How Transparent Are Central Banks?

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January 2004

CWPE 0411

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Abstract

Central bank transparency has become the topic of a lively public and academic debate on monetary policy. Unfortunately, it has been complicated by the fact that transparency is a qualitative concept that is hard to measure. This paper proposes a comprehensive index for central bank transparency that comprises the political, economic, procedural, policy and operational aspects of central banking. The index is compiled for nine major central banks. It is based on a detailed analysis of actual information disclosure and reveals a rich variety in the degree and dynamics of central bank transparency.

Keywords: central bank transparency, monetary policy
JEL classification: E52, E58

*We acknowledge the excellent research assistance by Annemieke Coldeweijer, Javier Corominas, Carin van der Cruijsen and Tessa Sprokkel. The authors would also like to thank seminar/conference participants at the Board of Governors of the Federal Reserve System, the European Central Bank, the European University Institute, De Nederlandsche Bank, the International Monetary Fund, the Riksbank, the EUI workshop "Governance and Legitimacy in EMU" in Florence, the MMF conference "Monetary Policy Transparency" at the Bank of England, and the Annual Congress of the European Economic Association (EEA) in Venice, and, in particular, Mike Artis, Jakub Borowski and Maria Demertzis for their detailed comments.

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1 Introduction

Central bank transparency has become the topic of a lively public and academic debate on monetary policy. The public demands transparency to achieve accountability of central banks that have increasingly become independent. In addition, a burgeoning academic literature analyzes the economic consequences of greater transparency of monetary policy. The debate on transparency has been complicated by the fact that it is a qualitative concept for which few measures exist. This paper proposes a comprehensive index for central bank transparency that comprises the political, economic, procedural, policy and operational aspects of central banking. The index is compiled for nine major central banks for five years (1998-2002) and is based on a scrutiny of actual information disclosure. It reveals the various ways in which central banks have become transparent and provides the prospect of an empirical evaluation of the theoretical literature on this issue.

To give a sneak preview of our findings, the most transparent central banks in our sample are the Reserve Bank of New Zealand, the Swedish Riksbank and the Bank of England. The subtop is formed by the Bank of Canada, the European Central Bank and the Federal Reserve. The least transparent central banks are the Reserve Bank of Australia, the Bank of Japan and the Swiss National Bank. Although the most transparent central banks are all inflation targeters, this monetary policy framework appears neither a necessary nor a sufficient condition for transparency.

An important advantage of our transparency index is that it distinguishes various aspects of transparency based on their role in the monetary decision making process. It allows us to identify how central banks differ in their emphasis of various aspects, independent of their monetary policy framework, how greater transparency manifests itself over time, and how different aspects affect economic performance.

There are several other papers that provide useful descriptions of central bank transparency in practice. Bernanke, Laubach, Mishkin and Posen (1999) provide a well structured description in the form of case studies but focus their analysis on inflation targeting. An elaborate informal discussion and review of central bank transparency is presented by Blinder, Goodhart, Hildebrand, Lipton and Wyplosz (2001). They give a detailed account of transparency at the Federal Reserve, the European Central Bank, the Bank of Japan, the Bank of England and the Reserve Bank of New Zealand, but do not provide objective criteria to measure the degree of transparency.

In their comprehensive survey of 94 central banks, Fry, Julius, Mahadeva, Roger and Sterne (2000) construct an index of 'policy explanations' that consists of three components: (i) explanations of policy decisions, (ii) explanations in forecasts and forward-looking analysis, and (iii) explanations in published assessments and research. Their index captures many transparency issues, but does not highlight the role that different kinds of transparency play in the decision-making process. In addition, their index is constructed using survey responses from

central banks, whereas our results stem from an objective, independent analysis of information disclosure practices.

In addition, Bini-Smaghi and Gros (2001) present an indicator of central bank transparency and accountability for six major central banks that captures four components: objectives, strategy, publication of data and forecasts, and communication strategy.[1] The latter captures diversity in the medium of information disclosure, regardless of how informative the disclosures are. In contrast, our transparency index focuses solely on the contents of information disclosure, systematically captures all stages of the policymaking process, and is based on criteria whose relevance is illustrated by a simple theoretical framework.

Last but not least, we are the first to provide a central bank transparency index for several years (1998-2002). It reveals that transparency has changed a lot for several central banks. We show that it is important to take this into account in cross-section empirical analyses of the effects of transparency.

The remainder of the paper is organized as follows. Section 2 discusses a conceptual framework for transparency. Subsequently, we review the theoretical literature on the desirability of central bank transparency in section 3. Then, we present the main contribution of this paper, an index of central bank transparency, in section 4, and discuss how transparent central banks are in section 5. In section 6 we provide some empirical evidence that suggests that the distinction between aspects of transparency matters because they appear to have different consequences for economic performance. Finally, section 7 concludes.

2 Conceptual Framework For Transparency

Transparency of monetary policy can be defined as the extent to which central banks disclose information that is related to the policymaking process. It is a multifaceted concept that could pertain to any aspect of economic policy-making. Thus, it seems natural to use a conceptual framework for transparency that reflects the different stages of the decision-making process. Following Geraats (2000), one can distinguish five aspects of transparency: political, economic, procedural, policy and operational transparency. Each of these aspects may give rise to different motives for transparency. Their relationship to the policy process is illustrated in figure 1.[2]

- **Political transparency** refers to openness about policy objectives. This comprises a statement of the *formal objectives* of monetary policy, including an explicit prioritization

[1] de Haan and Amtenbrink (2002) suggest a variation on this index. In addition, de Haan, Amtenbrink and Eijffinger (1999) provide an index of central bank accountability that includes some elements that pertain to transparency.

[2] This conceptual framework for transparency could also be applied to other forms of economic policy-making, or decision-making more generally.

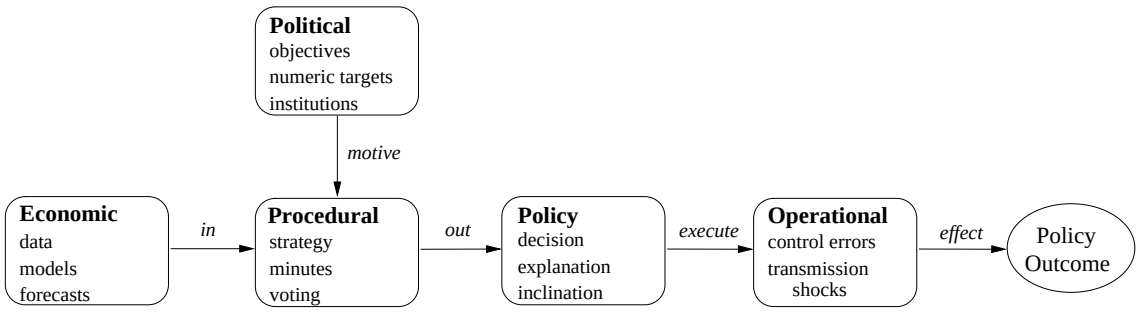

Figure 1: A conceptual framework for transparency.

in case of potentially conflicting goals, and *quantitative targets*. Political transparency is enhanced by *institutional arrangements*, like central bank independence, central bank contracts and explicit override mechanisms, because they ensure that there is no undue influence or political pressure to deviate from stated objectives.[3]

- **Economic transparency** focuses on the economic information that is used for monetary policy. This includes the *economic data* the central bank uses, the *policy models* it employs to construct economic forecasts or evaluate the impact of its decisions, and the *internal forecasts* the central bank relies on. The latter are particularly important since monetary policy actions are known to take effect only after substantial lags. So, the central bank's actions are likely to reflect anticipated developments.

- **Procedural transparency** is about the way monetary policy decisions are taken. It involves an explicit monetary policy rule or *strategy* that describes the monetary policy framework, and an account of the actual policy deliberations and how the policy decision was reached, which is achieved by the release of *minutes* and *voting records*.

- **Policy transparency** means a *prompt announcement* of policy decisions. In addition, it includes an *explanation* of the decision and a *policy inclination* or indication of likely future policy actions. The latter is relevant because monetary policy actions are typically made in discrete steps; a central bank may be inclined to change the policy instrument, but decide to wait until further evidence warrants moving a full step.

- **Operational transparency** concerns the implementation of the central bank's policy actions. It involves a discussion of *control errors* in achieving the operating targets of monetary policy and (unanticipated) macroeconomic disturbances that affect the *transmission* of monetary policy.[4]

[3]Note that political transparency need not be under control of the central bank, but is often determined by political authorities (government or legislature). For instance, Anglo-Saxon central banks typically do not have goal independence and lack the ability to set their own quantitative targets.

[4]Another kind of operational transparency that could potentially be considered is the publication of money

The index for central bank transparency presented in section 4 attempts to quantify each of these five aspects. We focus on the objective information disclosed by central banks, rather than the subjective ways in which the private sector interprets and incorporates this information. Also note that the concept of transparency is closely related to accountability. In fact, some degree of transparency is a necessary condition for accountability. Conceptually, transparency refers to mere information disclosure, whereas accountability concerns the explanation of one's actions and bearing responsibility for them, including possible repercussions when the policy outcomes fall short of the objectives.

3 Is Central Bank Transparency Desirable?

Although there seems to be an unambiguous trend towards greater transparency in monetary policy, the theoretical literature on the desirability of central bank transparency is still equivocal. It is useful to interpret the theoretical findings in the context of a canonical model and distinguish between the different aspects of transparency.

Consider a monetary policy game in which the central bank has the objective function

$$W = \alpha \left(\pi - \pi^*\right)^2 + \beta \left(y - y^*\right)^2 \tag{1}$$

where π is inflation and y is output. An important component of political transparency is the publication of the inflation target π^*.[5] In addition, institutional arrangements also matter because they clarify the motives of monetary policymakers. In particular, central bank independence ensures that central bankers can pursue (1) without political influence, and incentive schemes effectively modify their objective function (1).

The structure of the economy could be represented by the aggregate demand and supply equations

$$y = \bar{y} - a\left(i - \pi^e - \bar{r}\right) + d \tag{2}$$

$$\pi = \pi^e + b\left(y - \bar{y}\right) + s \tag{3}$$

where i is the nominal interest rate and π^e denote inflation expectations.[6] The natural rate of output is $\bar{y}$ and the long-run real interest rate equals $\bar{r}$. In addition, there are aggregate demand shocks d and aggregate supply shocks s. Economic transparency means that the private sector

market interventions that are made to implement policy decisions. However, this issue of market transparency is not included in our transparency index which focuses more on macroeconomic aspects.

[5]Perfect political transparency would require that the output target y^*, relative preferences α/β and the functional form of the objective function are also known to the private sector, but in practice, no central banks are transparent in this respect. See Cukierman (2001b) for a discussion and potential explanation.

[6]The structure of the economy determines the transmission mechanism. Cukierman (2001b) provides a comparison of three popular models: neo-monetarist Lucas-type transmission, the neo-Keynesian model with backward-looking pricing, and the new-Keynesian model with forward-looking pricing.

has the same knowledge about the economy as the central bank. This includes both the structure of the economy and the part of the disturbances d and s that are anticipated by the central bank and reflected in its actions.

Assume that the central bank controls the nominal interest rate i. The central bank could set its policy instrument using a Taylor-type instrument rule, or it could maximize (1) subject to (2) and (3), adopting a Svensson (2002) style targeting framework that allows for judgement. Alternatively, the central bank could use different procedures and formulate its own monetary policy strategy. In the case of procedural transparency, the central bank's strategy and other procedural aspects like minutes and voting records are shared with the private sector.

Policy transparency means that the central bank promptly announces the outcome of its proceedings, in this case the decision about the policy instrument i.

Finally, the implementation of monetary policy could be complicated by control errors pertaining to the policy instrument, or transmission disturbances in the form of unanticipated aggregate demand and supply shocks d and s. Operational transparency means that these control errors and transmission disturbances are communicated to the public.

This stylized model shows that all the five aspects of our transparency index can be distinguished in this general theoretical framework and that each is required for an adequate formal description of monetary policy. This simple model is also convenient to briefly summarize the main findings of the theoretical literature on central bank transparency.[7]

Political Transparency

Formal objectives, quantitative targets and explicit institutional arrangements all reduce *uncertainty* about policymakers' objectives, which tends to be beneficial.[8] Greater transparency about the inflation target π^* could also affect the *incentives* of central bankers. In the presence of an inflation bias ($y^* > \bar{y}$) this could involve either a beneficial (direct) effect by inducing additional losses to monetary policymakers when the target is missed (Walsh 1999), or a detrimental (indirect) effect by decreasing the payoff to reputation building under economic opacity (Geraats 2000).

Central bank independence is often represented as the appointment of 'conservative' central bankers that attach a greater weight to inflation stabilization α than socially optimal, which reduces the inflation bias albeit at the cost of greater output fluctuations (Rogoff 1985). The latter side-effect could be overcome by appointing central bankers with a conservative inflation target π^* (Svensson 1997), or 'responsible' central bankers that do not attempt to stimulate output beyond the natural rate so that $y^* = \bar{y}$ (Blinder 1997). Central bank contracts could also

[7] For a comprehensive survey, see Geraats (2002). In addition, there are some interesting informal discussions of central bank transparency, including Goodfriend (1986) and Winkler (2000).

[8] Exceptions are suggested by Nolan and Schaling (1996) and Eijffinger, Hoeberichts and Schaling (2000), but their results are sensitive to the specification of relative preference uncertainty, as Beetsma and Jensen (2001) point out. Another exception is provided by Sørensen (1991), who assumes strategic union behavior.

eliminate the inflation bias without compromising output stabilization (Walsh 1995). However, when there is uncertainty about the central bank's preferences, Beetsma and Jensen (1998) and Muscatelli (1998) find that optimal inflation targets and contracts may again involve a trade-off between credibility, in the form of a reduction of the inflation bias, and flexibility to stabilize output in response to supply shocks.

Economic Transparency

Most of the literature on economic transparency focuses on the disclosure of economic shocks (d, s) and/or central bank forecasts. When there is (mutual) uncertainty about expectations of the private sector and the central bank, Tarkka and Mayes (1999) argue that the release of central bank forecasts could help and make monetary policy more predictable. Furthermore, Geraats (2000) shows that the publication of central bank forecasts reduces the inflation bias and facilitates reputation building when there exists uncertainty about the preferences of the central bank. It also provides the central bank greater flexibility to stabilize economic shocks. She finds that inflation forecasts typically do not suffice to reap these benefits; central bank forecasts for both inflation π and output y are needed to identify d and s and achieve economic transparency. In addition, similar benefits could be obtained when the central bank releases the economic model(s) it uses for policy analysis.

On the other hand, when there is no preference uncertainty, Gersbach (1998) and Cukierman (2001a) show that the premature disclosure of supply shocks s could hamper their stabilization in case of a neo-monetarist Lucas-type transmission mechanism. Jensen (2000) also finds a negative stabilization effect using a New-Keynesian Phillips curve and assuming preference uncertainty. Another reason against economic transparency is that it could lead to greater political pressures when the central bank lacks independence or a clear political mandate (Geraats 2001).

Procedural Transparency

The only formal models that analyze procedural transparency pertain to the release of individual voting records when central bankers face reelection. Gersbach and Hahn (2001b) show that voting transparency is beneficial when central bankers' preferences may differ from the socially optimal objectives. On the other hand, Gersbach and Hahn (2001a) argue that the disclosure of attributed voting records could be harmful when central bankers differ in their degree of competency. However, this result relies on the debatable feature that central bankers abstain from voting under secrecy, but perturb the decision by random votes to get reelected under transparency.

To the best of our knowledge, there are no models on the desirability of an explicit monetary policy strategy or the publication of minutes. In defence of the latter, Buiter (1999, p. 194) strongly argues in favor of a "culture of openness and accountability" such that "all information is automatically in the public domain, unless there are overriding public interest reasons

for not releasing a particular item". In this light, he promotes the release of non-attributed minutes since attributed, verbatim transcripts are likely to discourage open discussion during the monetary policy meetings.

Policy Transparency
There are several papers that analyze the effects of the announcement of policy decisions, but they all focus on (nonborrowed) reserves targeting, which has largely been abandoned by central banks.[9] The consequences of a prompt disclosure of interest rate decisions, policy explanations and policy inclinations have not been formally modeled.

Operational Transparency
An influential precursor to the transparency literature is the paper by Cukierman and Meltzer (1986) on the optimal degree of ambiguity in monetary policy through control errors when the central bank's preferences are uncertain and change over time. Faust and Svensson (2001) extend their model and distinguish between imperfect monetary control and (operational) transparency. Their simulations reveal that operational transparency tends to reduce the inflation bias and improve social welfare. On the other hand, when the degree of transparency is a choice variable for the central bank, Faust and Svensson (2000) argue that minimum transparency is likely to occur in practice. In addition, Jensen (2001) finds that greater operational transparency could be beneficial when central banks suffer from low credibility, but that it limits the ability to stabilize economic disturbances in the case of a new-Keynesian Phillips curve.

This overview of the theoretical literature shows that the effects of transparency are by no means unambiguous. This suggests an important role for empirical analysis, which requires data on central bank transparency like the index we now describe further.

4 Index for Central Bank Transparency

The degree of central bank transparency could be measured by analyzing formal disclosure requirements or actual disclosure practices. This paper pursues the latter approach because the actual practice of central banks tends to go far beyond legal requirements. We present an index that captures the degree of transparency for the five aspects discussed in section 2: political, economic, procedural, policy and operational transparency. There is a subindex for each aspect, based on three questions that each have equal weight and a maximum score of one. A comprehensive measure of transparency is obtained by the sum of the five subindexes,

[9] One exception is the Bank of Japan, which has temporarily adopted a monetary operating target with its policy rate at zero.

so it has a maximum score of fifteen. A detailed description of our index for central bank transparency is in the Appendix.

The index is constructed for nine major central banks: the Reserve Bank of Australia (RBA), the Bank of Canada (BoC), the European Central Bank (ECB), the Bank of Japan (BoJ), the Reserve Bank of New Zealand (RBNZ), the Swedish Riksbank (SRB), the Swiss National Bank (SNB), the Bank of England (BoE), and the U.S. Federal Reserve (Fed). Resource constraints forced us to consider only a limited number of central banks. We chose the eight central banks that are most important in international financial markets, measured in terms of foreign exchange market turnover of their currencies in April 2001. In addition, we included the Reserve Bank of New Zealand because of its pioneering role in central bank transparency starting in 1989.

Our methodology was as follows. First, we sifted through all information published by central banks and other relevant government sources, that was freely available in English as of June 2001. Second, for each central bank, we sent the scores we had obtained for that central bank together with the detailed description of the transparency index to a senior official at that central bank (chief economist, or comparable) with the request to review the scores.[10] Third, we used the responses to reassess our scores and made a few modifications.[11] Later on, we updated the index for 2002 and went back to 1998. This methodology is very time-consuming, but it has the advantage that it combines an independent scrutiny of information sources with the expert feedback from central banks, leading to accurate and objective scores.[12]

The detailed transparency scores for 2001 are presented in Table 1.[13] In addition, Tables 2-4 show the 1998 index, the average 1998-2002 index, and the 1998-2002 increase in the transparency index for each central bank. The results are first briefly discussed by aspect before we turn to an analysis of transparency by central bank in section 5.

4.1 Political Transparency

All central banks in our sample have *formal objectives* for monetary policy (1.a). However, Japan, Switzerland, the United States (and Sweden in 1998) do not achieve the full score of one on this item because they have multiple objectives without a prioritization. The latter is important because objectives can be conflicting. The other central banks identify price stability

[10] All central banks responded. Interestingly, all suggested their overall score should be higher, and three central banks argued they deserved the maximum score!

[11] We adjusted only 4 out of 135 scores, three of which concerned item 2.a for which publicly available information in English appeared hard to find for Japan, Sweden and Switzerland. In addition, we found information relevant for item 5.a at a regional U.S. Federal Reserve Bank.

[12] The importance of an independent analysis is evident from the fact that every central bank awarded itself higher transparency scores than it deserved.

[13] The detailed information and sources used to construct all transparency scores are available in the Supplementary Data.

as their main objective.

The specification of a *quantitative target* for the main objective(s) of monetary policy (1.b) is popular. Only the Bank of Japan and the Federal Reserve do not have one. All other central banks in our sample have a quantitative target for inflation, in Switzerland only since December 1999. This target could be set by the central bank (ECB, SRB, SNB), the government (BoE), or be based on a joint agreement (RBA, BoC, RBNZ).

Even more prevalent are *institutional arrangements* between the monetary authorities and the government (1.c), mostly in the form of explicit instrument independence. For several central banks (RBA, BoC, RBZN, BoE) independence is subject to an explicit override procedure. Although it is sometimes argued that this reduces central bank independence, it greatly enhances transparency about the institutional setting. The United States (and initially also Sweden and Switzerland) do not enjoy formal instrument independence, so they are not awarded the full score of one.[14]

Many central banks now get the maximum score of three on political transparency, including the Reserve Bank of Australia, the Bank of Canada, the European Central Bank, the Reserve Bank of New Zealand, the Riksbank and the Bank of England. These are all central banks that have adopted 'inflation targeting', with the exception of the ECB. A particularly interesting case is New Zealand, which clarifies institutional arrangements in the form of a central bank contract (Policy Targets Agreement). It even allows the government to fire the Reserve Bank Governor if the inflation target is not met.

4.2 Economic Transparency

The economic information that is used for monetary policy includes timely *economic data* (2.a). We looked for quarterly time-series of variables that the academic literature considers important for monetary policy: money supply, inflation, GDP, unemployment rate and capacity utilization. The most common reason for not getting the full score is that data on capacity utilization is not publicly available.[15]

To interpret the central bank's policy actions it is important to know what kind of *policy models* it employs (2.b). An increasing number of central banks has published a structural macroeconomic model that is used for policy analysis; only Japan, Sweden and Switzerland remain deficient in this respect.

All central banks release numerical *internal forecasts* for inflation and/or output (2.c). However, only the Reserve Bank of New Zealand, the Riksbank and the Bank of England

[14]Nevertheless, the Fed is often thought to enjoy effective independence from the government and Congress. Although this is not based on formal instrument independence, it could be induced by the anticipation of negative reactions from Wall Street if the Fed is put under political pressure.

[15]Interestingly, a few central banks claimed they do not use any measures of capacity utilization, which is surprising given the prominence of the output gap in theoretical models.

publish medium term forecasts for both inflation and output at quarterly frequency and specify the underlying assumptions about the policy instrument, which we require for the maximum score.[16] This is motivated by the fact that inflation and output tend to be the key variables in the determination of monetary policy and can only be affected in the medium term (one to two years ahead). In addition, the availability of quarterly data for most macroeconomic data suggests that quarterly updates of forecasts are appropriate.

There has been a notable increase in economic transparency over time (from an average of 1.7 in 1998 to 2.3 in 2002). Only two central banks attain the maximum score of 3 on economic transparency, the Reserve Bank of New Zealand and the Bank of England. The latter deserves special mention; it provides extensive documentation on its economic models, including the computer code for its macroeconometric model. Furthermore, the Bank of England was the first central bank to introduce colorful fan charts for its internal forecasts of inflation and output, which has set an example for several other central banks.

4.3 Procedural Transparency

Most of the central banks in our sample provide a description of their monetary policy framework in the form of an *explicit monetary policy strategy* (3.a). Typically, the strategy is some form of inflation targeting, although the ECB's "two pillar strategy" is a notable exception. Only the Bank of Japan and the Federal Reserve do not have an explicit monetary policy framework.

Several central banks, in particular the Bank of Japan, the Riksbank, the Bank of England and the Federal Reserve, release a comprehensive account of policy deliberations within a reasonable amount of time (eight weeks) in the form of *minutes* (3.b) that also include a discussion of the forward-looking arguments that are so critical for monetary policy.

These central banks are also the ones that publish individual *voting records* (3.c).[17]

Three central banks score full marks on procedural transparency, the Reserve Bank of New Zealand, the Riksbank and the Bank of England. The Reserve Bank of New Zealand is special in the sense that its policy decisions are solely made by its Governor. This means that voting records are immaterial. In addition, minutes are substituted by comprehensive explanations of its decisions, including forward-looking analysis. Although decision-making by committee makes it harder to achieve procedural transparency, the Riksbank and the Bank of England

[16] We do not discriminate between conditional and unconditional forecasts, although we recognize that they may serve different purposes in terms of communication strategy. In addition, we acknowledge that inflation and output forecasts are suitable for transparency of central banks that adopt an interest rate as the policy instrument, but do not suffice for central banks that use the money supply as instrument.

[17] A few central banks told us they decide 'by consensus'. However, this term is ambiguous and need not mean unanimity. In fact, decision making by unanimity would be at odds with legal requirements which typically stipulate decisions be taken by majority voting.

show that this need not be an insurmountable problem.

4.4 Policy Transparency

All central banks make a *prompt announcement* of their policy decisions (4.a); their operating instrument or target is a short-term nominal interest rate, with the Bank of Japan currently being the only exception. However, there has not always been openness about policy decisions. The Federal Reserve, for instance, only adopted this practice in 1994.

In addition, most central banks provide an *explanation* when they announce their policy decisions (4.b). The Reserve Bank of Australia, the Bank of Japan and the Bank of England do not get the full score because they do not give an explanation after all policy decisions, although they do provide one whenever policy decisions change.

The publication of a *policy inclination* or indication of likely future policy actions (4.c) is unusual. The Federal Reserve includes a statement in its policy announcements that reflects its policy tilt, but only since May 1999. The Riksbank also provides a policy inclination, but only since May 2002. The Reserve Bank of New Zealand adopts a different approach and provides short-run quarterly forecasts of short-term nominal interest rates, which essentially convey its likely future policy actions. These three central banks get full marks on policy transparency.[18] And the clear increase in the average score on policy transparency (from 1.6 in 1998 to 2.2 in 2002) is mainly the result of significant improvements by these central banks.

4.5 Operational Transparency

The implementation of monetary policy could be complicated by two kinds of disturbances, *control errors* in achieving operating targets (5.a) and unanticipated macroeconomic disturbances that affect the transmission of monetary policy. Most central banks in our sample account for significant deviations from the operating target (if any), or have (nearly) perfect control over their main operating instrument or target. The only exceptions are the Bank of Japan and the Swiss National Bank. The Bank of Japan has an operating target for the outstanding balance of current accounts at the Bank (since March 2001), whereas the Swiss National Bank has an operating range of 100 basis points for the three-month LIBOR rate (since December 1999). Both fall short because they do not provide explanations for significant fluctuations, thereby getting a score of one-half.

Most central banks regularly publish an analysis of current macroeconomic developments or short-term forecasts, which implicitly provide information on *transmission disturbances* (5.b). Nevertheless, two central banks get a score of zero: the Federal Reserve releases its

[18] A few central banks suggested that the risks to forecasts they publish indicate a policy inclination. However, it is not straightforward to map risks to inflation and output forecasts into a policy tilt, especially when they go in opposite directions.

short-run forecasts and macroeconomic analysis only semiannually; and the Swiss National Bank only has a brief abstract of macroeconomic analysis in English. The Riksbank and the Bank of England both obtain the full score as they explain the importance of unanticipated factors by providing an annual discussion of past forecast errors.

Finally, we consider whether central banks regularly provide an *evaluation of the policy outcome* in light of macroeconomic objectives (5.c). Most central banks have some kind of evaluation without accounting for the role of monetary policy. The Reserve Bank of Australia and the Swiss National Bank are exceptions in the sense that they do not have a regular evaluation. On the other hand, the Riksbank sets a positive example with its explicit annual evaluation in which it discusses the contribution of monetary policy in meeting the objectives, thereby earning the maximum score.

All in all, the Riksbank is the only central bank to achieve full marks on operational transparency. Perhaps, it could be a source of inspiration for other central banks, since the scores on operational transparency vary a lot, with the Swiss National Bank getting the lowest score (0.5) for any of the five aspects.

The comprehensive index that consists of the sum of the subscores for each of the five aspects reveals which central banks are the most transparent. In 1998, the most transparent central banks were the Bank of England (11 out of 15), the Reserve Bank of New Zealand and the Bank of Canada (both 10.5), followed by the Swedish Riksbank (9), the Federal Reserve (8.5), the Reserve Bank of Australia and Japan (both 8) and Switzerland (6). In 2002, average transparency had increased from 8.9 to 10.7, with major improvements in economic and policy transparency. The top league of central bank transparency now consists of the Reserve Bank of New Zealand, the Riksbank (both 14) and the Bank of England (13). The subtop is formed by the Bank of Canada, the European Central Bank (both 10.5) and the Federal Reserve (10). The Reserve Bank of Australia (9), the Bank of Japan (8) and the Swiss National Bank (7.5) appear to be the least transparent central banks in our sample.

Table 4 shows that most of the increase in average transparency from 1998 to 2002 can be attributed to improvements in economic transparency by many central banks and large increases in policy transparency by a few central banks. This illustrates the usefulness of distinguishing between various aspects of transparency.

5 How Transparent Are Central Banks?

The previous section provided an analysis of each aspect of transparency across central banks. This section complements that view with a description of transparency across all aspects for each central bank.

Reserve Bank of Australia

Although the Reserve Bank of Australia has adopted inflation targeting, it gets one of the lowest transparency scores (8, increasing to 9 in 2002) in our sample. The fact that the RBA is an inflation targeter is reflected in the maximum score (3) on political transparency. It has an inflation target of 2-3% and enjoys instrument independence subject to an explicit override mechanism. However, its openness on other aspects is much less. With an initial score of only 1 on economic transparency it misses two points for several reasons: it does not publish quarterly data on capacity utilization, and it only provides rough short term forecasts for inflation (quarterly) and output (semiannually). In addition, initially there was no explicit policy model but this has improved in October 2001 so that RBA gains 1 point[19]. On procedural transparency the RBA scores only 1 because it does not release minutes and voting records. Its score for policy transparency (1.5) reflects the lack of an explicit policy inclination and the fact that it only provides an explanation of decisions when policy changes. Regarding operational transparency, the RBA misses 1.5 points because the information on transmission disturbances does not include a discussion of past forecast errors, and because there is no evaluation of the policy outcome in light of its macroeconomic objectives.

The Reserve Bank of Australia shows that inflation targeting does not guarantee transparency in all aspects.

Bank of Canada

The Bank of Canada, another inflation targeter, secures a place in the subtop with a score of 10.5. It earns the full score (3) on political transparency, with an explicit inflation target of 1-3% and instrument independence subject to an explicit override mechanism. On economic transparency the BoC achieves a respectable score of 2.5 points, missing 0.5 points because it only publishes rough projections for inflation and output. On procedural transparency, the BoC gets only 1 point because it does not disclose minutes and voting records. Concerning policy transparency it receives 2 points and just misses 1 point because it does not give an explicit indication of likely future policy actions. On operational transparency the BoC also receives 2 points. It misses credit for not discussing past forecast errors. In addition, although it publishes a graphical evaluation of the inflation outcome, it does not explicitly account for deviations from the target.

All in all, the Bank of Canada performs quite well, although its displays some weakness in procedural transparency.

European Central Bank

Starting of with a low score of 8.5, the European Central Bank has significantly improved its transparency and now belongs to the subtop with a score of 10.5. Although it is not an inflation targeter, it achieves the maximum score (3) on political transparency. It has a quantitative

[19] Although a structural macroeconomic model appears in one of its *Research Discussion Papers* (2000-05), it was not made clear until October 2001 that the Bank uses it for policy analysis.

definition of price stability of 0-2% inflation and its independence is firmly enshrined in an international treaty. For economic transparency the ECB now earns high marks (2.5). This is entirely due to recent developments. In January 2001 it disclosed its structural macroeconomic model of the euro area, and since December 2000 it has published its semiannual medium term conditional projections for inflation and output. The ECB emphasizes that these projections are made by ECB staff and not binding for the ECB Governing Council.[20] On procedural transparency the ECB gets only 1 point because it does not provide comprehensive minutes and actual voting records. Concerning policy transparency, the ECB has improved a bit and now provides an explanation of the policy decision at a press conference after each monetary policy meeting. The current score of 2 reflects the lack of an explicit policy inclination. On operational transparency the ECB also misses 1 point. The reason is that the ECB provides some information on unanticipated macroeconomic disturbances that affect the policy transmission through macroeconomic analysis in its Monthly Bulletin, but it does not (yet?) discuss past forecast errors. In addition, the ECB provides an informal evaluation of the policy outcomes in its Monthly Bulletin and Annual Report, but it does not explicitly account for the contributions of monetary policy.

In its early years of existence, the European Central Bank has already achieved quite some transparency in several respects, but it could use some improvement on procedural and policy transparency.[21]

Bank of Japan

The Bank of Japan has one of the lowest transparency scores (8) in our sample. It only gets 1.5 points for political transparency because it has multiple objectives of monetary policy without explicit prioritization, and no precise definition or quantification of its objectives. On economic transparency the BoJ has shown some improvement and now scores 1.5 points. It does not disclose a formal macroeconomic model for policy analysis. But since October 2000 it has published its forecasts for inflation and output, although only at semiannual frequency. Regarding procedural transparency, the BoJ does quite well with 2 points. It publishes elaborate minutes in a timely fashion, including individual voting records, and only misses 1 point because it lacks an explicit monetary policy strategy. On policy transparency the BoJ only scores 1.5 points. The reason is that it just provides an explanation of its policy decisions in case of a change and does not disclose an explicit policy inclination. On operational transparency the BoJ has dropped a bit to 1.5 points and misses some points on all counts. After changing

[20] It should be mentioned that the publication of projections has been triggered by the Committee on Economic and Monetary Affairs of the European Parliament in its quarterly Monetary Dialogue with the ECB based on Article 113(3) of the Treaty on European Union and on the advice of its Panel of Experts in their quarterly Briefing Paper.

[21] This also sheds light on the debate on ECB transparency between Buiter (1999) and Issing (1999), which is discussed by de Haan and Eijffinger (2000).

the main operating target to the outstanding balance of current accounts at the Bank in March 2001, there have been significant fluctuations without explanations for it.[22] Also, the BoJ gives information on macroeconomic disturbances through a monthly analysis of the current macroeconomic situation, but not (yet?) through a discussion of past forecast errors. Finally, it does not account for deviations between the policy outcomes and the objectives.

The Bank of Japan has recently shown some change in transparency, but it still falls short in several respects, most noticeably political and policy transparency.

Reserve Bank of New Zealand

The Reserve Bank of New Zealand, which has been one of the most transparent central banks throughout our sample, started off with a respectable score of 10.5 in 1998, zoomed ahead to 13 in 1999 and subsequently rose to 14 points. It is an inflation targeter, with an inflation target of 0-3% and instrument independence subject to an explicit override mechanism, earning the full score (3) on political transparency. For economic and procedural transparency, it also achieves the maximum score (3), but for the former only since 2002 when quarterly data for capacity utilization has become available. Regarding policy and operational transparency, the RBNZ accomplished an impressive increase (from 1 to 2.5 and 1 to 2, respectively) in March 1999 when it adjusted its monetary policy operating procedures. In particular, it changed its formal policy instrument from the daily settlement cash target, which had not been adjusted for a long time and was hardly mentioned in RBNZ communications, to the Official Cash Rate.[23] Concerning operational transparency, the RBNZ misses credit because it does not provide a discussion of past forecast errors or evaluate how monetary policy contributed to policy outcomes.

The performance of the Reserve Bank of New Zealand on transparency is outstanding, although improvement is still feasible on operational transparency.

Swedish Riksbank

The Swedish Riksbank has achieved the largest increase in transparency in our sample. Starting with a modest score of 9 in 1998, it has soared to 14, sharing the top spot with New Zealand. It is also an inflation targeter with a maximum score on political transparency. It has an inflation target of 2% and enjoys formal independence. On economic transparency the SRB misses 1 point because it does not disclose a formal macroeconomic model that is used for policy analysis. Regarding procedural transparency, the SRB has recently reached the maximum score

[22] Previously, the BoJ had a main operating target for the uncollateralized overnight call rate, with the rate at essentially zero since February 1999.

[23] Instead of focusing on the formal policy instrument, from December 1996 to March 1999 the monetary policy stance was essentially conveyed in terms of a target for the Monetary Conditions Index (MCI), which is a weighted average of the trade-weighted exchange rate and the 90-day interest rate. In terms of this (intermediate) policy target, policy and operational transparency in 1998 were much better (3 and 2, respectively).

(3), releasing both minutes and voting records.[24] On policy transparency, the SRB also recently achieved the full score (3) after it started providing an explicit policy tilt. For operational transparency the Riksbank is the only central bank to gain full marks; since 1999, it provides an annual evaluation of the inflation outcome over the last three years, including a discussion of the role of monetary policy.

The Swedish Riksbank has accomplished an impressive improvement in transparency. It attains perfect scores on all aspects except for economic transparency where it falls short because it does not publish a policy model.

Swiss National Bank

The Swiss National Bank receives the lowest transparency score in our sample with 7.5 points. Regarding political transparency, it improved significantly in 2000 (from 1 to 2.5), when its independence was enshrined in the constitution and it specified a quantitative definition of price stability of inflation below 2%. But it still has multiple objectives without an explicit prioritization. On economic transparency the SNB scores 1.5 points. It does not disclose a formal policy model, but since 1999 it has published a three-year forecast for inflation at semiannual frequency. On procedural transparency the SNB receives only 1 point because it releases neither minutes nor voting records. Concerning policy transparency the SNB misses 1 point because it does not provide an explicit policy inclination. On operational transparency the SNB currently has a score of only 0.5 points. Since December 1999 it has had an operational target range for the LIBOR of 100 basis points, but it does not provide an explanation for significant fluctuations within that range. Although it provides an elaborate analysis of macroeconomic developments, only a brief abstract is available in English.[25] Finally, the SNB gives merely a review of the year, and it does not account for discrepancies between policy outcome and target.

The Swiss National Bank performs poorly on transparency when compared to the other central banks in our sample. There is a lot of scope for improvement, especially on economic and operational transparency.

Bank of England

The Bank of England started off as the most transparent central bank in our sample (with 11 points) and its subsequent improvements (to 13) have kept it in the top league. It is an inflation targeter with full marks for political transparency; it has an inflation target of 2.5% and since 1998, instrument independence subject to an explicit override mechanism. It now attains the maximum score (3) for both economic transparency and procedural transparency. For policy transparency it only receives 1.5 points. The reason is that it only provides an explanation of

[24] In May 2002, the Riksbank clarified that the attributed reservations against the decision included in the minutes correspond to the only dissents, so that effectively individual voting records are available.

[25] If information were not restricted to be in English, the SNB would gain 0.5 point on item 5.b.

changes in policy decisions at the time of announcement, but not when it is decided not to adjust the policy instrument. In addition, the BoE does not provide an explicit policy inclination. On operational transparency the BoE scores very high (2.5) and only misses 0.5 points because there is no evaluation of its policy outcomes that accounts for the contribution of monetary policy.

The Bank of England is very transparent and has been used as an example by many other central banks. Nevertheless, there is still scope for significant improvement on policy transparency.

Federal Reserve System

The total score for the Federal Reserve is 10, securing a place in the subtop. For political transparency it only receives 1 point. It has multiple objectives without an explicit prioritization. Also, there is no quantification of its objectives for monetary policy. Finally, the Federal Reserve has no explicit, formal instrument independence. On economic transparency the Fed does very well with a score of 2.5, missing 0.5 points because it only publishes short-term economic projections for inflation and output at a semiannual frequency. Concerning procedural transparency, the Fed gets 2 points because it does not have an explicit policy strategy that describes its monetary policy framework. For policy transparency the Fed has earned full marks (3) since May 1999 when it started to provide an explanation and policy inclination with every policy decision. Its score for operational transparency is only 1.5. The Fed only provides a macroeconomic analysis and short-term forecasts for inflation and output at semiannual frequency. In addition, it provides only an informal evaluation of policy outcomes.

The Federal Reserve has great strength in policy transparency, but displays noticeable weakness in political transparency.

6 Does Central Bank Transparency Matter?

This description of the degree of transparency of central banks prompts the question whether transparency actually matters for economic performance. Demertzis and Hughes Hallett (2002) address this issue using our transparency index for 2001 in Table 1, which circulated in an earlier draft (Eijffinger and Geraats 2002). They regressed the mean and standard deviation of inflation and the output gap, mostly computed using 1990-2001 quarterly data, on the 2001 transparency index. They find no significant effects for the average levels of inflation and the output gap. But there is a significantly negative relationship between the variability of inflation and (total, economic, procedural and operational) transparency, and a significantly positive relationship between the variability of the output gap and operational transparency.

However, these relations between economic performance and end-of-period transparency can be misleading to assess the effects of transparency. The reason is that the degree of trans-

parency has changed considerably for several central banks as is shown in Table 4. This suggests that it may be better to look at the relationship between economic performance and average transparency over the same period. We computed simple sample correlations between average transparency and the mean μ and standard deviation σ of the output gap y, annual CPI inflation π, and the unemployment rate u, using quarterly data from 1998 to 2002. The correlations ρ are reported in Table 5.a, with p-values in square brackets. Nearly all correlations are insignificant, which is not surprising given the small sample of countries. Interestingly, transparency now appears to be unrelated to the variability of inflation; operational transparency still seems to be associated with a more variable output gap (and unemployment rate, with $\rho = 0.53$ $[0.14]$ for both) but this effect is no longer significant. Only two results are statistically significant: greater procedural transparency is associated with a lower output gap ($\rho = -0.65$ $[0.06]$), and political transparency with a higher unemployment rate ($\rho = 0.63$ $[0.07]$).

To get a better idea whether these correlations capture the effect of transparency on subsequent economic performance, we computed the correlations between the 1998 transparency index and the 1998-2002 means and standard deviations of the output gap, inflation and the unemployment rate, which are reported in Table 5.b. Many results are quite similar and again insignificant. But there are some big changes, in particular for policy transparency, where the correlation with the average output gap and unemployment variability goes from -0.06 to +0.67 and from +0.21 to -0.60, respectively. Procedural transparency still has a sizeable negative correlation with the average output gap ($\rho = -0.60$ $[0.11]$), and the positive relation between political transparency and average unemployment becomes even stronger ($\rho = 0.86$ $[0.01]$). Total transparency now also shows a significant, positive relation with average unemployment ($\rho = 0.70$ $[0.05]$). Furthermore, there appears to be a significant, positive correlation between 1998 political transparency and the subsequent variability of inflation ($\rho = 0.64$ $[0.09]$).

To assess whether any of the significant correlations are robust, we inspected scatter plots and omitted any outlying observation in the computation of the coefficients. This left us with only three significant effects: It appears that higher average political transparency is associated with higher average unemployment, and that a greater level of political transparency in 1998 leads to more variable inflation and a higher average unemployment rate in the subsequent five years.

It is important to be cautious when results are based on such a small sample of central banks. Moreover, these correlations could be driven by other variables. For instance, the relatively stable inflation in the US and Japan (with low political transparency) and the much more variable inflation in Australia, New Zealand and Sweden (with high political transparency) may be attributable to the degree of openness instead of transparency. In addition, the high average unemployment rates in Canada, Australia and New Zealand may be due to their labor market institutions and not their high degree of political transparency.

Nevertheless, two conclusions emerge from this empirical exercise. First, the distinction

between aspects of transparency is useful because they give rise to different empirical effects. Second, the choice of date or period for the transparency measure could have a dramatic impact on the findings of cross-section empirical studies because of the dynamics in transparency.

7 Concluding Remarks

Our comprehensive analysis of central bank transparency gives rise to some interesting conclusions.

The most transparent central banks are the Reserve Bank of New Zealand, the Swedish Riksbank and the Bank of England. The subtop is formed by the Bank of Canada, the European Central Bank and the Federal Reserve. The least transparent central banks in our sample are the Reserve Bank of Australia, the Bank of Japan and the Swiss National Bank.

Although the most transparent central banks in our sample are all inflation targeters, there is remarkable variation in overall transparency among central banks that have adopted inflation targeting. For instance, the Reserve Bank of Australia gets one of the lowest scores. It is striking that inflation targeters all achieve the maximum score on political transparency, which describes openness about objectives, quantitative targets and institutional arrangements. However, inflation targeting is not a necessary condition for political transparency, as is exemplified by the European Central Bank.

It should be noted that our analysis of the various aspects of central bank transparency is designed to be independent of the monetary policy framework and does not seem to be biased towards inflation targeters, given the large variation within this category. In principle, other monetary policy strategies, like monetary targeting or the ECB's two-pillar strategy, could all obtain the maximum score for any aspect of transparency.

Our analysis shows that central banks put different emphasis on the various aspects of transparency. For instance, the European Central Bank and the Federal Reserve both achieve the same overall score on transparency in 2001. But the ECB has its strength in political transparency, whereas the Fed excels in transparency about its policy decisions in the form of a prompt announcement, explanation and policy inclination. Perhaps, this explains why financial markets perceive the Fed as more transparent than the ECB.

In addition, we find that central bank transparency has an important dynamic aspect. The scores for several central banks have increased significantly over time, especially for economic and policy transparency, and most notably for the Riksbank. This suggests a general trend towards greater central bank transparency.

We have explored the effect of transparency on economic performance. A simple correlation analysis suggests that central banks with greater political transparency in 1998 tended to experience more variable inflation and higher unemployment in the subsequent five years for our small sample of central banks, but this result is probably driven by other variables such as openness and labor market institutions. Furthermore, our analysis shows that cross-section

empirical studies could yield misleading results due to the dynamics in transparency.

Last but not least, this paper provides an index of central bank transparency that systematically distinguishes between various aspects of transparency based on their role in the policy-making process. Such a distinction is critical to assess to what extent central bank transparency really matters.

References

Beetsma, Roel M.W.J. and Henrik Jensen, "Inflation Targets and Contracts with Uncertain Central Banker Preferences," *Journal of Money, Credit, and Banking*, August 1998, *30* (3), 384–403.

____ and ____ , "Comment on "Why Money Talks and Wealth Whispers: Monetary Uncertainty and Mystique," *Journal of Money, Credit and Banking*, 2001, (forthcoming).

Bernanke, Ben S., Thomas Laubach, Frederic S. Mishkin, and Adam S. Posen, *Inflation Targeting: Lessons from the International Experience*, Princeton, New Jersey: Princeton University Press, 1999.

Bini-Smaghi, Lorenzo and Daniel Gros, "Is the ECB Sufficiently Accountable and Transparent?," CEPS Working Document No. 169 July 2001.

Blinder, A., C. Goodhart, P. Hildebrand, D. Lipton, and C. Wyplosz, "How Do Central Banks Talk?," Geneva Report on the World Economy 3, ICMB May 2001.

Blinder, Alan S., "What Central Bankers Could Learn from Academics – and Vice Versa," *Journal of Economic Perspectives*, Spring 1997, *11* (2), 3–19.

Buiter, Willem H., "Alice in Euroland," *Journal of Common Market Studies*, June 1999, *37* (2), 181–209.

Cukierman, Alex, "Accountability, Credibility, Transparency and Stabilization Policy in the Eurosystem," in Charles Wyplosz, ed., *The Impact of EMU on Europe and the Developing Countries*, Oxford University Press, October 2001, chapter 3, pp. 40–75.

____ , "Are Contemporary Central Banks Transparent About Economic Models and Objectives and What Difference Does It Make?," Bundesbank Discussion Paper 05/01 January 2001.

____ and Allan H. Meltzer, "A Theory of Ambiguity, Credibility, and Inflation under Discretion and Asymmetric Information," *Econometrica*, September 1986, *54* (5), 1099–1128.

de Haan, Jakob and Fabian Amtenbrink, "A Non-Transparency European Central Bank? Who is to Blame?," mimeo, University of Groningen March 2002.

____ and Sylvester C.W. Eijffinger, "The Democratic Accountability of the European Central Bank: A Comment on Two Fairy-Tales," *Journal of Common Market Studies*, September 2000, *38* (3), 393–407.

____, Fabian Amtenbrink, and Sylvester C.W. Eijffinger, "Accountability of Central Banks: Aspects and Quantification," *Banca Nazionale del Lavoro Quarterly Review*, June 1999, (209), 169–193.

Demertzis, Maria and Andrew Hughes Hallett, "Central Bank Transparency in Theory and Practice," CEPR Discussion Paper 3639 November 2002.

Eijffinger, Sylvester C.W. and Petra M. Geraats, "How Transparent Are Central Banks?," CEPR Discussion Paper 3188 February 2002.

____ **, Marco Hoeberichts, and Eric Schaling**, "Why Money Talks and Wealth Whispers: Monetary Uncertainty and Mystique," *Journal of Money, Credit and Banking*, May 2000, *21* (2), 218–235.

Faust, Jon and Lars E.O. Svensson, "The Equilibrium Degree of Transparency and Control in Monetary Policy," *Journal of Money, Credit and Banking*, 2000, (forthcoming).

____ **and** ____ , "Transparency and Credibility: Monetary Policy with Unobservable Goals," *International Economic Review*, May 2001, *42* (2), 369–397.

Fry, Maxwell, DeAnne Julius, Lavan Mahadeva, Sandra Roger, and Gabriel Sterne, "Key Issues in the Choice of Monetary Policy Framework," in Lavan Mahadeva and Gabriel Sterne, eds., *Monetary Policy Frameworks in a Global Context*, London: Routledge, 2000, pp. 1–216.

Geraats, Petra M., "Why Adopt Transparency? The Publication of Central Bank Forecasts," CEPR Discussion Paper 2582 October 2000.

____ , "Transparency of Monetary Policy: Does the Institutional Framework Matter?," mimeo, University of Cambridge April 2001.

____ , "Central Bank Transparency," *Economic Journal*, November 2002, *112*, F532–F565.

Gersbach, Hans, "On the Negative Social Value of Central Banks' Transparency," mimeo, University of Heidelberg November 1998.

____ **and Volker Hahn**, "Should Individual Voting Records of Central Bankers Be Published?," Bundesbank Discussion Paper 02/01 January 2001.

____ **and** ____ , "Voting Transparency and Conflicting Interests in Central Bank Councils," Bundesbank Discussion Paper 03/01 January 2001.

Goodfriend, Marvin, "Monetary Mystique: Secrecy and Central Banking," *Journal of Monetary Economics*, 1986, *17*, 63–92.

Issing, Otmar, "The Eurosystem: Transparent and Accountable, or "Willem in Euroland"," *Journal of Common Market Studies*, September 1999, *37* (3), 503–519.

Jensen, Henrik, "Optimal Degrees of Transparency in Monetary Policymaking: The Case of Imperfect Information About the Cost-Push Shock," mimeo, University of Copenhagen November 2000.

____ , "Optimal Degrees of Transparency in Monetary Policymaking," CEPR Discussion Paper 2689 February 2001.

Muscatelli, Anton, "Optimal Inflation Contracts and Inflation Targets with Uncertain Central Bank Preferences: Accountability Through Independence?," *Economic Journal*, March 1998, *108* (447), 529–542.

Nolan, Charles and Eric Schaling, "Monetary Policy Uncertainty and Central Bank Accountability," Bank of England Working Paper 54 October 1996.

Rogoff, Kenneth, "The Optimal Degree of Commitment to an Intermediate Monetary Target," *Quarterly Journal of Economics*, November 1985, *100* (4), 1169–1189.

Sørensen, Jan Rose, "Political Uncertainty and Macroeconomic Performance," *Economics Letters*, December 1991, *37* (4), 377–381.

Svensson, Lars E. O., "Optimal Inflation Targets, "Conservative" Central Banks, and Linear Inflation Contracts," *American Economic Review*, March 1997, *87* (1), 98–114.

Svensson, Lars E.O., "Inflation Targeting: Should It Be Modeled as an Instrument Rule or a Targeting Rule?," May 2002. NBER Working Paper 8925.

Tarkka, Juha and David Mayes, "The Value of Publishing Official Central Bank Forecasts," Bank of Finland Discussion Paper 22/99 December 1999.

Walsh, Carl E., "Optimal Contracts for Central Bankers," *American Economic Review*, March 1995, *85* (1), 150–167.

____ , "Announcements, Inflation Targeting and Central Bank Incentives," *Economica*, May 1999, *66*, 255–69.

Winkler, Bernhard, "Which Kind of Transparency? On the Need for Clarity in Monetary Policy-Making," European Central Bank Working Paper 26 August 2000.

A Appendix

This appendix contains the exact formulation of the central bank transparency index. The index is the sum of the scores for the answers to the fifteen questions below (min = 0, max = 15). Note that all questions pertain to published information that is freely available in English.

1. Political Transparency

   Political transparency refers to openness about policy objectives. This comprises a formal statement of objectives, including an explicit prioritization in case of multiple goals, a quantification of the primary objective(s), and explicit institutional arrangements.

   (a) Is there a formal statement of the objective(s) of monetary policy, with an explicit prioritization in case of multiple objectives?

   No formal objective(s) = 0.
   Multiple objectives without prioritization = 1/2.
   One primary objective, or multiple objectives with explicit priority = 1.

   (b) Is there a quantification of the primary objective(s)?

   No = 0.
   Yes = 1.

   (c) Are there explicit institutional arrangements or contracts between the monetary authorities and the government?

   No central bank, contracts or other institutional arrangements = 0.
   Central bank without explicit instrument independence or contract = 1/2.
   Central bank with explicit instrument independence or central bank contract (although possibly subject to an explicit override procedure) = 1.

2. Economic Transparency

   Economic transparency focuses on the economic information that is used for monetary policy. This includes economic data, the model of the economy that the central bank employs to construct forecasts or evaluate the impact of its decisions, and the internal forecasts (model based or judgmental) that the central bank relies on.

   (a) Is the basic economic data relevant for the conduct of monetary policy publicly available?

   The focus is on the following five variables: money supply, inflation, GDP, unemployment rate and capacity utilization.
   Quarterly time series for at most two out of the five variables = 0.
   Quarterly time series for three or four out of the five variables = 1/2.
   Quarterly time series for all five variables = 1.

(b) Does the central bank disclose the formal macroeconomic model(s) it uses for policy analysis?

No = 0.
Yes = 1.

(c) Does the central bank regularly publish its own macroeconomic forecasts?

No numerical central bank forecasts for inflation and output = 0.
Numerical central bank forecasts for inflation and/or output published at less than quarterly frequency = 1/2.
Quarterly numerical central bank forecasts for inflation and output for the medium term (one to two years ahead), specifying the assumptions about the policy instrument (conditional or unconditional forecasts) = 1.

3. Procedural Transparency

Procedural transparency is about the way monetary policy decisions are taken. It involves an explicit monetary policy rule or strategy that describes the monetary policy framework, an account of policy deliberations and how the policy decision was reached.

(a) Does the central bank provide an explicit policy rule or strategy that describes its monetary policy framework?

No = 0.
Yes = 1.

(b) Does the central bank give a comprehensive account of policy deliberations (or explanations in case of a single central banker) within a reasonable amount of time?

No, or only after a substantial lag (more than eight weeks) = 0.
Yes, comprehensive minutes (although not necessarily verbatim or attributed) or explanations (in case of a single central banker), including a discussion of backward- and forward-looking arguments = 1.

(c) Does the central bank disclose how each decision on the level of its main operating instrument or target was reached?

No voting records, or only after substantial lag (more than eight weeks) = 0.
Non-attributed voting records = 1/2.
Individual voting records, or decision by single central banker = 1.

4. Policy Transparency

Policy transparency means prompt disclosure of policy decisions. In addition, it includes an explanation of the decision, and an explicit policy inclination or indication of likely future policy actions.

(a) Are decisions about adjustments to the main operating instrument or target promptly announced?

No, or after a significant lag = 0.

Yes, at the latest on the day of implementation = 1.

(b) Does the central bank provide an explanation when it announces policy decisions?

No = 0.

Yes, when policy decisions change, or only superficially = 1/2.

Yes, always and including forwarding-looking assessments = 1.

(c) Does the central bank disclose an explicit policy inclination after every policy meeting or an explicit indication of likely future policy actions (at least quarterly)?

No = 0.

Yes = 1.

5. Operational Transparency

Operational transparency concerns the implementation of the central bank's policy actions. It involves a discussion of control errors in achieving operating targets and (unanticipated) macroeconomic disturbances that affect the transmission of monetary policy. Furthermore, the evaluation of the macroeconomic outcomes of monetary policy in light of its objectives is included here as well.

(a) Does the central bank regularly evaluate to what extent its main policy operating targets (if any) have been achieved?

No, or not very often (at less than annual frequency) = 0.

Yes, but without providing explanations for significant deviations = 1/2.

Yes, accounting for significant deviations from target (if any); or, (nearly) perfect control over main operating instrument/target = 1.

(b) Does the central bank regularly provide information on (unanticipated) macroeconomic disturbances that affect the policy transmission process?

No, or not very often = 0.

Yes, but only through short-term forecasts or analysis of current macroeconomic developments (at least quarterly) = 1/2.

Yes, including a discussion of past forecast errors (at least annually) = 1.

(c) Does the central bank regularly provide an evaluation of the policy outcome in light of its macroeconomic objectives?

No, or not very often (at less than annual frequency) = 0.

Yes, but superficially = 1/2.

Yes, with an explicit account of the contribution of monetary policy in meeting the objectives = 1.

B Supplementary Data

This supplement contains the detailed information and sources used to construct the scores on the index of central bank transparency described in the Appendix for nine central banks (Australia, Canada, Euro zone, Japan, New Zealand, Sweden, Switzerland, United Kingdom, United States) from 1998 to 2002. For each of the fifteen items of the index, the score for June 1998 and subsequent changes (if any) are included in bold in square brackets. Nearly all sources mentioned below are available from central banks' web sites.

Reserve Bank of Australia (http://www.rba.gov.au)
1.a [**1**] Objectives: (a) the stability of the currency of Australia; (b) the maintenance of full employment in Australia; and (c) the economic prosperity and welfare of the people of Australia. *Reserve Bank Act* 1959, Part II 10(2), Functions of Reserve Bank Board.
Prioritization: "These objectives allow the Reserve Bank to focus on price (currency) stability while taking account of the implications of monetary policy for activity and, therefore, employment in the short term." *Statement on the Conduct of Monetary Policy*, by the Treasurer and the Reserve Bank Governor (designate), 14 August 1996.
1.b [**1**] "In pursuing the goal of medium term price stability the Reserve Bank has adopted the objective of keeping underlying inflation between 2 and 3 per cent, on average, over the cycle." *Statement on the Conduct of Monetary Policy*, by the Treasurer and the Reserve Bank Governor (designate), 14 August 1996.
1.c [**1**] Operational responsibility: *Reserve Bank Act* 1959, Part II 10(1).
Explicit override procedure: *Reserve Bank Act* 1959, Part II 11.
Instrument independence: "The Government recognises the independence of the Bank and its responsibility for monetary policy matters and intends to respect the Bank's independence as provided by statute. Section 11 of the Reserve Bank Act prescribes procedures for the resolution of policy differences between the Bank and the Government. The procedures, in effect, allow the Government to determine policy in the event of a material difference; but the procedures are politically demanding and their nature reinforces the Bank's independence. Safeguards like this ensure that monetary policy is subject to the checks and balances inherent and necessary in a democratic system." *Statement on the Conduct of Monetary Policy*, by the Treasurer and the Reserve Bank Governor (designate), August 14, 1996.
2.a [**0.5**] Money, price, output and unemployment data are available from web site under Statistics.
2.b [**0 + 1** (10/2001)] Meredith Beechey, Nargis Bharucha, Adam Cagliarini, David Gruen, Christopher Thompson, "A small model of the Australian macro economy", *Reserve Bank of Australia Research Discussion Paper* 2000-05, provide a macroeconomic model. However, it was only in the speech "The Monetary Policy Process at the RBA" by Glenn Stevens, Assistant Governor, Melbourne, October 10, 2001, that it was clarified that this is indeed used by the Reserve Bank for policy analysis.
2.c [**0.5**] Since November 2000, the Reserve Bank publishes a quarterly *Statement on Monetary Policy* (replacing the *Semi-Annual Statement on Monetary Policy* and the *Quarterly Report on the Economy and Financial Markets*, published since 1997), which contains a rough short-term inflation projection. In addition, the *Opening Statement to House of Representatives Standing Committee on Economics, Finance and Public Administration* of the semi-annual testimony by the Governor, which is held since 1997, contains a rough short-term output forecast.
3.a [**1**] The monetary policy framework of inflation targeting is outlined in the *Statement on the Conduct of Monetary Policy*, by the Treasurer and the Reserve Bank Governor (designate), 14 August 1996.
See also http://www.rba.gov.au/MonetaryPolicy/about_monetary_policy.html
3.b [**0**] No minutes available.
3.c [**0**] No voting records available.
4.a [**1**] Changes in policy decision are usually announced the day after the policy meeting at 9:30am, when the policy implementation starts (at least since 1990).
4.b [**0.5**] Policy explanations including forward-looking assessments released together with announcement of policy decision but only when policy changes (at least since 1990).
4.c [**0**] No explicit policy inclination.

5.a [**1**] Operating target for the cash rate (interest rate on overnight interbank loans in money market). Since 1998, a graphical evaluation of the cash rate target in the annual *Report and Financial Statements*, Operations in Financial Markets, shows nearly perfect control.
5.b [**0.5**] Analysis of macroeconomic developments and rough short-term inflation forecast in quarterly *Statement on Monetary Policy*.
5.c [**0**] Policy outcome not compared to objectives. (However, implicit graphical evaluation of inflation target since August 2001 *Statement on Monetary Policy*.)

Bank of Canada (http://www.bankofcanada.ca/)
1.a [**1**] Objectives: "to regulate credit and currency in the best interests of the economic life of the nation, to control and protect the external value of the national monetary unit and to mitigate by its influence fluctuations in the general level of production, trade, prices and employment, so far as may be possible within the scope of monetary action, and generally to promote the economic and financial welfare of Canada". *Bank of Canada Act*, Preamble.
Prioritization: The joint statement of the Government of Canada and the Bank of Canada on the renewal of the inflation-control target (February 24, 1998) clarifies that "The best contribution monetary policy can make to these goals is through preserving confidence in the value of money by providing an environment of stable average prices" and expresses the commitment of the Government and Bank to an explicit inflation-control target (with a similar joint statement on May 17, 2001).
1.b [**1**] Inflation-control target range (since 1991), equal to 1-3% (effective since 1995) focused around the midpoint of 2% and using 12-month CPI inflation. See "Renewal of the Inflation-Control Target: Background Information" (May 18, 2001).
1.c [**1**] Explicit override procedure: *Bank of Canada Act* 14(2)-(3).
2.a [**1**] Information available in the *Bank of Canada Review*, e.g. Spring 2001 issue, Table A2: Major Financial and Economic Indicators.
2.b [**1**] Policy model described by Richard Black and David Rose (1997), "Canadian Policy Analysis Model (CPAM)", *Bank of Canada Working Paper* 97-16.
2.c [**0.5**] Rough projections for inflation and output in semiannual *Monetary Policy Report* and its *Update* every other quarter since August 2000.
3.a [**1**] "Inflation-control (targeting) strategy" (since 1991) is described in the November 1997 *Monetary Policy Report*. See also "Renewal of the Inflation-Control Target: Background Information", May 2001.
3.b [**0**] No minutes available.
3.c [**0**] No voting records available.
4.a [**1**] Policy decisions announced at 9am on fixed announcement days (which started only in December 2000; previously, same day announcement of changes in policy actions).
4.b [**1**] Press release with announcement of policy decision includes explanation with forward-looking assessments (at least since 1997).
4.c [**0**] No explicit policy inclination.
5.a [**1**] Initially, the main operating instrument was the Bank rate, which (since February 1996) is the interest rate the Bank of Canada charges on one-day loans to financial institutions and the ceiling of an operating band of 50 basis points for the overnight rate. Since May 2001, the Bank's key policy rate is the Overnight Rate Target, which is the midpoint of the operating band. Data and graphs on the Bank's web site suggest near perfect control.
5.b [**0.5**] Analysis of macroeconomic developments (at least since 1995) and rough inflation and output forecasts in semiannual *Monetary Policy Report*, and since August 2000 at quarterly frequency with the regular *Update*.
5.c [**0.5**] Graphical evaluation and some discussion of policy outcomes in *Annual Report* and *Monetary Policy Report (Update)*, but without an explicit account of deviations from objectives. (In "Renewal of the Inflation-Control Target: Background Information", May 2001, the Bank announced that persistent deviations in inflation from the target midpoint will be explained in the quarterly *Monetary Policy Report* (*Update*). However, the Bank does not provide any account of the role of monetary policy in the (lack of) achievement of its objectives.)

European Central Bank (http://www.ecb.int)

1.a [**1**] Objectives and prioritization: "the primary objective of the ESCB shall be to maintain price stability. Without prejudice to the objective of price stability, it shall support the general economic policies in the Community with a view to contributing to the achievement of the objectives of the Community as laid down in Article 2 of this Treaty" *Protocol on the Statute of the European System of Central Banks and of the European Central Bank*, Art. 2.
1.b [**1**] Quantitative definition of price stability: annual increase of the Harmonised Index of Consumer Prices (HICP) for the Euro area of less than 2 per cent. See ECB press release "A stability-oriented monetary policy strategy for the ESCB", 13 October 1998.
1.c [**1**] Independence: "When exercising the powers and carrying out the tasks and duties conferred upon them by this Treaty and this Statute, neither the ECB, nor a national central bank, nor any member of their decision making bodies shall seek or take instructions from Community institutions or bodies, from any government of a Member State or from any other body." *Protocol on the Statute of the ESCB and of the ECB*, Art. 7.
2.a [**1**] Information available in the *Monthly Bulletin*, section "Euro area statistics".
2.b [**0 + 1** (1/2001)] Policy model described by G. Fagan, J. Henry and R. Metez, "An Area-Wide Model (AWM) for the Euro Area", *European Central Bank Working Paper* 42, January 2001.
2.c [**0 + 0.5** (12/2000)] Since December 2000, medium term conditional inflation and output projections are published twice a year in the June and December *Monthly Bulletin*.
3.a [**1**] "Two Pillar Strategy" with (1) a prominent role for money, and (2) a broadly based assessment both of the outlook regarding price developments and of the risks to price stability in the Euro area as a whole. *Monthly Bulletin* January 1999.
3.b [**0**] No minutes available.
3.c [**0**] No voting records available. (It has been suggested that the ECB decides "by consensus". However, according to the *Protocol on the Statute of the ESCB and of the ECB*, Art. 10(2), the Governing Council shall act by majority voting.)
4.a [**1**] Policy decisions are announced the same day.
4.b [**0.5 + 0.5** (11/2001)] Initially, there were two policy meetings every month, the first of which was followed by a press conference in which the President provides an introductory statement with an explanation of the policy decision. Since November 2001, there has been a monetary policy meeting once a month followed by the press conference.
4.c [**0**] No explicit policy inclination.
5.a [**1**] Main operating instruments are minimum bid rate on the main refinancing operations and the interest rates on the marginal lending facility and the deposit facility.
5.b [**0.5**] Analysis of current macro developments in *Monthly Bulletin*.
5.c [**0.5**] Informal evaluation and discussion of policy outcomes in *Monthly Bulletin* and *Annual Report*, but no explicit account of the role of monetary policy.

Bank of Japan (http://www.boj.or.jp)
1.a [**0.5**] Multiple objectives without priority: to issue banknotes; to carry out currency and monetary control aimed at contributing to the sound development of the national economy through the pursuit of price stability; and, to ensure smooth settlement of funds among banks and other financial institutions, thereby contributing to the maintenance of an orderly financial system. *Bank of Japan Law* Art. 1 and 2.
1.b [**0**] No precise definition and/or quantification of the objectives could be found.
1.c [**1**] Independence: "The Bank of Japan's autonomy regarding currency and monetary control shall be respected." *Bank of Japan Law*, Art. 3.
2.a [**1**] Data is available at the following web sites: money at Bank of Japan; inflation and unemployment rate at Statistics Bureau and Statistics Center (www.stat.go.jp); GDP at Cabinet Office (www.esri.cao.go.jp); capacity utilization at Ministry of Economy, Trade and Industry (www.meti.go.jp).
2.b [**0**] No explicit policy model could be found.
2.c [**0 + 0.5** (10/2000)] Since October 2000, the semiannual *Outlook and Risk Assessment of the Economy and Prices* contains short-term conditional forecasts for inflation and output by the Policy Board.
3.a [**0**] No explicit monetary strategy could be found.

3.b [**1**] Non-attributed minutes are released approximately six weeks after policy meeting, including summary of discussions, remarks by Government representative and individual votes.
3.c [**1**] Individual voting records are published together with minutes, approximately six weeks after the policy meeting.
4.a [**1**] Policy decisions are announced the same day.
4.b [**0.5**] Policy explanation at the time of announcement but only when policy decision changes.
4.c [**0**] No explicit policy inclination.
5.a [**1 - 0.5** (3/2001)] Initially, there was a main operating target for the average uncollateralized overnight call rate; charts in the *Monthly Report of Recent Economic and Financial Developments* show quite some fluctuations but suggest that the targets for the average call rate were indeed met (with effectively a 'zero interest rate policy' since February 12, 1999). On March 19, 2001 the main operating target was changed to the outstanding balance of the current accounts at the Bank. This target is very rough and there are significant fluctuations in the outstanding balance but no explanations for it.
5.b [**0.5**] Analysis of macroeconomic situation in *Monthly Report of Recent Economic and Financial Developments* and (since October 2000) short-term inflation and output forecasts in the semiannual *Outlook and Risk Assessment of the Economy and Prices*.
5.c [**0.5**] Informal evaluation of policy outcome in *Monthly Report of Recent Economic and Financial Developments*, without explicitly accounting for deviations between outcomes and objectives.
(Unfortunately, the Bank of Japan web site appears quite hard to navigate, but for those who persist it provides very elaborate information.)

Reserve Bank of New Zealand (http://www.rbnz.govt.nz/)
1.a [**1**] Primary objective: "The primary function of the Bank is to formulate and implement monetary policy directed to the economic objective of achieving and maintaining stability in the general level of prices." *Reserve Bank Act* 1989, Part II, Sec 8.
In addition: "Have regard to the efficiency and soundness of the financial system" *Reserve Bank Act* 1989, Part II, Sec 10; and "In pursuing its price stability objective, the Bank shall implement monetary policy in a sustainable, consistent and transparent manner and shall seek to avoid unnecessary instability in output, interest rates and the exchange rate." *Policy Targets Agreement*, December 16, 1999.
1.b [**1**] Policy target specified in *Policy Targets Agreement*: 12-monthly increase in the CPI(X) between 0 and 3 % (from December 1997-1999).
1.c [**1**] Independence: operational independence subject to *Policy Targets Agreement* and override mechanism. See *Reserve Bank Act* 1989, Part II, Sec 13.
Explicit override mechanism: *Reserve Bank Act* 1989, Part II, Sec 12
2.a [**0.5 + 0.5** (2002)] All the time series except for capacity utilization can be found on the web site under Statistics. Data on capacity utilization have been available in Excel spreadsheets that accompany *Monetary Policy Statements* on the web site, at least since June 2002 (when we first observed them).
2.b [**1**] The macroeconomic model used for medium term analysis is presented by Richard Black, Vincenzo Cassino, Aaron Drew, Eric Hansen, Benjamin Hunt, David Rose and Alasdair Scott (1997), "The Forecasting and Policy System", *Reserve Bank of New Zealand Research Paper* 43.
2.c [**1**] The quarterly *Monetary Policy Statement* includes numerical, unconditional projections for inflation and output up to three years ahead.
3.a [**1**] Inflation targeting strategy described in *Policy Targets Agreement*, December 15, 1997; a useful complement is "Monetary policy implementation and signalling: Discussion Document", March 1997,
http://www.rbnz.govt.nz/monpol/about/0047041.html. For a more recent account, see "Independent review of the operation of monetary policy: Submission by the Reserve Bank of New Zealand", September 2000,
http://www.rbnz.govt.nz/monpol/review/0096189.pdf.
3.b [**1**] Comprehensive explanation of policy stance (including medium term macroeconomic projections) by Reserve Bank Governor published in quarterly *Monetary Policy Statement* (about six weeks after Official Cash Rate review dates since March 1999).

3.c [**1**] Policy decisions are made by the Governor.
4.a [**1**] Initially, the formal monetary policy instrument was the daily settlement cash target. Although the cash target was last changed in August 1995, the Governor indicated in his "Speaking notes" for the May 1998 *Monetary Policy Statement* that any cash target changes would be promptly announced after the policy meeting. In practice, the monetary policy stance was essentially conveyed in terms of a target for the Monetary Conditions Index (MCI; weighted average of trade-weighted exchange rate and 90-day interest rate), starting in December 1996. These desired MCI levels were announced and explained every quarter with the release of the *Economic Projections* (discontinued in March 1998) and the *Monetary Policy Statement*. Since March 1999, the main operating target has been changed from settlement cash to the Official Cash Rate (which is the midpoint of an operating band of 50 basis points for the interbank interest rate) and policy decisions have been promptly announced at Official Cash Rate review dates.
(Focusing on the intermediate operating target (MCI), 4.a would also be [**1**].)
4.b [**0+ 0.5** (3/1999) **+ 0.5** (12/2000)] Initially, there were no explanations of formal policy decisions. After the introduction of the Official Cash Rate in March 1999, explanations first only in case of policy changes, but since December 2000 also for no-change decisions.
(Focusing on the intermediate operating target (MCI), 4.b would be [**1 - 0.5** (3/1999) **+ 0.5** (12/2000)].)
4.c [**0 + 1** (3/1999)] Initially, there was no inclination for the formal policy instrument, but since March 1999 the quarterly *Monetary Policy Statement* have included three-year ahead unconditional projections for the 90-day bank bill rate, which is very closely related to the Official Cash Rate.
(Focusing on the intermediate operating target (MCI), the quarterly *Monetary Policy Statement* included three-year ahead unconditional projections for the MCI until March 1999, so 4.c would be [**1**].)
5.a [**0 + 1** (3/1999)] Initially, when daily settlement cash target was the formal operating target, there was no evaluation of its achievement. Since March 1999, the main operating target is the Official Cash Rate, which is controlled almost perfectly (e.g. see Andy Brookes and Tim Hampton, 'The Official Cash Rate one year on', *Reserve Bank Bulletin*, June 2000)
(Focusing on the intermediate operating target, deviations of the MCI from its target used to be discussed in the quarterly *Monetary Policy Statement*, so 5.a would be [**1**].)
5.b [**0.5**] Analysis of macroeconomic developments and short-term forecasts for inflation in quarterly *Monetary Policy Statement*.
5.c [**0.5**] Graphical evaluation of policy outcome in quarterly *Monetary Policy Statement*, without an explicit account how monetary policy contributed to the achievement of objectives.

Swedish Riksbank (http://www.riksbank.com)
1.a [**0.5 + 0.5** (1/1999)] "The objective of the Riksbank's operations shall be to maintain price stability. In addition, the Riksbank shall promote a safe and efficient payment system." *Sveriges Riksbank Act*, Chapter 1, Art. 2 (amendment effective January 1999).
1.b [**1**] Inflation target (formulated in 1993, effective since 1995) of 2 % with a margin of $\pm$ 1 percentage point. *Annual Report* 1997.
1.c [**0.5 + 0.5** (1/1999)] Independence: "The Riksbank is responsible for monetary policy. No authority may determine the decisions made by the Riksbank on issues relating to monetary policy." *Constitution Act*, Chapter 9, Art. 12; and "Members of the Executive Board may not seek nor take instructions when they are fulfilling their monetary policy duties." *Sveriges Riksbank Act*, Chapter 3, Art. 2 (both amendments effective January 1999).
2.a [**0.5 + 0.5** (12/1999)] Since 2001, all information is available from the Riksbank web site; data on money under the heading Statistics, and data on inflation, GDP, unemployment rate and capacity utilization (in the form of econometric estimates of the output gap) in Excel spreadsheets that are made available for downloading with each *Inflation Report* (first for December 1999).
2.b [**0**] No explicit policy model could be found.
2.c [**1**] Conditional inflation and output forecasts for a two-year horizon are published in the quarterly *Inflation Report*.

3.a [**1**] Monetary policy framework is explained as 'rule-of-thumb' adjustment of repo rate based deviation of inflation forecast from target, with two exceptions: (1) temporary inflation effects are disregarded, and (2) adjustment is gradual in case of costly real effects. See *Annual Report* 2000, p. 10; and speech on 'Monetary Policy' by Lars Heikensten, October 22, 1997. (Essentially flexible inflation forecast targeting.)
3.b [**1**] Detailed non-attributed minutes including policy discussions, released 2-3 weeks after the meeting.
3.c [**0 + 1** (5/2002)] Initially, attributed reservations against the decision were sometimes noted in the minutes, but it was not clear whether these were (the only) dissents. This was clarified in May 2002, so that the minutes effectively provide voting records.
4.a [**1**] Policy decisions are promptly announced after the policy meeting before implementation.
4.b [**0.5 + 0.5** (10/1999)] Explanation of adjustments in policy instrument, and since October 1999 of all policy decisions at time of announcement.
4.c [**0 + 1** (3/2002)] Policy inclination has been provided since March 2002.
5.a [**1**] Main operating instrument: Repo rate.
5.b [**0.5 + 0.5** (3/2000)] Analysis of macroeconomic developments and macroeconomic forecasts in quarterly *Inflation Report*. In addition, annual discussion of past inflation forecast errors in March *Inflation Report* since 2000.
5.c [**0.5 + 0.5** (3/2000)] Initially, review of policy outcome in *Annual Report*. Since 2000, annual evaluation of inflation outcome over last three years in March *Inflation Report*, including a discussion of the effect of monetary policy.

Swiss National Bank (http://www.snb.ch)
1.a [**0.5**] Objectives: "The principal task of the National Bank is to regulate the country's money circulation, to facilitate payment transactions, and to pursue a credit and monetary policy serving the interests of the country as a whole." *National Bank Law* Art. 2(1)
1.b [**0 + 1** (12/1999)] Quantitative definition of price stability since December 1999: inflation rate as measured by the national consumer price index of less than 2 % per annum.
1.c [**0.5 + 0.5** (1/2000)] "As an independent central bank, the Swiss National Bank shall pursue a monetary policy serving the interests of the country as a whole", *Federal Constitution* Art. 99(2), January 2000 amendment.
2.a [**1**] Money, inflation, output and unemployment data are available in the *Statistical Monthly Bulletin*. Other data is available via Swiss Statistics web site (www.statistics.admin.ch).
2.b [**0**] Although Peter Stalder, "An econometric macro-model for Switzerland", *Quarterly Bulletin* 2, June 2001, discusses a policy model, it is only in French and German and only presents a few of the equations.
2.c [**0 + 0.5** (12/1999)] Since December 1999, inflation forecast for the three ensuing years, presented in the June and December *Quarterly Bulletin* (French and German only) and at the half-yearly media news conference (in English).
3.a [**1**] Initially, monetary policy framework was focused on medium term monetary growth targets. Since 2000, this has been abandoned in favor of effectively an inflation targeting strategy. See "Monetary policy of the Swiss National Bank" in various issues of the *Annual Report*.
3.b [**0**] No minutes available.
3.c [**0**] No voting records available.
4.a [**1**] Initially, annual announcement concerning longer run monetary growth target. After adopting a target for the LIBOR, policy decisions are announced the same day.
4.b [**1**] Explanation of all policy decisions at time of announcement.
4.c [**0**] No explicit policy inclination.
5.a [**1 - 0.5** (12/1999)] Initially, graphical evaluation of monetary targets in *Annual Report*, including explanation for deviations. Since December 1999, operational target range of 100 basis points for three-month LIBOR rate graphically evaluated in *Annual Report*, but no explanations for significant fluctuations within target.
5.b [**0**] Analysis of macroeconomic developments in *Quarterly Bulletin*, but only brief abstract available in English. No analysis in *Monthly Statistical Bulletin*, merely graphs (again only brief abstract in English).

5.c [**0**] The Bank only gives a review of the year, but doesn't account for discrepancies between policy outcome and target.

Bank of England (http://www.bankofengland.co.uk)
1.a [**1**] "The objectives of the Bank of England are to maintain price stability and, subject to that, support the economic policy of Her Majesty's Government, including its objectives for growth and employment." *Bank of England Act* 1998, Ch 11 Part II, Sec 11
1.b [**1**] The price stability objective is to achieve underlying inflation, measured by the RPI excluding mortgage interest rates, of 2.5%.
1.c [**1**] Operational responsibility: *Bank of England Act* 1998, Ch 11, Part II, Sec 10.
Explicit override mechanism: *Bank of England Act* 1998, Ch 11, Part II, Sec 19.
2.a [**0.5 + 0.5** (2002)] Time series are available from the Office of National Statistics web site (www.statistics.gov.uk), initially with the exception of capacity utilization, and more recently also at the Bank of England web site.
2.b [**0 + 1** (4/1999)] Extensive documentation on policy models in *Economic Models at the Bank of England*, April 1999 (see also September 2000 Update), and the computer code of the macroeconometric model is available on the web site.
2.c [**1**] Conditional inflation and output forecasts for a two-year horizon are published in the quarterly *Inflation Report*.
3.a [**1**] Monetary policy framework described on web site
(www.bankofengland.co.uk/framework.htm)
3.b [**1**] Comprehensive non-attributed minutes released about two weeks after policy meeting, including summary of discussions and individual votes.
3.c [**1**] Individual voting records included together with minutes.
4.a [**1**] Policy decisions announced the same day.
4.b [**0.5**] Explanation of policy decisions at time of announcement when policy changes (with a few exceptions).
4.c [**0**] No explicit policy inclination.
5.a [**1**] Main operating instrument: Repo rate.
5.b [**0.5 + 0.5** (8/1999)] Short-term forecasts for inflation and output, and analysis of macroeconomic developments in quarterly *Inflation Report*. In addition, discussion of the MPC's forecasting record in the August *Inflation Report* (since 1999).
5.c [**0.5**] Evaluation of policy outcome only casually in quarterly *Inflation Report*.

Federal Reserve (http://www.federalreserve.gov/)
1.a [**0.5**] Multiple objectives without priority: "The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy's long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices and moderate long-term interest rates." *Federal Reserve Act* Sec. 225a.
1.b [**0**] No explicit target for objectives.
1.c [**0.5**] No explicit instrument independence in *Federal Reserve Act*.
2.a [**1**] All data available from the FRED database at the Federal Reserve Bank of St Louis web site (www.stls.frb.org).
2.b [**1**] Policy model described by Flint Brayton and Peter A. Tinsley (1996) "A Guide to FRB/US: A Macroeconomic Model of the United States", *Federal Reserve Board Finance and Economics Discussion Paper* 96-42.
2.c [**0.5**] Short-term economic projections for inflation and output are published in the semiannual *Monetary Policy Report to the Congress*.
3.a [**0**] No explicit monetary policy strategy could be found.
3.b [**1**] Non-attributed minutes, including discussion of arguments and individual votes, released about six weeks after policy meeting.
3.c [**1**] Individual voting records included together with minutes
4.a [**1**] Decisions about adjustments in policy instrument announced the same day.
4.b [**0.5 + 0.5** (5/1999)] Initially, only explanation at time of announcement in case of policy changes, and since May 1999 also when policy remains unchanged.

4.c [**0 + 1** (5/1999)] Since May 1999, explicit phrase in statement after every meeting that describes the policy tilt, clarified in Federal Reserve Board Press Release "FOMC announced modifications of its disclosure procedures", January 19, 2000.
5.a [**1**] Annual evaluation of target for Federal Funds rate reveals near perfect control. For instance, see *Domestic Open Market Operations During 2001*, Federal Reserve Bank of New York, Markets Group, February 2002.
5.b [**0**] Macroeconomic analysis and short-term forecasts for inflation and output in the semi-annual *Monetary Policy Report to the Congress*.
5.c [**0.5**] Only informal evaluation of policy outcomes in the semiannual *Monetary Policy Report to the Congress*.

Table 1: Index of Central Bank Transparency, June 2001

Central Bank Transparency	Australia	Canada	Euro zone	Japan	New Zealand	Sweden	Switzerland	UK	US
1. Political	**3**	**3**	**3**	**1.5**	**3**	**3**	**2.5**	**3**	**1**
a. Formal Objectives	1	1	1	0.5	1	1	0.5	1	0.5
b. Quantitative Targets	1	1	1	0	1	1	1	1	0
c. Institutional Arrangements	1	1	1	1	1	1	1	1	0.5
2. Economic	**1**	**2.5**	**2.5**	**1.5**	**2.5**	**2**	**1.5**	**2.5**	**2.5**
a. Economic Data	0.5	1	1	1	0.5	1	1	0.5	1
b. Policy Models	0	1	1	0	1	0	0	1	1
c. Central Bank Forecasts	0.5	0.5	0.5	0.5	1	1	0.5	1	0.5
3. Procedural	**1**	**1**	**1**	**2**	**3**	**2**	**1**	**3**	**2**
a. Explicit Strategy	1	1	1	0	1	1	1	1	0
b. Minutes	0	0	0	1	1	1	0	1	1
c. Voting Records	0	0	0	1	1	0	0	1	1
4. Policy	**1.5**	**2**	**1.5**	**1.5**	**3**	**2**	**2**	**1.5**	**3**
a. Prompt Announcement	1	1	1	1	1	1	1	1	1
b. Policy Explanation	0.5	1	0.5	0.5	1	1	1	0.5	1
c. Policy Inclination	0	0	0	0	1	0	0	0	1
5. Operational	**1.5**	**2**	**2**	**1.5**	**2**	**3**	**0.5**	**2.5**	**1.5**
a. Control Errors	1	1	1	0.5	1	1	0.5	1	1
b. Transmission Disturbances	0.5	0.5	0.5	0.5	0.5	1	0	1	0
c. Evaluation Policy Outcome	0	0.5	0.5	0.5	0.5	1	0	0.5	0.5
Total	**8**	**10.5**	**10**	**8**	**13.5**	**12**	**7.5**	**12.5**	**10**

Table 2: Central Bank Transparency Index, June 1998

1998 Index	Political	Economic	Procedural	Policy	Operational	Total
Australia	3	1	1	1.5	1.5	8
Canada	3	2.5	1	2	2	10.5
Euro Zone	-	-	-	-	-	-
Japan	1.5	1	2	1.5	2	8
New Zealand	3	2.5	3	1	1	10.5
Sweden	2	1.5	2	1.5	2	9
Switzerland	1	1	1	2	1	6
United Kingdom	3	1.5	3	1.5	2	11
United States	1	2.5	2	1.5	1.5	8.5

Table 3: Average Transparency Index, June 1998 - June 2002

Average Index	Political	Economic	Procedural	Policy	Operational	Total
Australia	3	1.2	1	1.5	1.5	8.2
Canada	3	2.5	1	2	2	10.5
Euro Zone*	3	1.8	1	1.6	2	9.4
Japan	1.5	1.2	2	1.5	1.8	8
New Zealand	3	2.6	3	2.4	1.8	12.8
Sweden	2.8	1.8	2.2	2	2.6	11.4
Switzerland	1.9	1.3	1	2	0.7	6.9
United Kingdom	3	2.4	3	1.5	2.3	12.2
United States	1	2.5	2	2.7	1.5	9.7

* Euro Zone average index for June 1999 - June 2002.

Table 4: Increase in Central Bank Transparency Index, June 1998 - June 2002

Change in Index	Political	Economic	Procedural	Policy	Operational	Total
Australia	0	+1	0	0	0	+1
Canada	0	0	0	0	0	0
Euro Zone*	0	+1.5	0	+0.5	0	+2
Japan	0	+0.5	0	0	-0.5	0
New Zealand	0	+0.5	0	+2	+1	+3.5
Sweden	+1	+0.5	+1	+1.5	+1	+5
Switzerland	+1.5	+0.5	0	0	-0.5	+1.5
United Kingdom	0	+1.5	0	0	+0.5	+2
United States	0	0	0	+1.5	0	+1.5

* Euro Zone change in index for June 1999 - June 2002.

Table 5: Correlation between Transparency Index and Policy Outcomes (1998-2002)

a. Correlation with Average Transparency Index

Transparency	μ_y	σ_y	μ_π	σ_π	μ_u	σ_u
Political	-0.17 [0.66]	0.11 [0.78]	0.44 [0.24]	0.45 [0.23]	**0.63** [0.07]	0.37 [0.32]
Economic	-0.07 [0.85]	-0.06 [0.88]	0.47 [0.20]	-0.06 [0.89]	0.21 [0.59]	0.25 [0.52]
Procedural	**-0.65** [0.06]	0.19 [0.63]	-0.04 [0.92]	0.07 [0.85]	-0.25 [0.52]	0.14 [0.73]
Policy	-0.06 [0.88]	0.15 [0.70]	0.17 [0.67]	-0.09 [0.81]	-0.28 [0.46]	0.21 [0.58]
Operational	-0.45 [0.22]	0.53 [0.14]	0.09 [0.81]	0.13 [0.73]	0.44 [0.23]	0.53 [0.14]
Total	-0.50 [0.17]	0.28 [0.47]	0.36 [0.35]	0.21 [0.60]	0.26 [0.49]	0.47 [0.21]

b. Correlation with 1998 Transparency Index

Transparency	μ_y	σ_y	μ_π	σ_π	μ_u	σ_u
Political	-0.17 [0.69]	-0.11 [0.79]	0.55 [0.16]	**0.64** [0.09]	**0.86** [0.01]	0.19 [0.65]
Economic	-0.04 [0.92]	-0.05 [0.90]	0.42 [0.30]	-0.05 [0.91]	0.42 [0.30]	0.44 [0.27]
Procedural	-0.60 [0.11]	0.06 [0.88]	0.00 [1.00]	-0.07 [0.88]	0.00 [1.00]	0.42 [0.30]
Policy	**0.67** [0.07]	-0.12 [0.77]	-0.12 [0.77]	-0.44 [0.27]	-0.19 [0.66]	-0.60 [0.11]
Operational	-0.03 [0.94]	0.30 [0.47]	-0.12 [0.78]	-0.09 [0.84]	0.34 [0.41]	-0.01 [0.97]
Total	-0.29 [0.48]	0.01 [0.99]	0.42 [0.30]	0.19 [0.65]	**0.70** [0.05]	0.38 [0.35]

Correlations of the transparency index with the mean μ and standard deviation σ of the real GDP output gap y (1998Q1-2002Q4, computed as percent deviation from HP trend from 1993Q1), annual CPI inflation π, and the unemployment rate u. Means and standard deviations are computed using quarterly 1998Q1-2002Q4 data for Australia, Canada, Euro zone, Japan, New Zealand, Sweden, Switzerland, UK and US, except for Switzerland (unemployment data 1998Q1-2002Q2), UK (unemployment data 1998Q1-2002Q3), and New Zealand (output data 1998Q1-2002Q3).
Table 5.a uses the average 1998-2002 transparency index from Table 3; Table 5.b uses the 1998 transparency index from Table 2 and so excludes the Euro Zone.
Correlations significant at 10% level are bold and p-values are in square brackets.
Sources: Economic data from OECD (Quarterly National Accounts Statistics; Main Economic Indicators; Quarterly Labor Force Statistics), Eurostat and US Bureau of Labor Statistics.