* The freedom of interventions by the government reflects the choice of instruments as well as the timing and magnitude of their use to meet the given monetary policy objective(s). The more the government keeps control over instruments such as interest rates, open market policy and so on, the less it commits to stability. Another way to intervene in monetary policy is to fix the exchange rate of the domestic currency towards other currencies with political motives. Let us assume that the exchange rate between the currencies of two countries, A and B, has been in a long-term floating equilibrium. Due to monetary expansion in country A relative to country B, A's currency depreciates in nominal and real terms. This diminishes the price competitiveness of the international sector in country B. Both governments now decide to agree on an exchange rate fix on the level prior to the monetary shock in A. However, A does not reduce the speed of its monetary expansion. The efforts to fix the exchange rate will contradict monetary policy in country B with the likely result that money growth accelerates there as well. To sum up, governmental competencies concerning the exchange rate policy also indicate low commitment to stability (component *gov*).

4) *Conditions of appointment and dismissal of monetary policymakers.* The rules for the appointment of policymakers[9] have been discussed controversially for a long time, in particular with respect to their independence from politics. In general, two aspects are of inter-

[9] In the following, we concentrate on the chief executive officer of the monetary institution.

est (Cukierman 1992, p. 373). First, the question is who is able to become chief executive officer (CEO), especially whether only a reputed expert or any other person can be appointed. The higher the demanded expertise of the CEO, the higher the level of commitment (component *ceo*). Second, how is a potential dismissal organised (component *diss*)? For instance, if a dismissal is possible after a change of government or even certain ministers (Cukierman and Webb 1995), legal monetary commitment is low. It is also possible that only severe violation of her/his duty leads to the dismissal of the CEO. The latter is correlated with a high level of legal commitment.

5) *Conditions of lending to the government.* Monetisation of budget deficits by monetary expansion has always been and still is the main reason for hyperinflation wherever it happened. Public budget deficits per se are not a threat to stability, as long as they are financed on the (international) capital market. However, it has to be avoided at any rate that public deficits are financed by emitting fresh money. This would necessarily lead to money growth[10] and to inflation. Thus, an important factor determining the level of legal commitments is a provision on lending fresh money to the government (component *limcred*). Hence, the highest commitment is given when the central bank is allowed to buy government bonds neither on the primary nor secondary market. Even central bank holding of government bonds purchased on the secondary market (component *limsec*) has fiscal effects as long as the seigniorage is added to public revenues. The state pays itself an interest. In other words: "interest paid to the Fed is essentially a wash" (Hetzel 1997, p. 56). Moreover, if the central bank is not allowed to buy government bonds on the primary market but may still purchase them on the secondary market, it is rather easy to circumvent this regulation. Thus, the level of commitment is the lower, the easier it is for the government to borrow money from the monetary institution.

6) *Public pledges of the government.* It is possible to take external obligations. They raise the level of commitment (component *extern*) compared with a situation without these obligations. First, the government can *ex ante* fix the exchange rate towards an international

[10] Sikken and de Haan (1998, pp. 494f) summarise four theoretical causes for public debt leading to money creation.

currency such as the US dollar, the euro or the Swiss franc. This fixing completely differs from interventions on the market for foreign exchange like those described in criterion 3. It illustrates that the government is willing to keep the exchange rate stable, i.e. to import stability. This is particularly important after a period of high and volatile inflation. Second, the government can accept support for its monetary policy by an international organisation such as the International Monetary Fund (IMF). This (financial or administrative) support is on principle given conditionally. Certain elements of the commitment (like those discussed here, e.g. convertibility) are not only promised domestically, but also internationally, that is they are part of a contract between the government and the IMF. Both fixing the exchange rate and conditionality raise the level of commitment.

7) *Convertibility restrictions.* Full convertibility can be interpreted as a signal that the government is fully committed to stability. For it indicates that the monetary regime is open to competition. This enables individuals to spend their money where they prefer. A lack of convertibility indicates the opposite. The public does not know whether the commitment to stability is earnest (Colombatto and Macey 1996). The dynamic inconsistency problem may again evolve due to inflationary expectations. Beside monetary problems resulting from convertibility restrictions, the allocation of resources may be seriously hampered. In case of foreign exchange control, it may be difficult for young and innovative enterprises to obtain foreign exchange for only old enterprises are awarded. Then, structural change would be repressed. Especially in the transition countries, this has been a problem (Bomhoff 1992, pp. 454f). Moreover, foreign and domestic capital investments depend positively on convertibility, that is the opportunity to reallocate the capital whenever wanted. If convertibility is denied, foreigners will avoid investing in the country and domestic investors probably will invest abroad. This can lead to further restrictions of convertibility and consequently to capital flight (Röpke 1979, pp. 337-40).[11] Therefore, the level of commitment is positively correlated with the degree of convertibility (component

[11] This view is not shared by all observers. Greene and Isard (1991) argue that convertibility also has risks. Their implicit assumption seems to be that economic policymaking without strict rules does not bear any risks. In other words: their trust in governments is high.

*conv*). We distinguish full convertibility of all transactions, restricted convertibility for either capital or current account transactions or no convertibility at all (Schuler 1996, pp. 29-32). A second component (*mult*) shows whether or not the market for foreign exchange is unified. If it is, commitment in this respect is high.

8) *Interactions with other currencies.* The monetary regime may allow for monetary competition in that not only their own currency circulates, but also one or more foreign currencies. In Argentina, for instance, the US dollar is a legal means of payment beside the peso. The public has the choice between the peso and the US dollar for their transactions. This arrangement is not an application of the free banking approach. The state remains the monopolist or oligopolist issuer of money; private firms are not allowed to issue their own currency and compete with the state. It only implies that the public has the freedom of choice to make contracts in any of the two (or more) currencies. Such an arrangement exerts competitive pressure on the domestic monetary authorities to issue a sound currency. If they fail to do so, demand for money will focus on the foreign exchange. This makes the realisation of seigniorage difficult. Therefore, the permission of monetary competition raises the level of commitment to stability (component *comp*).

9) *Supervison and regulation of the financial system by the central bank.* At first glance, financial market regulation is not necessarily connected with commitment to stability. However, if the central bank is involved in regulatory issues, this will probably have an impact on its monetary policy. In so far, regulatory responsibilities can be a signal for whether or not commitment to stability is high. However, this signal is ambivalent. As regards the political independence of monetary policy, there are both arguments against and in favour of commissioning the monetary institution with the supervision and regulation of the domestic financial system (Eijffinger and de Haan 1996, pp. 46-49).[12]

There are three arguments against such an arrangement. First, the central bank can face a conflict of interests in case some banks or other financial institutions have liquidity problems. Adding liquidity to the system may on the one hand rescue these banks. On the other

[12] See also De Beaufort Wijnholds and Hoogduin (1994, pp. 76-79)

hand, money growth associated with the new liquidity may raise both inflationary expectations and inflation (in the longer run). Second, in case of a failure of a financial institution the central bank may receive bad publicity. Its reputation may be harmed, which again diminishes the credibility of the monetary regime. A third argument is related to the fact that not just the central bank, but also the government is concerned with a potential bailout of a failed bank. Mixed responsibilities would harm the central bank. The primary argument for an active role of the central bank is that co-ordination of monetary policy and prudential regulation will enhance efficiency (*ibid*., p. 78). The other arguments are restricted to independent central banks: central banks act as lender of last resort. Therefore, it makes sense that they control the financial system to recognise as well as to prevent financial crisis as early as possible. Moreover and similarly, the central bank smoothes the payment system. A good knowledge of the system helps with this task.

Nevertheless, we do not give much credit to the arguments in favour of commissioning the supervision of the financial system. The counter arguments are stronger. Other actors than the central bank may also obtain a profound knowledge of the financial system and are able to co-operate with the central bank. The separation of responsibilities is most important in our view. Hence, separating monetary policy and financial supervision indicates high commitment, whereas both tasks being carried out by the same institution shows a lower level. The lowest commitment, however, is made when there is no financial market regulation (component *reg*).

10) *Accountability of the central bank*. As with the supervision of the financial system, the correlation of commitment to stability and the accountability of the central bank to the government or parliament is not clear. On the one hand, the central bank has to create transparency (Bini Smaghi 1998, p. 123); an informed public is more likely to form realistic expectations than an uninformed one.[13] On the other hand, accountability must not lead to the right of the government or parliament to participate in monetary policy. This requirement has led de Haan, Amtenbrink and Eijffinger (1998) to include aspects into their index of accountability: objectives of mone-

[13] For a recent discussion of this topic see Deutsche Bundesbank (2000). See also the controversy between Buiter (1999) and Issing (1999).

tary policy, transparency of actual monetary policy and the final responsibilities. The latter is considered in this paper by introducing criterion 3. The objectives of monetary policy are addressed in criterion 1. Here we concentrate on transparency. The level of commitment is the higher, the better the public is informed about monetary policy. The highest level is given when the public has to be informed by at least quarterly reports of the central bank (or a detailed website on the Internet). It is the least when no information is required. A medium level of commitment is achieved when instead of a public report hearings at the parliament have to take place (component *acc*).

To summarise, the government's legal commitment to price stability is the stronger, the more of these elements are considered. Legal commitment does not imply a guarantee for governments' and central banks' behaviour. Although commitment is a device to make monetary policy more transparent, it may not be possible to cover all possibilities in an act of parliament such as a central bank law. It remains incomplete. Governments and central banks still may have an informational advantage over the citizens. This they may wish to explore. Legal commitment is a way to prevent such a behaviour. In the following, various measures of it are analysed. We first discuss different concepts of CBI before suggesting an alternative interpretation of legal monetary commitment.

## 5. Do indices of CBI reflect legal commitment?

This section is dedicated to the question of whether these elements of commitment are adequately considered in the concept of CBI. For this purpose, we look at some measures of CBI which have been used to empirically assess the influence of CBI on inflation and other macroeconomic variables. This section is not meant to give a comprehensive survey on the literature. Rather, we concentrate on those indices being most influential on subsequent work.[14] The measures of central bank independence are separated into two groups: legal and non-legal

[14] Beside the already mentioned survey by Berger, de Haan and Eijffinger (2000), there are other surveys by Eijffinger and de Haan (1996) and by Kißmer and Wagner (1998).

measures. Legal measures are based on laws and contracts, whereas non-legal measures are normally based on questionnaires or actual developments such as the turnover rate of central bank governors.[15] The latter are excluded from the analysis for methodological reasons (Section 4).

All measures are composed of different criteria. This has often been criticised for being arbitrary.[16] A higher score of the index indicates a higher degree of independence. All indices range between two values, that is they are not infinite. As regards the components of the index of central bank independence, all studies quoted here employ the same or very similar factors. These include limitations to lending to the government, appointing and dismissal procedures for the board members, accountability of the central bank, the possibility of the government overriding the central bank's decisions and the objectives of monetary policy.[17] Table 1 shows the measures of CBI in detail. It reads as follows. In the columns, the studies are listed, the rows contain the 12 components. It is indicated whether or not an index contains an element.

TABLE 1

ELEMENTS OF LEGAL COMMITMENT AND INDICES OF CBI

| Component/ Index of CBI | Bade and Parkin (1988) | Alesina (1988) | GMT[1] | LVAU/ LAVW[2] | Eijffinger and Schaling (1993) | Anyadike-Danes (1995) |
|---|---|---|---|---|---|---|
| obj | 0 | 0 | 1 | 1 | 0 | 0 |
| const | 0 | 0 | 1 | 0 | 0 | 0 |
| gov | 1 | 1 | 1 | 1 | 1 | 0 |
| ceo | 1 | 1 | 1 | 0 | 1 | 0 |
| diss | 0 | 0 | 0 | 1 | 0 | 0 |
| limcred | 0 | 1 | 1 | 1 | 0 | 0 |
| limsec | 0 | 0 | 0 | 1 | 0 | 0 |
| extern | 0 | 0 | 0 | 0 | 0 | 1 |
| conv | 0 | 0 | 0 | 0 | 0 | 0 |
| mult | 0 | 0 | 0 | 0 | 0 | 0 |
| comp | 0 | 0 | 0 | 0 | 0 | 0 |
| reg | 0 | 0 | 0 | 0 | 0 | 0 |
| acc | 0 | 0 | 0 | 0 | 0 | 0 |

[1] Grilli, Masciandaro and Tabellini (1991).
[2] Cukierman (1992).

[15] See e.g. Cukierman (1992), Cukierman, Webb and Neyapti (1992) and Cukierman and Webb (1995).

[16] We do not give much credit to this argument since there is no alternative to a composed index. Notwithstanding, it should be treated very carefully.

[17] For an overview see Eijffinger and de Haan (1996, pp. 22-28 and Appendix A).

Cukierman (1992) norms his index between zero and one as a weighted (LVAW) and unweighted (LVAU) average of 16 factors grouped into four clusters. Thus, he receives very differentiated scores. Others have chosen an additive approach: if the central bank has certain properties, these add to the index. The approach of Bade and Parkin (1988) is to explore whether each out of three criteria is valid or not. If it is, the score is one, otherwise zero. The simple unweighted average is calculated and the countries in the sample are ranked. Alesina (1988) proceeds similarly by adding a fourth criterion. Grilli, Masciandaro and Tabellini (1991) construct an unweighted index, where they apply two kinds of criteria, political and economic, on the whole 13 criteria. If the criterion is fulfilled, the score is one, otherwise zero. Consequently, the highest degree of independence is represented by a score of thirteen. In contrast to all indices named so far, Eijffinger and Schaling (1993) use a weighted average of three criteria, out of which one has three solutions. They obtain a range of five policy types with scores between one and five. As compared with Cukierman's index, the scores of these four indices are less differentiated. Anyadike-Danes (1995) elaborates the analysis of Cukierman, Webb and Neyapti (1992) on non-legal measures using a variable for the exchange rate system of the developing countries analysed by the latter.

Table 1 shows that only parts of the components required for a comprehensive understanding of commitment are contained in the measurements of legal CBI. This is due to the fact that these mainly concentrate on central bank legislation which is admittedly an important source for the evaluation of legal commitment. The neglect of some components of commitment may cause a systematic overestimation of central bank independence, and consequently the extent governments commit themselves to rule bound monetary policy. This is due to the fact that in many countries, including the European Monetary Union, neither exchange rate policy, nor capital controls and so on are in the responsibility of the central bank but are rather left to the discretion of the government.

The critique cannot be rejected by empirical results. Both the rate and the variability of inflation have been tested regarding their dependence on CBI, with the focus of the analyses being on the rate of inflation. Among the first studies to test the impact of CBI on the inflation rate there is a paper by Parkin and Bade (1977) who em-

ployed reaction functions of central banks. They came to the conclusion that (legally) independent central banks are concerned with price stability whereas dependent ones (as the Bank of England in those days) respond to other macroeconomic variables. Subsequent studies[18] tested the correlation between CBI and inflation econometrically, using different measures for legal central bank independence. For *industrialised countries*, the evidence is (almost) unambiguous: there is a negative impact of the degree of CBI on the inflation rate. The evidence is less convincing for *developing countries*. The legal measures of CBI do not correlate with the inflationary performance.[19] The empirical evidence strengthens the argument that indices of CBI are not comprehensive measures of legal commitment. Thus, it cannot be taken for granted that CBI is a significant determinant of the monetary performance.

## 6. The index of commitment: an alternative

A comprehensive index of legal commitment is an alternative to the concept of CBI. It contains the ten elements discussed above, which cover all pertinent aspects of a monetary regime, and it does not depend on personal attitudes of central bankers. Technically, the degree of legal commitment is the higher, the higher each component of the index is. It takes into account that commitment only makes sense if it is the government that commits to stability. In other words, monetary commitment can only be credible and, therefore, successful if it is deliberately chosen and accepted as a part of the economic order of the country.

It makes sense to construct the index of commitment similarly to the index of central bank independence. The most convenient way to construct an index is by defining its boundaries as zero and one.

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[18] See e.g. Cukierman (1992, pp. 415-31), Grilli, Masciandaro and Tabellini (1991), Cukierman, Webb and Neyapti (1992), Alesina (1988) and Eijffinger and van Keulen (1995). More studies are listed in Eijffinger and de Haan (1996, Table B2) as well as in Berger, de Haan and Eijffinger (2000, Table 1).

[19] Some non-legal measures do (Anyadike-Danes 1995 and Loungani and Sheets 1997).

Thereby, the index is easily comparable to other indices. If the index broaches zero, the level of commitment is very low. The highest theoretically possible commitment is expressed by the value one. Hence, $0 < C < 1$, where $C$ denotes the index of commitment. In other words: the higher $C$, the lower the discretionary power of government in monetary policy. The index is the (weighted or unweighted) average of all the factors determining legal monetary commitment. These criteria are operationalised by using components with discrete outcomes having numerical codings between zero and one. A suggestion for the codings is given in Table 2.

The codings in Table 2 refer to an empirical assessment of the index of commitment (Section 7). Besides its comprehensiveness, this type of index has another advantage compared with all indices of CBI. It can be used to analyse all kinds of monetary regime. Apart from a central bank system, the classical gold standard, a currency board system, dollarisation and even free banking are potentially covered by this index. Thus, it may serve very well for a cross-sectional empirical analysis of the determinants of inflation including both industrialised countries with a modern central bank system and developing countries applying any other form of monetary regime, e.g. a currency board system.

## 7. Comparing CBI and legal monetary commitment empirically

In this section, the index of commitment is compared to the CBI index of Alex Cukierman (LVAU) as the latter contains many elements we find necessary to describe legal monetary commitment (Table 1). We have calculated the index of monetary commitment for 26 OECD member countries covering the period between 1950 and 1989 (Table 3).

The index of legal commitment on average creates higher values than the index of CBI. This reflects the fact that limitations to lending activities are weighted less than by Cukierman (1992). This outcome is not a contradiction to the statement that measures of CBI are likely to overestimate central bank independence as they neglect external monetary relations. Rather, the overestimation is a relative one. In re-

TABLE 2

INDEX OF COMMITMENT: A SUGGESTION FOR CODINGS

| Criterion | Component | Explanation | Numerical codings |
|---|---|---|---|
| **Stated objectives of monetary policy** | *obj* | 1. Price stability only goal | 1.00 |
| | | 2. Other objectives mentioned | 0.50 |
| | | 3. No goals for monetary policy | 0.00 |
| **Locus of legal commitment** | *const* | 1. Constitution | 1.00 |
| | | 2. Central bank law | 0.66 |
| | | 3. Decree | 0.33 |
| | | 4. Not fixed at all | 0.00 |
| **Discretionary power belonging to the government** | *gov* | 1. No power left to the government | 1.00 |
| | | 2. Exchange rate only issue to be consulted between government and monetary authority | 0.66 |
| | | 3. Exchange rate regime completely left to government | 0.33 |
| | | 4. Government may override central bank as regards monetary policy | 0.00 |
| **Conditions of appointment and dismissal of monetary CEO** | *ceo* | 1. CEO must be a reputed expert | 1.00 |
| | | 2. No expertise demanded | 0.00 |
| | *diss* | 1. Appointment with fixed term and dismissal only after bad performance | 1.00 |
| | | 2. No rules for dismissal | 0.50 |
| | | 3. Dismissal unconditioned or linked to resignation of governments and ministers | 0.00 |
| **Conditions of lending to the government** | *limcred* | 1. No central bank credit allowed | 1.00 |
| | | 2. Central bank credit allowed | 0.00 |
| | *limsec* | 2. Central bank is allowed to purchase public bonds in hard currency on the secondary market | 1.00 |
| | | 3. Central bank is allowed to purchase public bonds in any currency on the secondary market | 0.50 |
| | | 4. No limitations on credit activities | 0.00 |

TABLE 2 (*cont.*)

| | | | |
|---|---|---|---|
| **Public pledges of the government** | *extern* | 1. Exchange rate fixed to a hard currency and money base fully backed with foreign reserves | 1.00 |
| | | 2. Exchange rate fixed | 0.75 |
| | | 3. Crawling peg | 0.50 |
| | | 4. Conditional help accepted | 0.25 |
| | | 5. No external pledge | 0.00 |
| **Convertibility restrictions** | *conv* | 1. Full convertibility | 1.00 |
| | | 2. Partial convertibility | 0.75 |
| | | 3. Convertibility for current account transactions only | 0.50 |
| | | 4. Convertibility for capital account transactions only | 0.25 |
| | | 5. No convertibility | 0.00 |
| | *mult* | 1. One exchange rate | 1.00 |
| | | 2. Multiple exchange rate | 0.00 |
| **Interactions with other currencies** | *comp* | 1. A hard currency can be used for all transactions | 1.00 |
| | | 2. A hard currency can be used for some transactions, others are excluded | 0.66 |
| | | 3. A hard currency may be held | 0.33 |
| | | 4. No holdings or transactions in hard currencies allowed | 0.00 |
| **Supervision and regulation of the financial system by the central bank** | *reg* | 1. Supervision and regulation is assigned to a separated body | 1.00 |
| | | 2. Supervision and regulation is assigned to central bank | 0.50 |
| | | 3. No supervision and regulation | 0.00 |
| **Accountability of the central bank** | *acc* | 1. Obligation to inform the public | 1.00 |
| | | 2. Obligation to inform the parliament in public hearings | 0.66 |
| | | 3 Obligation to inform the government without publicity | 0.33 |
| | | 4. No accountability | 0.00 |

TABLE 3

INDEX OF COMMITMENT AND CBI FOR OECD MEMBERS

| Country | LVAU | | | | Index of commitment | | | |
|---|---|---|---|---|---|---|---|---|
| | 1950s | 1960s | 1970s | 1980s | 1950s | 1960s | 1970s | 1980s |
| Australia | n.a. | 0.31 | 0.31 | 0.31 | n.a. | 0.36 | 0.47 | 0.42 |
| Austria | 0.69 | 0.69 | 0.58 | 0.58 | 0.70 | 0.73 | 0.73 | 0.73 |
| Belgium | 0.18 | 0.18 | 0.19 | 0.19 | 0.31 | 0.31 | 0.31 | 0.31 |
| Canada | 0.46 | 0.46 | 0.46 | 0.46 | 0.53 | 0.61 | 0.55 | 0.60 |
| Denmark | 0.47 | 0.47 | 0.47 | 0.47 | 0.56 | 0.58 | 0.64 | 0.68 |
| Finland | 0.27 | 0.27 | 0.27 | 0.27 | 0.28 | 0.36 | 0.42 | 0.42 |
| France | 0.24 | 0.40 | 0.28 | 0.28 | 0.27 | 0.30 | 0.43 | 0.43 |
| Germany | 0.66 | 0.66 | 0.66 | 0.66 | 0.75 | 0.75 | 0.80 | 0.80 |
| Greece | 0.54 | 0.50 | 0.51 | 0.51 | 0.43 | 0.38 | 0.42 | 0.45 |
| Hungary | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| Iceland | n.a. | 0.36 | 0.36 | 0.36 | n.a. | 0.38 | 0.48 | 0.48 |
| Ireland | 0.39 | 0.39 | 0.39 | 0.39 | 0.58 | 0.58 | 0.58 | 0.58 |
| Italy | 0.22 | 0.22 | 0.22 | 0.22 | 0.31 | 0.31 | 0.18 | 0.33 |
| Japan | 0.16 | 0.16 | 0.16 | 0.16 | 0.20 | 0.25 | 0.23 | 0.25 |
| Korea | 0.26 | 0.26 | 0.27 | 0.23 | 0.28 | 0.20 | 0.20 | 0.28 |
| Mexico | 0.33 | 0.36 | 0.36 | 0.36 | 0.34 | 0.34 | 0.37 | 0.31 |
| Netherlands | 0.42 | 0.42 | 0.42 | 0.42 | 0.47 | 0.47 | 0.52 | 0.52 |
| New Zealand | 0.20 | 0.27 | 0.27 | 0.27 | 0.42 | 0.38 | 0.38 | 0.38 |
| Norway | 0.10 | 0.07 | 0.14 | 0.14 | 0.27 | 0.21 | 0.21 | 0.32 |
| Poland | 0.10 | 0.10 | 0.10 | 0.10 | 0.16 | 0.16 | 0.16 | 0.16 |
| Spain | 0.18 | 0.16 | 0.16 | 0.21 | 0.20 | 0.20 | 0.20 | 0.31 |
| Sweden | 0.27 | 0.27 | 0.27 | 0.27 | 0.33 | 0.35 | 0.26 | 0.29 |
| Switzerland | 0.55 | 0.55 | 0.55 | 0.68 | 0.64 | 0.64 | 0.55 | 0.56 |
| Turkey | 0.33 | 0.33 | 0.44 | 0.44 | 0.29 | 0.35 | 0.61 | 0.58 |
| UK | 0.23 | 0.33 | 0.31 | 0.31 | 0.32 | 0.47 | 0.33 | 0.36 |
| US | 0.51 | 0.51 | 0.51 | 0.51 | 0.57 | 0.57 | 0.60 | 0.62 |

*Source*: Own calculations based on Bonin (1979), Botos (2000), Bouveret (1979), Caesar (1981 and 1995), Capie, Mills and Wood (1994), Cowitt (1988/1989), Cukierman (1992), de Haan, Amtenbrink and Eijffinger (1998), Hansmeyer (1989), Hawkesby (2000), Heun (1998), Inan (1961), Institute for Economic Policy (2001), Lee (1991), Lück (1998), Martín-Ancena and Pons (1994), Pick (various issues), Stern (1998), Ziegler (1998).

lation to countries with a high degree of monetary commitment, CBI indices for countries with a lesser degree of commitment are too high because of the focus on domestic monetary policy. Greece and Turkey are proper examples (Table 4). Put another way, the measures of CBI do not explore the whole range of possible commitment, in particular the upper range.

In Table 4, the weights given to the individual components are compared. The LVAU index covers the components of the index of legal commitment to a degree of more than three quarters. Thus, the correlation between the indices is high (0.89). The difference is due to the fact that the LVAU index places much weight (60%) on those components dealing with lending activities, whereas our index only devotes 20% to these, but 30% to external monetary relations which are not covered by the LVAU index.

TABLE 4

THE WEIGHTS OF THE COMPONENTS COMPARED

| Component | Index of commitment | LVAU (Cukierman 1992) |
|---|---|---|
| *obj* | 0.1 | 0.125 |
| *const* | 0.1 | 0 |
| *gov* | 0.1 | 0.0625 |
| *ceo* | 0.05 | 0 |
| *diss* | 0.05 | 0.03125 |
| *limcred* | 0.1 | 0.0625 |
| *limsec* | 0.1 | 0.5 |
| *extern* | 0.1 | 0 |
| *conv* | 0.1 | 0 |
| *mult* | 0.05 | 0 |
| *comp* | 0.05 | 0 |
| *reg* | 0.05 | 0 |
| *acc* | 0.5 | 0 |
| *Others* | 0 | 0.21875 |
| Sum | 1.00 | 1.00 |

The index of legal commitment (COMM) as well as the LVAU index are then used to estimate the influence of monetary commitment on the average inflation rate in each of the four decades. The results of the comparison are shown in Table 5. The regression is a univariate one to eliminate the influences of other determinants on inflation. Therefore, the results cannot be interpreted as an analysis of what determines inflation. Consequently, the influence of both CBI and legal commitment as defined here on inflation is moderate. Nevertheless, the results allow for a comparison of the two indices. In general, the index of commitment as defined here has a higher corre-

lation with and a greater influence on inflation rates of the same period than the LVAU index of CBI.[20]

TABLE 5

INFLATION AND COMMITMENT:
LEGAL COMMITMENT AND CBI COMPARED

| Estimation/ Independent | β | t-statistic | $R^2$ adjusted | N |
|---|---|---|---|---|
| LVAU 1950s | -2.27 | -1.19 | 0.02 | 19 |
| COMM[a] 1950s | -3.87* | -2.04 | 0.15 | 19 |
| LVAU 1960s | -4.14 | -1.13 | 0.03 | 24 |
| COMM 1960s | -4.38 | -1.44 | 0.04 | 24 |
| LVAU 1970s | -0.44 | -0.05 | -0.04 | 25 |
| COMM 1970s | 0.51 | 0.08 | -0.04 | 25 |
| LVAU 1970[b]s | -7.15 | -1.23 | -0.01 | 22 |
| COMM 1970[b]s | -4.51 | -0.85 | -0.03 | 22 |
| LVAU 1980s | -11.48 | -0.54 | -0.03 | 26 |
| COMM 1980s | -22.99 | -1.16 | 0.01 | 26 |

[a] Index of legal commitment.
[b] Estimations without Poland, Hungary, Mexico and Korea.
* Significant at the 90% level.

*Source*: IMF (2000) for inflation rates; see also Table 4.

Apart from the 1970s, the parameter, the t-statistics and adjusted $R^2$ of the index of legal commitment are higher than those of the CBI (LVAU) index. The results for the 1970s are poor for both indices. In this period, many shocks disturbed monetary policy. Commitment was not likely to be a disciplining factor for policymakers. For the 1950s, the index of legal commitment exhibits the only significant estimation. The results are confirmed by the correlation coefficient for the whole period. The variable COMM is absolutely higher correlated with inflation (–0.12) than is the variable LVAU (–0.09).

We do not claim to explain the monetary performance with a univariate estimation such as reported in Table 5. However, given that the conditions for the empirical assessment are the same for both indices, the results are encouraging. They show that it is worth to

[20] In an empirical analysis of about 30 monetary reforms after World War II (Freytag 2000), the index of commitment was a determinant of their success. The sample in that study contains industrialised, newly industrialised and developing countries pursuing a monetary reform, covering the time span from 1948 to 1994.

think about a new concept of legal monetary commitment. The inclusion of international monetary relations is a promising exercise as it allows for a more precise measure of legal monetary commitment.

## 8. Conclusions

Undoubtedly, the literature on central bank independence has had at least two very important effects. In a positive analysis, it was demonstrated that a politically independent central bank is more likely to provide price stability than one directly controlled by the government. As a normative conclusion, this has strengthened the argument for central bank independence and has probably contributed to the increasing degree of average central bank independence all over the world. Nevertheless, this analysis has shown that the concept of central bank independence does not perfectly reflect monetary commitment. Instead it has three weaknesses that are important methodologically. First, it does not exactly separate the independence of the central bank to choose its objective(s) from its independence to choose the policy instruments to meet given objective(s). Constitutional political economy considerations show that only instrument independence is desirable. If the central bank is free to choose its own objective(s) or if the central banker in charge must have certain preferences to guarantee a certain level of price stability, the danger occurs that society's preferences will not be met by the central bank.

Second, the concept of CBI does not contain all the elements of legal monetary commitment identified in this paper. Giving independence to the central bank is a special form of commitment. The indices of central bank independence, therefore, contain a number of factors which are also relevant for the index of commitment. The latter is a generalisation of the first, obviously being higher correlated with inflation than CBI. Especially, the external aspects of commitment (exchange rate system, convertibility and so on) are excluded from the indices. Thus, CBI regularly bears the danger of being (relatively) overestimated, if the government decides on an exchange rate policy which is the case in many OECD countries and in Euroland.

Third, measures of CBI are not equally well suited for industrialised and developing countries. This may be due to the fact that they lack some important features of commitment. The comprehensive index of legal commitment may have the advantage of being applicable for both industrialised and developing countries. This has to be further tested empirically. There is much work to be done in the future. This paper is meant to stimulate research in this direction.

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