

SVERIGES RIKSBANK
WORKING PAPER SERIES

221



Governing the Governors: A Clinical Study of Central Banks

*Lars Frisell, Kasper Roszbach
and Giancarlo Spagnolo*

MARCH 2008

WORKING PAPERS ARE OBTAINABLE FROM

Sveriges Riksbank • Information Riksbank • SE-103 37 Stockholm
Fax international: +46 8 787 05 26
Telephone international: +46 8 787 01 00
E-mail: info@riksbank.se

The Working Paper series presents reports on matters in the sphere of activities of the Riksbank that are considered to be of interest to a wider public.

The papers are to be regarded as reports on ongoing studies and the authors will be pleased to receive comments.

The views expressed in Working Papers are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Executive Board of Sveriges Riksbank.

Governing the Governors: A Clinical Study of Central Banks¹

Lars Frisell²
Sveriges Riksbank

Kasper Roszbach³
Sveriges Riksbank

Giancarlo Spagnolo⁴
*University of Rome Tor Vergata
SITE and CEPR*

Sveriges Riksbank Working Paper Series

No. 221

March 2008

ABSTRACT: We study the specific corporate governance problems of central banks in their complex role of inflation guardians, bankers' banks, financial industry regulators/supervisors and, in some cases, competition authorities and deposit insurance agencies. We review the current institutional arrangements of a number of central banks, e.g. formal objectives, ownership, board and governor appointment rules, term limits and compensation, using both existing surveys and newly collected information. Research on central bank governance appears to have focused almost only on their monetary policy task. As shown by the sub-prime loan market turmoil, central banks play a crucial role in financial markets not only in setting monetary policy, but also in ensuring their stability. In this paper, we contrast the current governance practices at central banks with the structures suggested in the corporate governance literature. Our analysis highlights a number of specific issues that appear to have been unsatisfactorily addressed by existing research, such as the incentive structure for governors and board members, the balance between central banks' multiple objectives and the need for term limits.

Keywords: accountability, bank regulation, board structure, central banks, corporate governance, central bank independence, governor remuneration, term limits

JEL codes: G18, G34, G38, E58

¹ We are grateful to Franklin Allen, Mats Bergman, Mathias Dewatripont, Francesco Giavazzi, Enrico Perotti, Marco Pagano, and participants at seminars at Maastricht University, De Nederlandsche Bank, the 2004 Tor Vergata Conference, the 2006 FIRS Conference in Bocconi, the 2006 Riksbank Conference on the Governance of Central Banks, ASSA-AFA 2007 and the 2007 Central Banking Seminar in Cambridge for comments and discussions. We are also indebted to Roberto Rocci for suggesting and introducing us to the biplot, to the BIS and Tonny Lybek for making their data available to us, to all central banks that participated in our survey, and to Harvey Migotti for research assistance. The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Executive Board of Sveriges Riksbank.

² Financial Stability Department, Sveriges Riksbank, SE 103 37 Stockholm; lars.frisell@riksbank.se.

³ Research Division, Sveriges Riksbank, SE 103 37 Stockholm; kasper.roszbach@riksbank.se.

⁴ University of Rome Tor Vergata, SITE-Stockholm School of Economics, and CEPR; giancarlo.spagnolo@uniroma2.it.

1. Introduction

Over the past years, several European central banks have been subject to media attention and public debate because of alleged corporate governance (CG) problems. The alleged incidents touch upon a range of issues at the heart of central bank governance, including the risk of regulatory capture (cf. the Parmalat/Cirio scandal in Italy, and the Weltecke crisis in Germany⁵), the control over governor appointments (cf. the Slovenian parliament's repeated rejections of the president's nominee for governor of the Bank of Slovenia),⁶ the remuneration of bank officials and the financial independence of central banks (cf. the debate over the Dutch central bank's pension contributions), and nationalism or plain favoritism in regulatory decisions (cf. the "Fazio problem" in relation to ABN AMRO's bid for Banca Antonveneta).^{7,8} Even more recently, the market turbulence and the bank failures that occurred in the early fall of 2007 have lead several observers to question both the "UK model" of financial regulation – where financial supervision is separated from the central bank – and the modern "narrow" inflation-targeting objective.^{9,10}

The objective of this paper is – in the light of recent research findings in corporate finance, banking, and political economy – to raise the broad question of whether the current institutional setups and governance structures are optimally configured to make central banks execute the tasks assigned to them by the public in the most efficient way. Our thesis is that the modern institutional setup of central banks has predominantly been driven by the quest for monetary independence; this may have resulted in poor solutions and poor accountability with respect to other central bank tasks.

As highlighted by these recent events, the issue of central bank governance and regulation is not of purely theoretical interest. Recent empirical work by Beck, Demirgüç-Kunt and Levine (2005), Demirgüç-Kunt, Laeven and Levine (2004), and particularly Guiso, Sapienza and Zingales (2006) suggests that through its effect on the allocation of financial resources, the quality of bank regulation and supervision may have *dramatic* effects on the economic growth of nations.

⁵ See "Germany's central bank hit by Weltecke scandal", *Financial Times*, April 6, 2004.

⁶ See "Bank dispute mars Slovenia's euro adoption triumph", *Financial Times*, March 16, 2007.

⁷ See "Fazio bows out", *Financial Times*, December 20, 2005.

⁸ Of course, even if they are confirmed as real, these alleged corporate governance problems are rather mild when compared to those of some central banks in less developed countries, for which accusations reach outright corruption and fraud (see e.g. <http://www.ex.ac.uk/~RDavies/arian/scandals/centralbanks.html>).

⁹ See, for example, "Central banks should prick asset bubbles" by Paul De Grauwe, *Financial Times*, November 1 2007.

¹⁰ On these issues see, for example "The great Northern run", *The Economist*, September 22nd – 28th, 2007.

Basic Principles of Governance

Generically, good corporate governance for an organization can be defined as the establishment of institutional arrangements that ensure that the organization pursues its statutory goals (rather than the private goals of the members of the organization).¹¹ Much of the CG literature focuses on the way governance structures limit insiders' (management or controlling shareholders) expropriation of outsiders (especially financiers) through the enjoyment of private benefits, slack, or diversion of resources.

The mechanisms ensuring good corporate governance identified by the literature are sometimes classified as internal or external. Examples of external governance mechanisms include (i) product market competition (Allen and Gale, 2000), (ii) the market for corporate control (Manne, 1965; Bertrand and Mullainathan, 2003), (iii) contractual enforcement through the legal system (La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1998) and (iv) the market for managers (Fama, 1980, Holmström, 1999). Examples of internal mechanisms are (i) monitoring by large-block shareholders and other large stakeholders with sufficiently strong individual incentives to collect information and evaluate managers' decisions (Shleifer and Vishny, 1997), (ii) delegated monitoring by the board of directors (Hermalin and Weisbach, 1998), and (iii) incentive contracts for managers aimed at increasing the congruence of managers' and shareholders' objectives (Murphy, 1999).

To get an understanding of why the governance problems facing central banks may be more complex than those encountered by corporations, it is useful to consider the various tasks that central banks typically perform and the lack of reliable performance indicators for most of these tasks.

First, in its role as a bank-of-the-banks and insurer (lender of last resort), a central bank is subject to (additional) governance problems linked to the intrinsic opaqueness of the banking business, which reduces the effectiveness of the "standard" (internal and external) governance mechanisms (see e.g. Caprio and Levine, 2004; Adams and Mehran, 2003). Second, as a publicly owned or publicly controlled corporation, it is exposed to the governance problems that are typical for public organizations: diluted monitoring incentives due to multiple layers of delegation, weak incentives to reduce costs and innovate, and political distortions.¹² Third, as a monopoly provider of public goods (a stable currency and a well-functioning payment system), a central bank is insulated from what probably constitutes the most powerful mechanism disciplining private corporations: product market

¹¹ Shleifer and Vishny (1997), Becht, Bolton and Roell (2002), and Denis and McConnell (2003), among others, survey the literature on corporate governance. Tirole (2005) offers an up-to-date integrated treatment of the topic.

¹² These problems led to the recent massive privatization wave of public utilities around the world; Shleifer (1998) offers an excellent survey of these problems, while Sapienza (2003) provides fresh evidence of political distortions in the operations of publicly owned banks.

competition and the market for corporate control.¹³ Last, as a regulator that produces and enforces secondary legislation and guidelines relating to bank solvency, entry and competition, a central bank is susceptible to risk of capture by the banks it regulates as well as to outright corruption.¹⁴

The interaction between the governance problems associated with each role performed by a central bank raises new questions about what constitutes an adequate governance structure. In our view, the existing literature on publicly owned firms, regulation, and corporate governance does not offer satisfactory answers to many of the problems inherent to central banks. For central banks, all external governance mechanisms save the reputational one are absent, and the only internal mechanisms that are likely to be effective are board supervision and incentive contracts. For this reason, we shall focus on these three tools.

The remainder of this paper is organized as follows. In Section 2 we create a benchmark for the current governance standards at – and the institutional organization of central banks, and compare this benchmark with the existing economic literature. In particular, Section 2.1 discusses the multiplicity of tasks and objectives of central banks. Section 2.2 deals with supervision, separation of powers and ownership. Section 2.3 discusses boards and their dual role as advisor and supervisor. Section 2.4 looks at governor appointment and dismissal procedures. Section 2.5 studies term limits and term lengths of governors. Section 2.6 reviews the role of financial independence in the governance of central banks. Section 2.7 addresses the remuneration of the governors and senior staff of central banks. In Section 3, we try to identify patterns of governance features that tend to appear together in the countries in our sample, and patterns of countries that present analogous governance frameworks for their central banks. Section 4 briefly summarizes and concludes the paper.

2. Governance Mechanisms for Central Banks: Practice versus Theory

A large number of authors, starting with Kydland and Prescott (1977), Barro and Gordon (1983) and Rogoff (1985), has investigated how central bank objectives ought to be shaped for the purpose of monetary policy. Persson and Tabellini (1993) and Walsh (1995) have extended this work and studied

¹³ Yardstick competition could, in principle, provide a form of competitive pressure (Schleifer, 1985). But the absence of a principal to implement the scheme, the enormous cross-country institutional variation, and the susceptibility of yardstick competition to collusion (Potters et al. 2003) make a successful implementation rather implausible.

¹⁴ Central-bank corruption appears to be an issue for many developing and transition countries (see e.g. Graf Lambsdorff and Shinkel, 2002). Stigler (1971) first underlined this risk for regulators.

the optimal contract for central bankers.¹⁵ Their focus, however, remains limited to the relevance of independent institutions for optimal monetary policy. Surprisingly, the design of the optimal contract for the supervisory tasks – historically the prime activity of many central banks - the possible trade-offs between achieving monetary policy, financial stability and banking sector efficiency, and the link between central bank independence, accountability and supervisory performance, have received relatively little attention.

One recent exception is Quintyn and Taylor (2002), who argue that “regulatory and supervisory independence” is important for financial stability for the same reasons that central bank independence is important for monetary stability. They list a number of dimensions of regulatory and supervisory independence, among which budgetary freedom, and contend that a supervisor’s independence, in order for the agency to be fully effective, needs in general to go hand in hand with accountability. These authors conclude that improper supervisory arrangements have contributed significantly to the deepening of several recent systemic banking crises.¹⁶

In this section, we study in detail the various features of reputational and internal governance mechanisms that may apply to central banks. We will look at the current practices in a group of (mostly European) central banks and contrast them with the insights economic research on the subject. The data we employ come from three sources: most data were obtained through a self-conducted survey among 50 central banks, while parts come from BIS surveys (Bank for International Settlements, 2007) and an IMF database.¹⁷ It should be noted that the sample of countries in this article can vary item wise as a consequence of our using three data sources.

2.1 The Multiple Tasks and Objectives of Central Banks

As mentioned in the introduction, central banks typically have multiple roles: they are, at the same time, a bank-of-the-banks and insurer, a monopoly provider of public goods, a regulator, and sometimes a competition authority.

¹⁵ A rich literature has developed out of these seminal contributions, including recent work such as Keefer and Stasavage (2001), looking into the importance of checks and balances; Eijffinger and Hoeberichts (2002), discussing the need for more transparency in the decision-making process; and Moser (1999), studying the factors that empirically determine independence.

¹⁶ See also Caprio and Levine (2004) and Guiso et al. (2006) for econometric evidence on the possible long-term effects of poor banking supervision.

¹⁷ See Lybek and Morris (2004) and Berger et al. (2006) for a description of parts of the IMF data.

Figure 1. What Are the Primary Objectives of Central Banks?

The chart shows what percentages of banks in the survey indicate a specific task as a primary responsibility.

[Source: Frisell Roszbach Spagnolo, N=47]

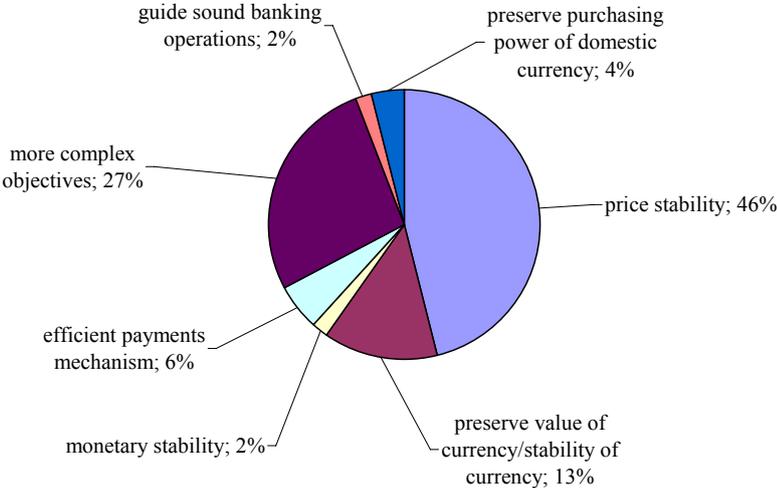


Figure 2. What Are the Major Responsibilities of Central Banks?

The bars show what percentage of all banks includes a specific task among its responsibilities. Multiple tasks are frequent. [Source: Frisell Roszbach Spagnolo, N=25]

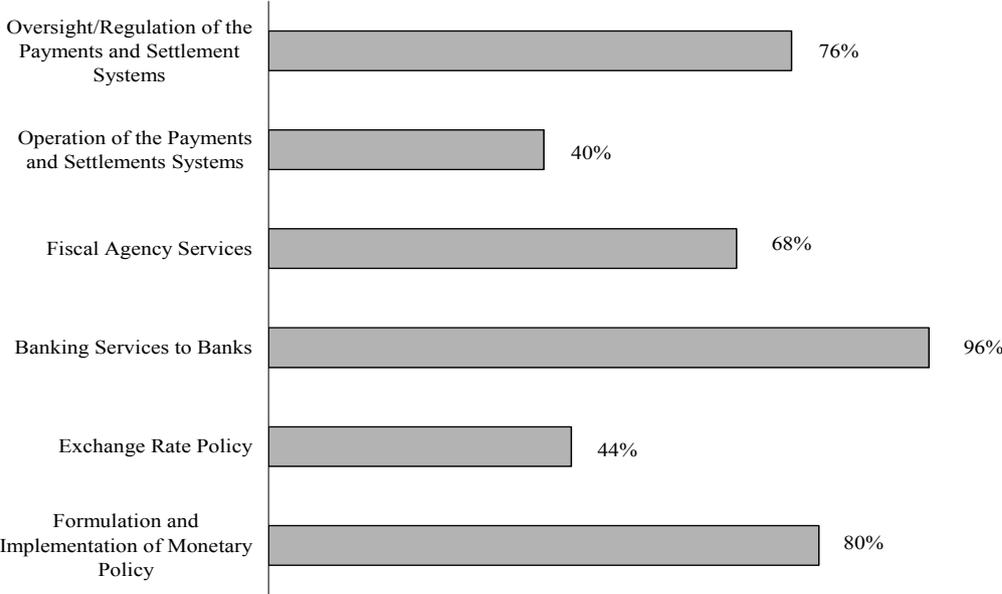
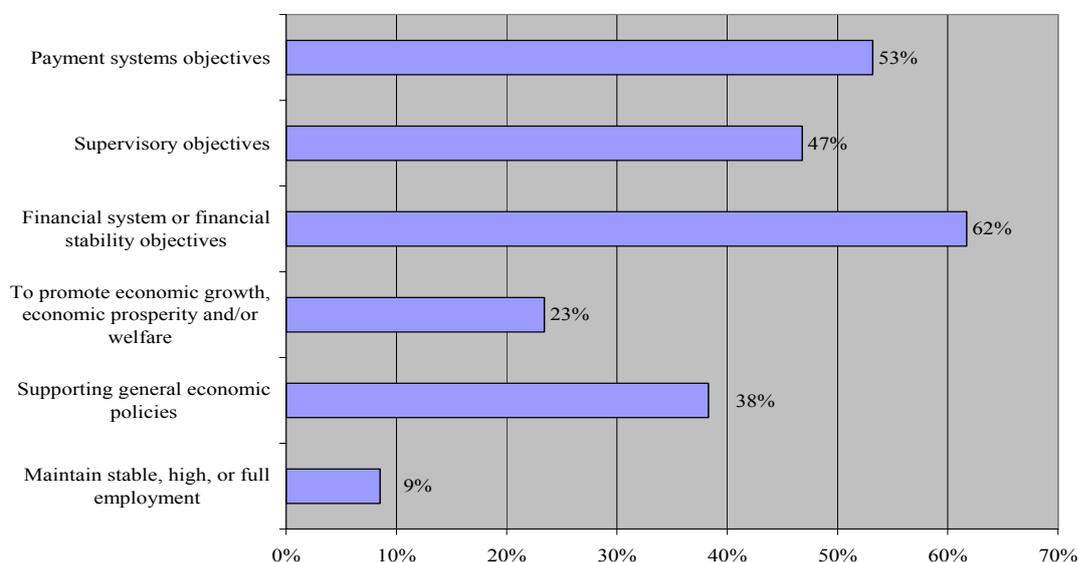


Figure 3. What Other Objectives Do Central Banks Have?

The bars show the objectives that are mentioned in the statutes of central banks besides those related to monetary policy. Multiple additional objectives are possible. Values are expressed as a percentage of all banks in the sample. [Source: Frisell Roszbach Spagnolo, N=47]



Figures 1, 2 and 3 summarize the information on tasks and objectives for central banks in a number of countries, most of which are OECD members.¹⁸ Central banks are typically given several other tasks besides monetary policy, including guaranteeing payment system stability, individual bank supervision and, more rarely, consumer protection; and they are often given other (generic) objectives than price stability.

Despite this, an almost lexicographic priority is typically assigned to the price stability objective and corresponding monetary policy tasks. This is, in fact, a relatively new development in the history of central banking, arguably caused by the high inflation decades. Originally, the key responsibilities of central banks were government financing, liquidity assistance to commercial banks and, later on, bank supervision (see, e.g., Goodhart 1988). From the late 1970s, however, central bank theory has focused on the stabilization of inflation and output variability. Reflecting advances in principal-agent theory and in research on optimal CEO compensation in corporate finance, an extensive economic literature on incentive contracts for CBs has developed by and large, suggesting that the budget of the CB and/or the remuneration of the governor should be linked to the achievement of an inflation target (see, e.g., Rogoff 1985, Persson and Tabellini 1993, Walsh 1995, and Persson and Tabellini 2000). However, this literature tends to ignore the other important objectives of CBs.¹⁹

¹⁸ Countries or Currency Regions studied in Figure 1b; Argentina, Australia, Bulgaria, Canada, China, ECB, France, Germany, Hong Kong, Hungary, India, Italy, Japan, Mexico, New Zealand, Norway, Poland, Russia, Singapore, South Africa, Sweden, Switzerland, Taiwan, Great Britain, and the US.

¹⁹ See Eisenbeis (2004) for a notable exception.

Hence, after so many years of successful inflation control, and in the light of recent events, it is time to pose the following questions:

- If conflicts appear between objectives, how should they be traded off?
- If the priority given to monetary policy objectives is not justified, what are then the right weights to attach to the other objectives?

One could for example question whether the strong priority that has been given to price stability is still justified? Does reaching inflation targets justify any sacrifice in terms of stability or cost increases? Naturally, all objectives of relevance should (optimally) enter a CB's 'incentive package'. However, it is hard to think of a good performance indicator to use for, say, bank supervision (the absence of failed banks?), or financial stability (the absence of banking crises?). It could be argued that lacking good performance indicators for other important objectives besides monetary policy, politicians should refrain from giving full-fledged incentive contracts on that account, as attempted in New Zealand. As shown by Milgrom and Holmström (1991), when managers face multiple tasks, using high-powered incentives to motivate them may be detrimental, since managers will distort their efforts towards measurable tasks and away from less measurable (but not necessarily less important) ones.

Even if reliable performance measures could be found for all objectives, the multiplicity of objectives itself may prove to be problematic. Dewatripont, Jewitt and Tirole (1999) show that the lack of focus in an agency's mission greatly limits the effectiveness of career concerns as a motivating device, as it renders inferences of the quality of management much more difficult.

2.2. Supervision, Separation of Powers and Ownership

The multiplicity of objectives has recently sparked a debate on what constitutes the optimal allocation of tasks between a central bank and a range of other financial supervisory authorities, for example a financial supervisory authority, a deposit insurance agency, an insurance industry supervisor, a stock market supervisor and a supervisor for consumer financial services. Combining different responsibilities, such as a lender-of-last-resort function, monetary policy, and bank supervision, may give rise to conflicts of interest for several reasons. Splitting up tasks that are related can, however, imply foregoing scale effects or ignoring externalities, particularly informational ones. Recognizing that the government or job market explicitly or implicitly rewards "good performance" by regulators means that regulators will, on the margin, trade off tasks so as to obtain the highest reward or smallest penalty. In general, this makes the allocation of powers important.

More or less parallel to the separation issue runs the ownership issue. In designing the optimal institutional structure for achieving its objectives, governments can – and do – also consider different ownership structures for central banks.

Separation of Powers

One of the earliest studies that recognizes the trade-off faced by a central bank when attempting to attain a multiplicity of goals is Schoenmaker (1992). He acknowledges that a central bank with supervisory responsibility may choose to hold down interest rates because of concern with the banking system, although purely monetary considerations suggest higher rates. Hence, simultaneously striving for price stability and financial stability involves a time-dependent trade-off. In line with this, Haubrich (1996) and Di Noia and Di Giorgio (1999) present evidence of the inflation rate being higher and more volatile in OECD countries where the central bank also has sole responsibility for banking supervision.²⁰

Boot and Thakor (1993) provide another reason why supervisory tasks should be partially or completely separated from the central bank. They show that in the presence of uncertainty about the supervisor's ability (e.g., in evaluating the quality of banks' assets), foreclosing a bank may signal poor monitoring ability. Hence, the supervisor will tend to delay such decisions. Boot and Thakor suggest that the responsibility for bank closures should therefore be separated from that for asset-quality monitoring. Naturally, efficient separation still requires a mechanism to induce the monitor to truthfully share its information with the regulator.

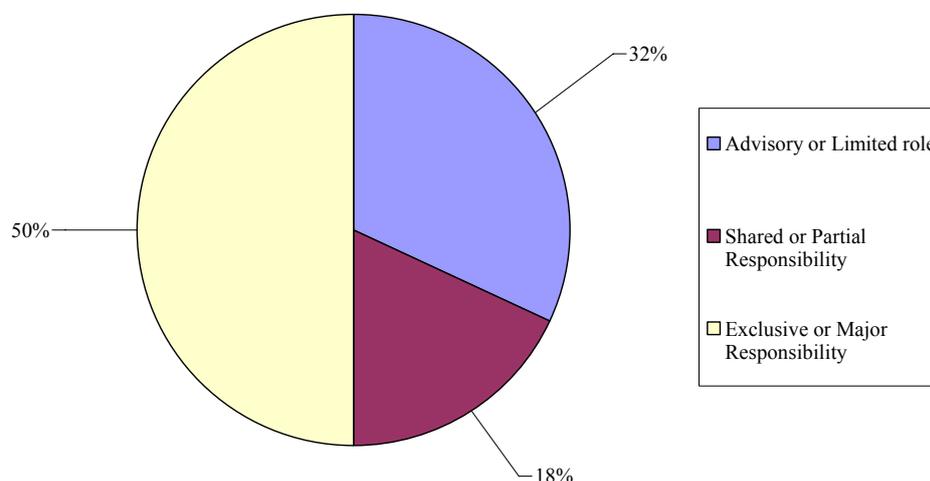
Kahn and Santos (2004) study the allocation of the lender-of-last-resort-function, closure authority (supervision) and deposit insurance. They find that in the multi-regulator arrangement, it is beneficial to give supervision to the deposit insurer. The choice between the unified-regulator arrangement and the multi-regulator arrangement involves a trade-off: The multi-regulator arrangement reduces the forbearance problem at high levels of liquidity shortage but may exacerbate it at low levels. To our knowledge, there is not yet any empirical research that assesses the costs of supervision in different countries and relates these to the various outputs of the supervisory system (e.g., official warnings, interventions, bank closures). Figure 4 shows how the frequencies at which different institutional arrangements for organizing bank supervision occur.

As shown by the pie chart, the most common setup in our sample is to have one agency assume the sole responsibility for bank supervision. More than eight out of ten countries have this arrangement.

²⁰ Whether such a higher rate of inflation is suboptimal will depend, of course, on the exact weight the government attaches to the bank supervision (financial stability) objective.

Figure 4. Is Banking Supervision a Major Activity of the Central Bank?

The chart shows the frequencies of different models of banking supervision. [Source: Frisell Roszbach Spagnolo, N=47]



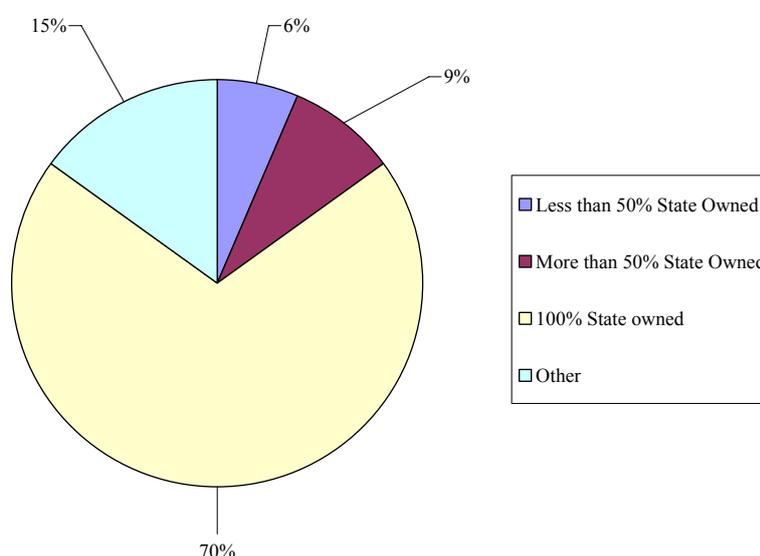
Among those, however, the odds are in favor of assigning the supervisory task to the central bank (50%) rather than to another independent supervisory agency. To verify whether differences in institutional setups could be ascribed to the level of development – possibly reflecting the fact that new insights about optimal organizational arrangements spread slowly – we split the sample into OECD and non-OECD member states. As it turned out, no significant differences exist between the two subgroups.²¹

The predominance of single supervisors in our sample and the fact that countries assign bank supervision to either a central bank or a different (more or less) independent government agency, raise a number of questions. What are the advantages and disadvantages of having a unified regulator? What circumstances make concentration of all tasks in a central bank optimal and which circumstances justify the creation of a separate authority? Can theory at all explain different institutional solutions in similar countries? Despite the recent theoretical contributions, these questions remain more or less unanswered.

²¹ This figure can be obtained from the authors upon request.

Figure 5. The Ownership of Central Banks

The pie chart illustrates to what extent the shares of central banks are owned by the government, by the private sector, by a combination of these or if some other ownership form applies. [Source: Frisell Roszbach Spagnolo, N=47]



Ownership

The economic literature has demonstrated that public ownership may generally allow for better control of non-contractible qualitative aspects, but leads to weak incentives to innovate, both in terms of improving quality and reducing costs (see Shleifer, 1998; Hart, Shleifer and Vishny, 1997). According to Alfred Marshall, public ownership is likely to be efficient only when 1) opportunities for cost reductions that lead to non-contractible deterioration of quality are significant; 2) innovation is relatively unimportant; 3) competition is weak and consumer choice ineffective; and 4) reputational mechanisms are weak. In all other cases, the cost of potential political use of the firm’s assets and weakened incentives to innovate and cut costs will dominate, making contracting of production to private firms more efficient.²²

If we apply these criteria to central banks, requirement (3) is clearly satisfied and most likely also requirement (1). To what extent the second and fourth conditions hold is less clear. However, the importance of the regulatory function that most central banks exercise reinforces the case for public ownership. Indeed, private ownership may directly conflict with the role of the bank as a regulator. This is particularly obvious in the case of a central bank that should enforce competition among banks which, in turn, jointly own the central bank. This was the case in Italy for a long time before the

²² Sapienza (2003), for example, shows that Italian publicly owned banks distort their lending behavior in response to political pressures.

system was reformed in 2005. A comparable situation exists in the U.S., where the financial institutions in each district own their respective regional Federal Reserve Banks.²³ A similar conflict may arise in more subtle ways for other central banks.

The primary advantage of private ownership usually stems from linking incentives to residual claims on profits. In the case of central banks, however, even when these are privately held, the allocation of profits is typically stipulated in advance (e.g., fixed dividends on shares or upper bounds on retained profits). The incentives for the owners to monitor management and for management to promote innovation and cost efficiency are thus greatly reduced. Another case for private ownership is made by Besley and Ghatak (2001). In the classical Grossman-Hart theory of the firm, if non-contractible investments, such as in human capital, are an important aspect of a project's success, ownership should be allocated depending on the relative importance of different parties' investments. However, with respect to public goods, Besley and Ghatak demonstrate that the hold-up problem is minimized when the party valuing the good most is the owner. Ignoring the other tasks of central banks suppose, for example, that both the central bank and the bank community can invest in general "risk awareness" (in order to promote financial stability). Then, even if the central bank has the superior technology (or credibility) for this, it might actually be optimal to allocate "ownership" of this task to the banks if the bank community itself is the primary beneficiary of a stable financial system.²⁴

Figure 5 provides an overview of the most common types of ownership and the frequency of their occurrence. Clearly, complete ownership by the national government is most common. Nevertheless, nearly three out of ten central banks are either only partially owned by the government, are private property or have some other ownership structure. Among the latter, about a third concerns cases where the government holds a 50 % or majority stake.

As mentioned, notable exceptions to the rule of public ownership are Bank of Italy and the Federal Reserve System. Other examples of uncommon ownership structures are the National Bank of Belgium and the Reserve Bank of South Africa. The Bank of Italy has been owned by a stable set of shareholders, mostly banks, since 1948. This ownership structure was not problematic as long as almost all Italian banks were public (controlled through 'non-profit' foundations linked to local governments, see Sapienza 2003). However, it has become a problem in the last few decades when the Italian banking sector has in large parts been privatized and the Bank of Italy was supposed to enforce competition law on its owners. After this problem emerged forcefully with the 'Fazio scandal', a new

²³ The Federal Reserve does not have sole authority in competition policy, however.

²⁴ The intuition is that the more caring party is able to get more than an equal split of the surplus *irrespective* of who is the owner. This bargaining advantage translates into higher (relative) investment incentives when that party is the owner.

financial law was passed in 2005 prescribing that Bank of Italy become entirely publicly owned by 2008.²⁵

The Federal Reserve System in the US comprises 12 Federal Reserves which, in turn, are owned by the commercial banks. The Federal Reserve Act requires national banks and participating state banks to purchase shares of their regional Federal Reserve Bank and thereby becoming "member banks".²⁶ However, control of the Federal Reserve System resides with the Board of Governors and the Federal Open Market Committee (FOMC). The Board is a seven-member panel appointed by the President and approved by the Senate. It determines the discount rate for loans to commercial banks and thrifts, selects the required reserve ratio, and also decides how much new currency Federal Reserve Banks may issue each year. The FOMC consists of the members of the Board, the president of the New York Fed, and the presidents from four other regional Federal Reserve Banks. The FOMC formulates open market policy, which determines how much the regional Banks may trade in government bonds. Moreover, the commercial banks can hardly be considered as residual claimants of the Fed's profits: by an agreement between the Board of Governors and the Treasury, nearly all the Fed's annual profits are paid to the federal government.

Other exceptions to complete public ownership include the National Bank of Belgium (NBB) and the Reserve Bank of South Africa. The NBB's share capital is owned to 50% by the Belgian State, while the remaining shares are listed on Euronext's Eurolist. These shares may be traded like any other stock. Interestingly, the dividend on the shares is not dependent on the development of the National Bank's profits or losses, rather its dividend policy ensures that the dividend grows steadily in nominal terms. The governance structure of NBB is complex, and the powers of shareholders are very limited. For example, the General Meeting (of shareholders) elects the members of the Council of Regency who, in turn, nominate the directors who are then appointed by the king. The governor is directly appointed by the king.²⁷

The Reserve Bank of South Africa is completely privately owned. Its shares are traded on an over-the-counter market which is co-ordinated within the Reserve Bank. No individual shareholder is allowed to hold more than 0.5% of outstanding shares, and there is an absolute limit on dividends. Half of the directors, including the governor and deputy-governors, are appointed by the president, while the other half is elected by shareholders.²⁸

²⁵ Legge 28 dicembre 2005, n. 262 - " Disposizioni per la tutela del risparmio e la disciplina dei mercati finanziari ", in Gazzetta Ufficiale n. 301, December 28, 2005 - Supplemento ordinario n. 208.

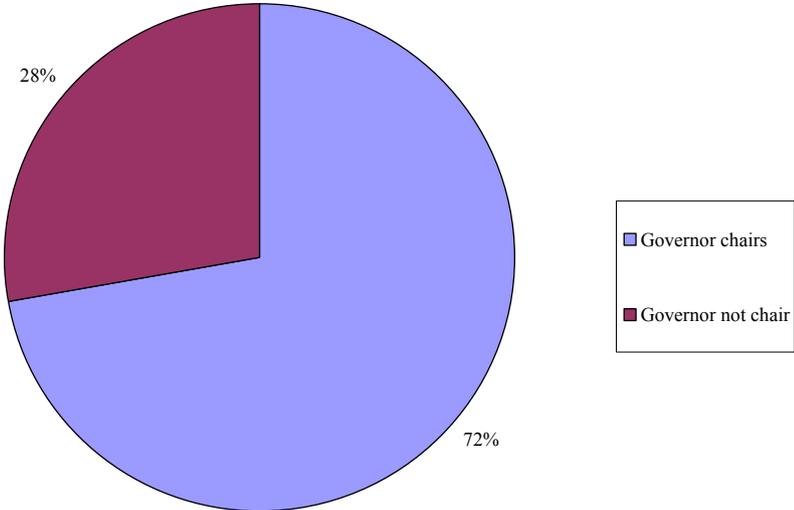
²⁶ The law also allows for a small portion of Federal Reserve stock to be sold to the public, but this portion is quite small, and such public stock does not carry any voting rights.

²⁷ See <http://www.nbb.be>

²⁸ See <http://www.reservebank.co.za/>

Figure 6. Is the Governor the Chairman of the Supervisory Board?

The pie chart illustrates the number of cases where the governor is the chairman of the supervisory board. This figure includes boards with dual functions. [Source: IMF/Lybek and Frisell Roszbach Spagnolo, N=101]



2.3 The Board as a Supervisor and Advisor

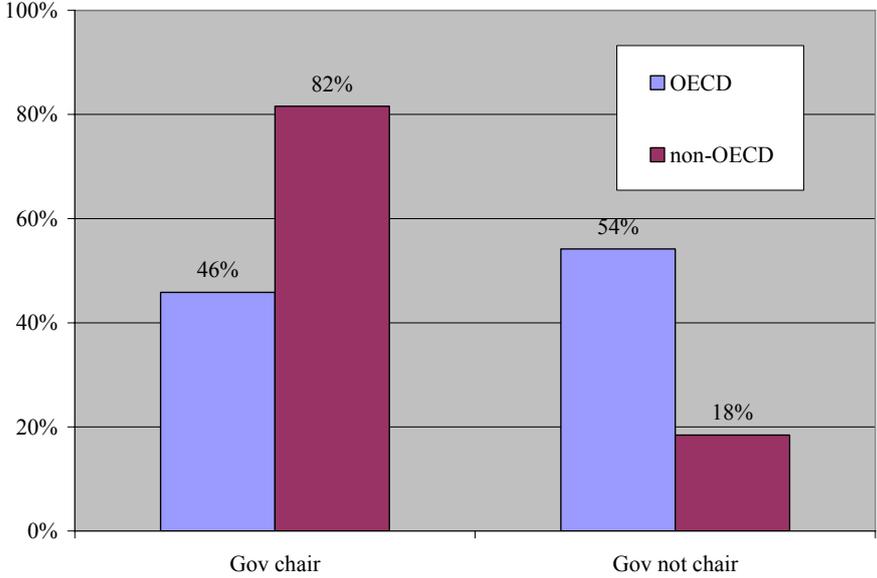
Generally, the existence of a board of directors can be seen as a partial solution to the agency problem between shareholders (or a political principal) and managers. In a recent survey of the literature on the role of boards, Hermalin and Weisbach (2003) conclude that “formal theory on boards has been quite limited to this point”. Empirical studies have attempted to answer questions about the impact of board characteristics on board actions, firm profitability and the factors that determine the evolution of board composition over time, but many questions remain unresolved, both theoretically and empirically. We here focus on three highly debated issues: boards’ independence from management; dual versus sole boards; and board size.

Board Independence from Management

The recent debate fuelled by a wave of corporate scandals has focused on the importance of boards’ independence from management. In particular, boards have been criticized for having been too “friendly” to the management and thereby having contributed to the emergence of the scandals through poor monitoring. However, empirical research has generally found negligible effects of independent directors on firm performance (see Sect. 3.1 in Hermalin and Weisbach 2003).

Figure 7. Is the Governor the Chairman of the Supervisory Board? OECD vs. non-OECD.

The pie chart illustrates the number of cases where the governor is the chairman of the supervisory board, distinguishing OECD from non-OECD countries. This figure includes boards with dual functions. [Source: IMF/Lybek, N=101]



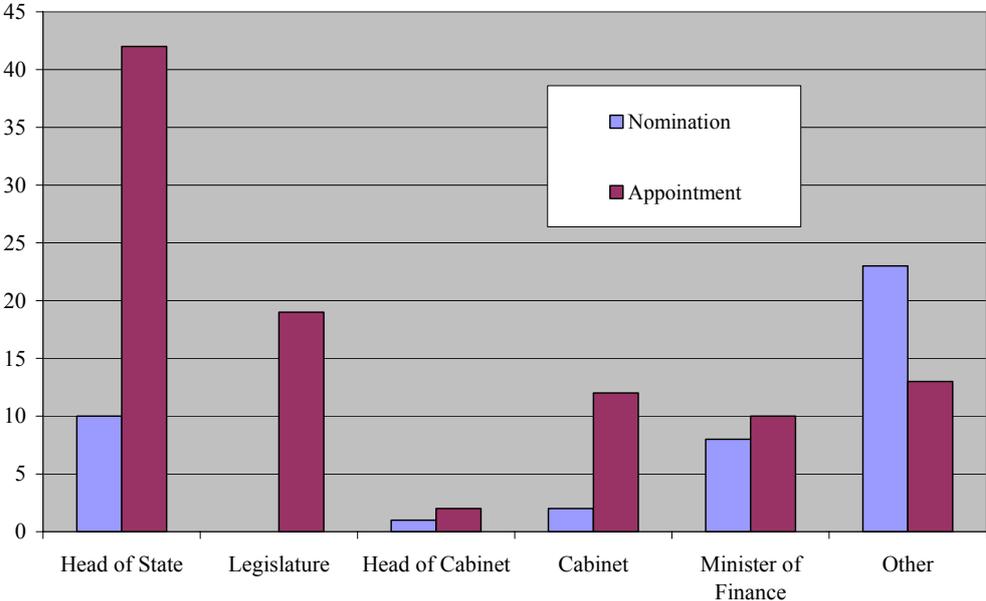
A recent theoretical contribution by Adams and Ferreira (2007) analyzes the consequences of the board’s dual role as advisor and monitor of the executive management. They note that independent directors are bound to rely on information provided by the management. When deciding how much information to disclose, managers must trade off the benefits of getting better advice against the increased ability of the board to determine the quality of the managers and potentially intervene in their dealings. Among other things, the authors conclude that “friendly boards” may in fact be optimal, and that a more independent board (and the resulting increase in monitoring intensity) is likely to be welfare-improving when it only acts as a supervisor, while it may be reducing welfare when a board also acts as an advisor – a task that requires the management’s trust and information (see also Harris and Raviv 2006 who reach a similar conclusion in a rather different model).

Figures 6-9 show information on supervisory and dual function boards.²⁹ In our sample of countries, no member of the supervisory board is proposed or appointed by the governor. In this sense, at least, members of the supervisory board are independent of the governor. However, as can be seen in Figure 6, in most cases the governor does chair the supervisory board, which puts this independence into question.

²⁹ Naturally, the question of independence is not very relevant for a purely executive/advising board.

Figure 8. Nomination and Appointment of Non-Ex Officio Supervisory Board Members

The chart shows, in absolute frequencies, who appoints and, in case another body than the appointing one is involved in nominating, what institution nominates supervisory board members. [Source: Lybeck and Morris 2004, N = 98]



Distinguishing between OECD and non-OECD countries in Figure 7 reveals that it is much more common in the latter than in the former for the governor to chair the board. This suggests that in non-OECD countries, the board is less independent from the governor, although, as we will see in the next section, the above finding is largely driven by non-OECD countries having mostly a single, dual function board, for which it is more natural to have the governor as a chairman than for specialized supervisory boards.

As for the appointment and replacement of board members, Figure 8 shows that at least in the nomination, the Head of State or the Legislature is involved in most cases, which both tend to be less partisan institutions. Figure 9 shows that there is an enormous variation in the number of ex-officio (typically politically appointed) members, even in our smaller sample of mostly OECD countries.

Separate Supervisory Boards

Adams and Ferreira (2007) also explore the optimal choice between “sole” or “unitary” boards, and the “dual board system” – common in northern European countries – where two separate boards exist that are specialized in monitoring and advising, respectively. They show that a sole board tends to be optimal

Figure 9. The Presence of Ex-Officio Members in Dual Supervisory Boards

The chart shows ex-officio members as a percentage of supervisory board size [Source: Frisell Roszbach Spagnolo, N=29 (18 Central Banks have no Dual Board)].

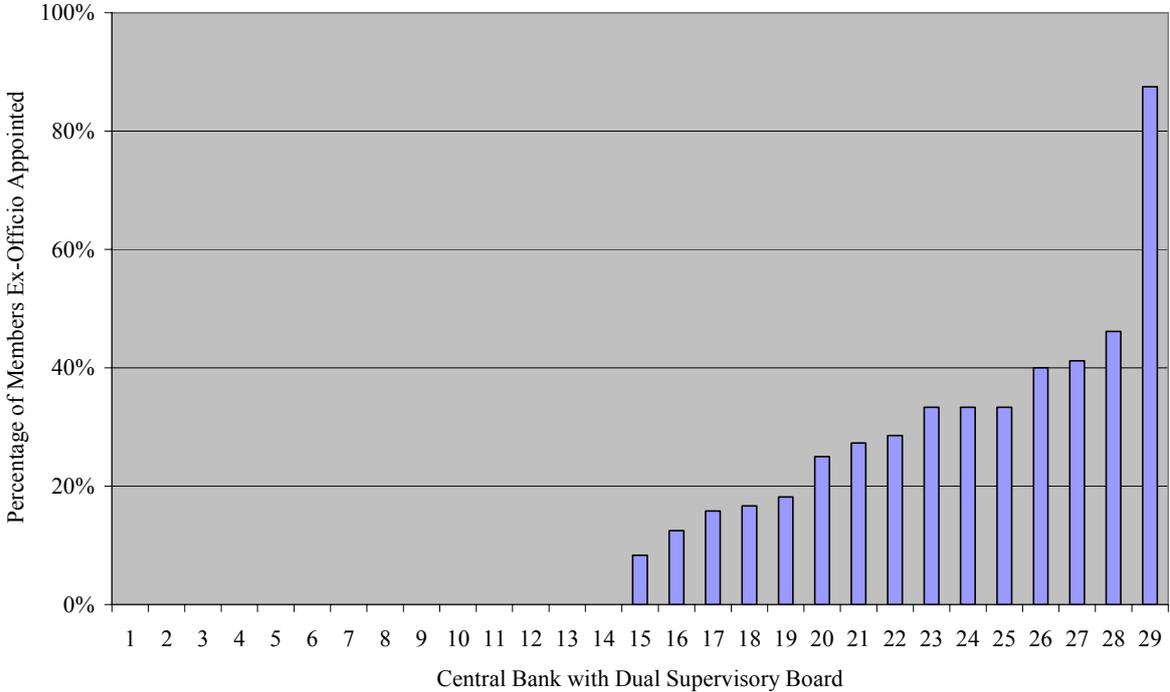


Figure 10. Separate Supervisory Board in OECD Countries

The chart shows what share of all central banks has a separate supervisory board [Source: IMF/Lybek and Frisell Roszbach Spagnolo, N=24].

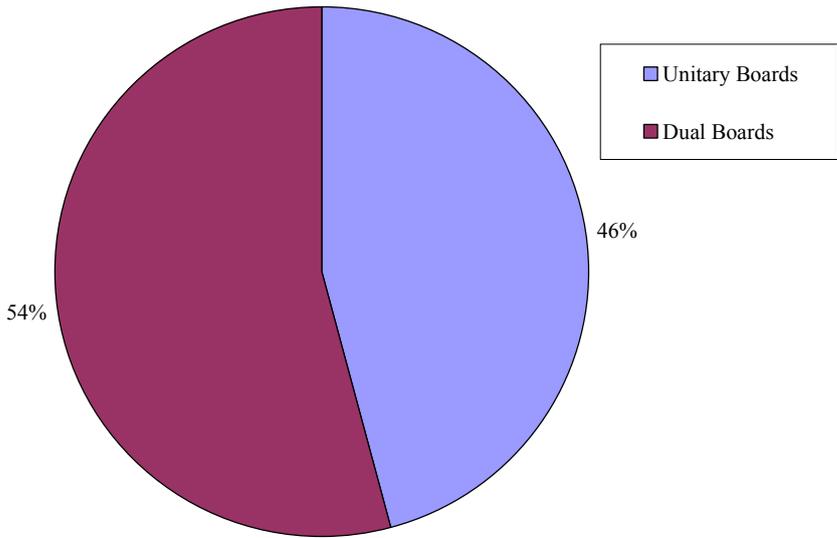
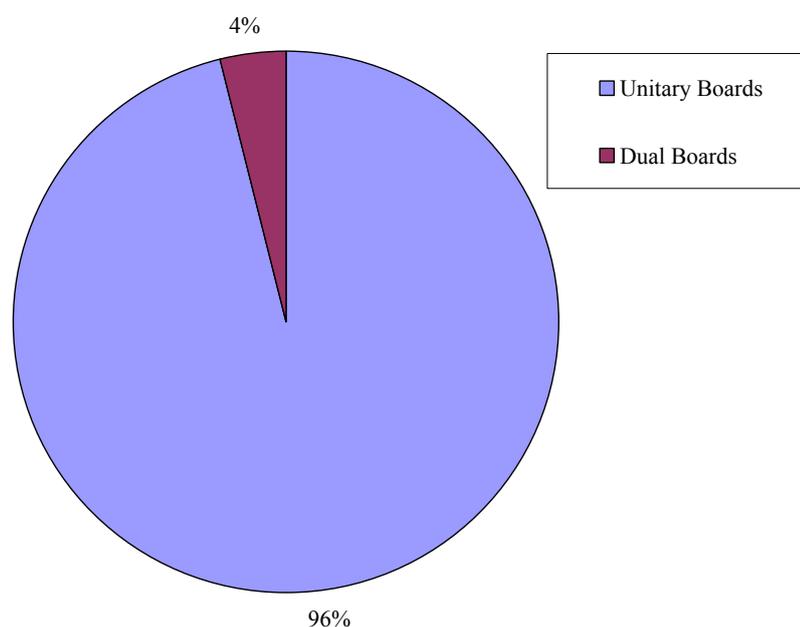


Figure 11. Separate Supervisory Board in Non-OECD Countries

The chart shows what share of all central banks has a separate supervisory board [Source: Source: IMF/Lybek and Frisell Roszbach Spagnolo, N=77].



as more information and effort are elicited from the management when managers have preferences sufficiently aligned to those of the shareholders. However, they also find that if the management's incentives are weak (e.g. because of low stock ownership), so that the moral hazard problem is more acute, then it may become optimal (as a second best) to have a dual board system where a supervisory board plays the “unfriendly” monitoring role in full. Figure 10 shows that more than half of the banks in OECD countries have a separate supervisory board.

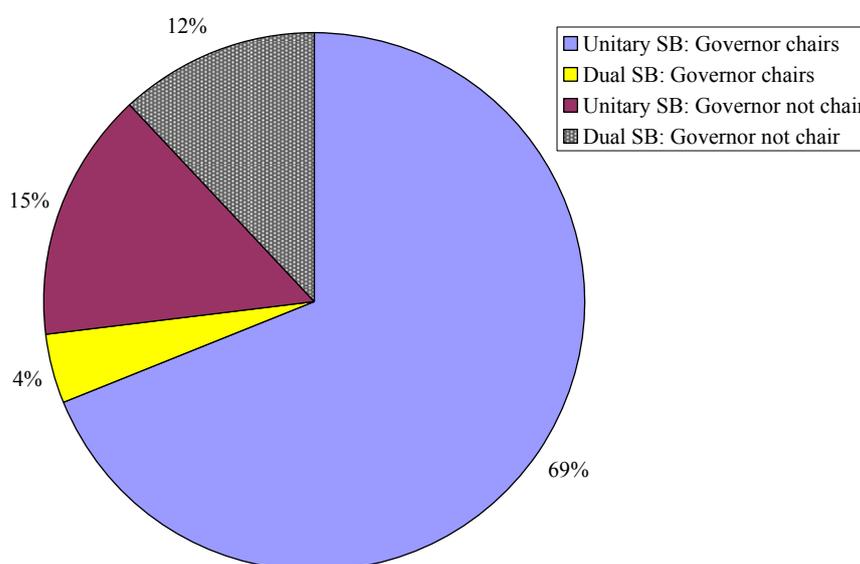
Figure 11, on the other hand, shows that nearly all non-OECD countries have a unitary board with joint executive and supervisory functions. What could explain this striking geographical variation in board setups?

If the board structure is a response to organizational needs, then – according to Adams and Ferreira – central banks with separate boards should be those where accountability problems are more acute and stricter monitoring of the executive is more important relative to the need for well informed advice by board members. Figures 10 and 11 show that separate supervisory boards are, in fact, more common in OECD countries, and in northern Europe in particular. If one believes that moral hazard problems tend to be less severe in more developed countries, one should find this to be in puzzling contrast to what should have been expected according to the theory of Adams and Ferreira (2007). According to them, separate supervisory boards would be optimal where there is less congruence of objectives between principal and agent.

Figure 12. Governor's Role in Unitary and Dual Supervisory Boards

The chart shows what share of all central banks has a governor chairing a dual or unitary supervisory board

[Source: Source: IMF/Lybek and Frisell Roszbach Spagnolo, N=100].



However, it is possible that dual boards were devised in these countries precisely to minimize moral hazard problems that may have become more salient with the movement towards central bank independence, a movement that had a smaller impact for non-OECD countries where credible commitment to central bank's independence is made difficult by the generally weak institutional setting. Moreover, some central banks in developed countries have become ever more specialized in implementing monetary policy, with supervisory tasks being taken over by separate authorities (see Figure 4). In less developed nations, it is still common for central banks to perform an even broader range of tasks than those mentioned in Section 1. This may have led to less of a need for advice from boards in developed countries relative to less developed countries.

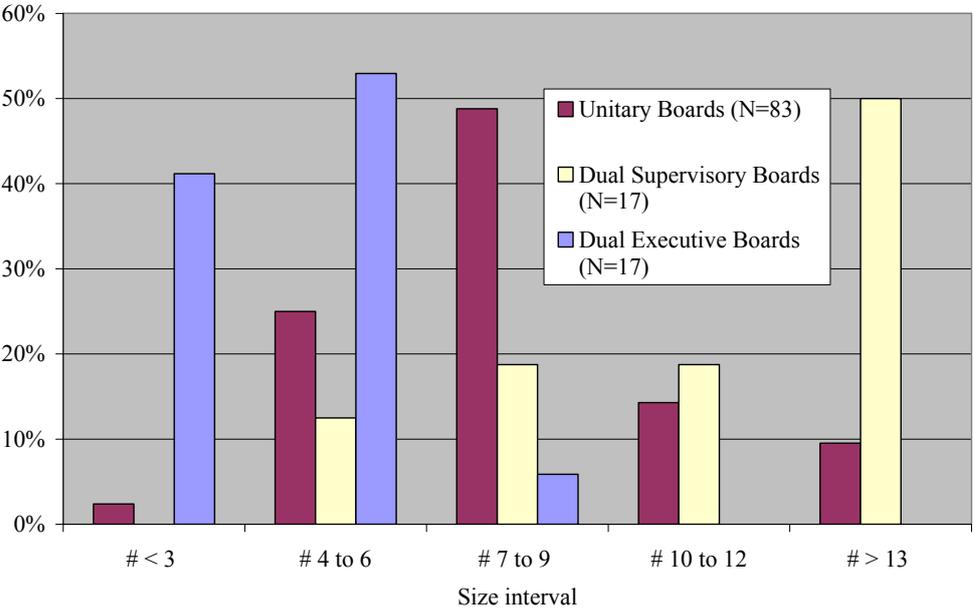
It is also interesting to note that some countries, for example Norway and Sweden, have dual boards for their central banks, even though they typically have sole boards for corporations (see Adams and Ferreira 2007, Table 1). This might signal that in these countries, moral hazard problems are felt to be more relevant for central banks. On the other hand, there are also countries, like Germany, Poland and the Czech Republic, that have a dual board system for corporations but a sole board for the central bank.³⁰

Figure 12 is instead consistent with our expectations that if a board has the specific function of supervising management, then it is less likely to be chaired by the governor: the governor chairs

³⁰ Some central banks, like the German one, have changed institutional settings in recent years, going from a dual board system to a unitary board system (hence, increasing independence).

Figure 13. Number of Members for Different Types of Central Bank Boards

This histogram separates executive boards from dual and unitary supervisory boards [Source: IMF/Lybek and Frisell Roszbach Spagnolo, N=100]



separate supervisory boards in one case out of four, while he chairs unitary boards in more than eight cases out of ten.

Board Size

Empirical work on the effects of board size in non-financial firms has identified a robust negative relation between board size and firm performance (see e.g. Section 3.1 in Hermalin and Weisbach 2003). The most intuitive interpretation of this finding is that above a certain size, agency problems, free riding, and coordination problems dominate over the possible value added of additional directors (see e.g. Jensen 1993). Surprisingly, a recent inquiry by Adams and Mehran (2003) finds that the negative empirical relation between board size and performance does not extend to banks. For a large sample of banking firms over a forty-year period, they find that banking firms with larger boards perform better, thus suggesting that constraints on board size in the banking industry may be counter productive. The Adams-Mehran study only covers US Banks with unitary or sole boards, however. In our sample, we have central banks with both sole and dual board systems; therefore, Figure 13 reports board size for all three types of boards. The extent to which the size of different boards varies across countries is striking.

The figure suggests there to be a trade off in terms of optimal board size between supervisory and executive functions. Specialized supervisory boards tend to be much larger than specialized executive boards, probably because supervision requires more independent members with different expertise and

opinions, while executive tasks require a lighter and faster decision-making body. Unitary boards are in between the two in terms of size, which is a plausible outcome with the weights of the two forces pointing in opposite directions.

2.4 Governor Appointment and Dismissal

The delegation of decision making by political actors to independent agencies has long been subject to debate and research, the main reason being that such delegation can act as an antidote to political inefficiencies. The extent to which such delegation is made irreversible will generally depend on the specific details of the political institutions. The procedure by which the governors of central banks are appointed and the conditions under which they can be fired can thus be expected to depend on the institutional structure of a country.

With respect to central banks, a typical claim made in the literature is that de-politicization, by means of delegation to independent bureaucrats, is economically beneficial for several reasons. First, the making of monetary policy requires specific technical skills. Second, there is often a tension between the long-term workings of monetary policy and politicians' short-term objectives. However, as mentioned in the preceding sections, the first steps to integrate the literatures on accountability and independence of central banks were set only recently. Until now, the attention primarily remains restricted to the role of accountability for the purpose of attaining monetary policy targets.

Keefer and Stasavage (2001), for example, look into the importance of checks and balances. They conclude that political interference with the central bank is more beneficial when few checks and balances exist. (One would expect, however, that when political decision makers are more polarized, the effects of checks and balances are greater.) Eijffinger and Hoeberichts (2002) investigate what is the effect of transparency on macroeconomic outcomes when monetary policy is delegated to a central bank. Castellani (2004) explicitly introduces accountability by allowing a political principal to make an ex-post evaluation of a central bank's monetary policy choices in a standard Barro-Gordon model. Walsh (2002) explicitly links accountability to the dismissal of governors and shows that a government can improve economic outcomes by formulating an (optimal) dismissal rule for central bankers and making the inflation target state-contingent. More recently, a more general trade-off between political accountability and independence of public managers has become subject to politico-economic research. Besley and Coate (2003), for example, uncover a new cost of delegation

Figure 14. Who Nominates and Appoints the Governor?

The chart shows who appoints and – in case a second body is involved – nominates the governor [Source: IMF/Lybeck, N=98].

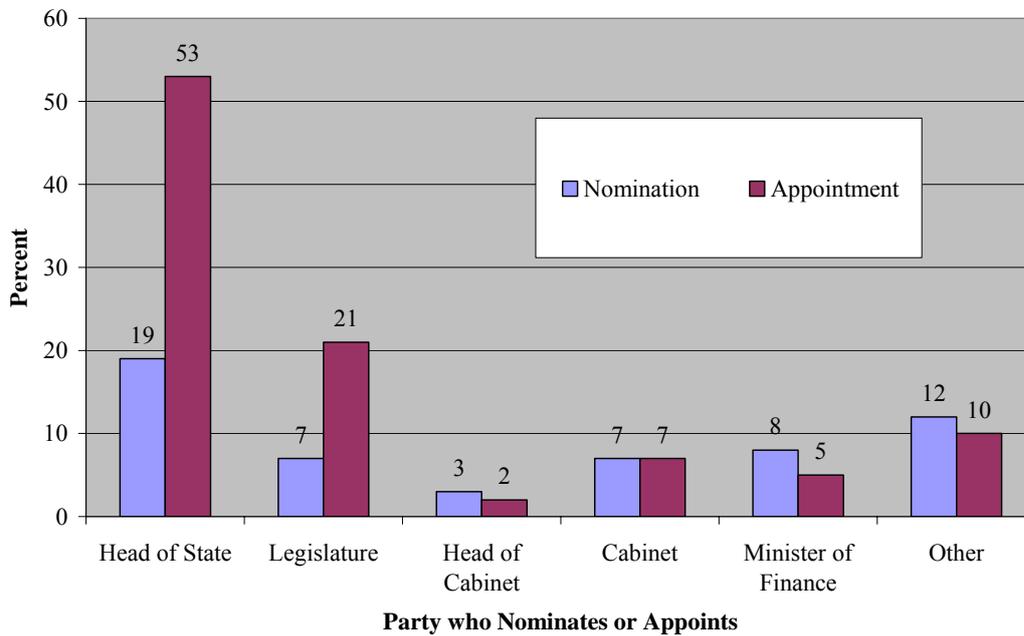


Figure 15. Dismissal of Governors

The bars show by whom central bank governors can be fired. The numbers sum up to more than 100% because more than one body in a country may be able to do so [Source: Frisell Roszbach Spagnolo, N=47].

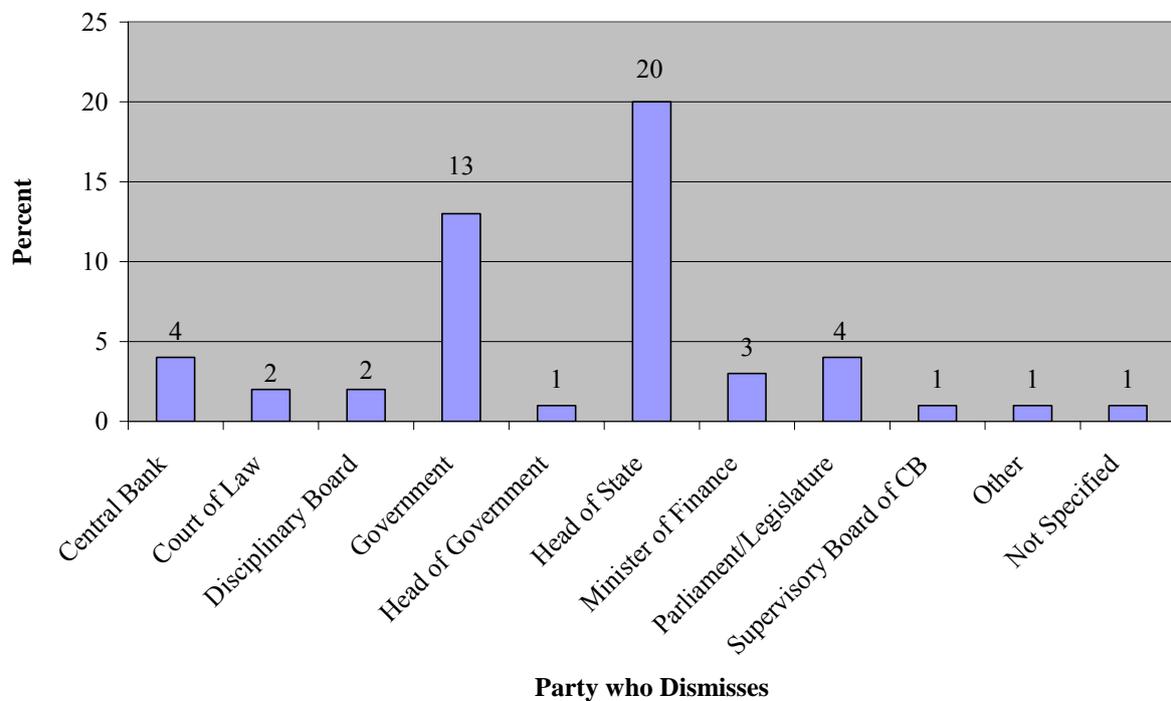
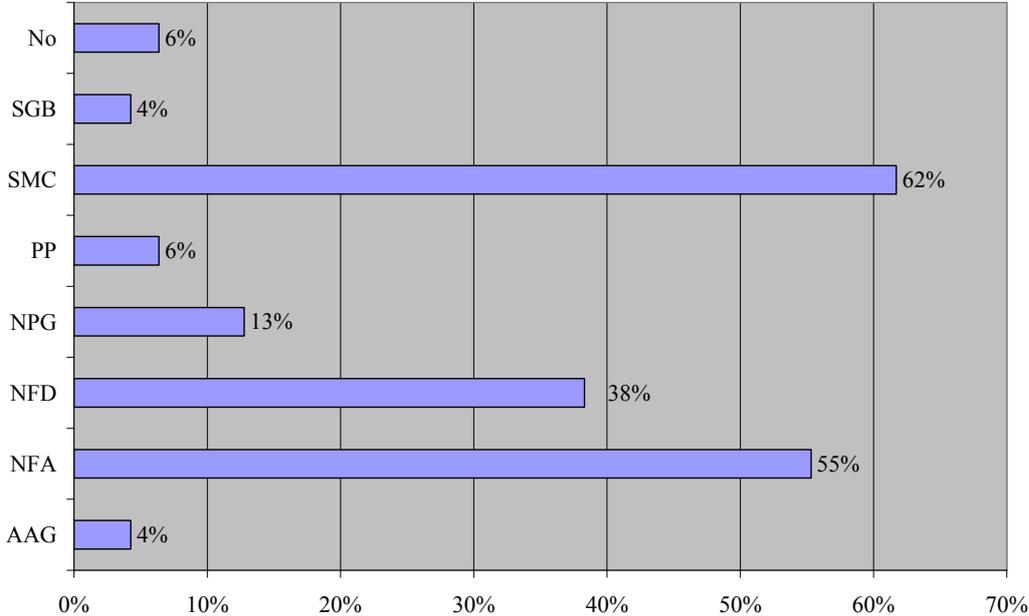


Figure 16. Grounds for Dismissal

The bars show what events are explicitly mentioned in the statutes of central banks as possible reasons for dismissal (expressed as a percentage of all banks in the sample). Multiple grounds are possible. Key: No: No Precise Definition/ Reports no reason for dismissal; SGB: Governor holds office subject to good behavior; SMC: Serious misconduct or conviction for a serious criminal offence; PP: Poor performance; NPG: Dismissal possible but no precise definition of grounds; NFD: Non-fulfillment of duties; NFA: Non-fulfillment of requirements for appointment or for the performance of duties; AAG: Acting against government policy; [Source: Frisell Roszbach Spagnolo, N=47].



by evaluating the potential effect of directly electing regulators rather than having politicians appoint them.³¹

In Figures 14 to 16, we provide some stylized facts about the procedures that are followed in the appointment and dismissal of central bank governors. Figure 14 shows which branch of the government or other institution nominates and appoints the governor(s). The most common situation is that a country’s head of state appoints a governor. Depending on the political structure of countries, this could be a non-partisan actor or a directly elected official. Appointment by the government as a collective ranks second, with about one case out of seven. Other constructions involve parliament, the Minister of Finance and the central bank’s own supervisory board. As shown by the figure, the process of installing a new governor typically involves more than one institution. Figure 15 shows a large variance regarding which institution has the right to dismiss the governor, the most common being the Head of State, followed by the government.

³¹ They show that elected regulators would tend to be more pro-consumer than appointed ones. The reason is that the issue of regulator selection is bundled with other issues and not very salient in general political elections – leaving space for the influence of regulated firms’ stakeholders on politicians – while it would be the only relevant issue in a direct election of a regulator.

More interestingly, Figure 16 describes the grounds for governor dismissal. Clearly, in most countries, the governor can only be dismissed if he or she really misbehaves in terms of violating the law. Most governors can be fired for “serious misconduct or conviction for a serious criminal offence;” for not “fulfilling his or her duties” or for “non-fulfillment of requirements for appointment”. The figure also shows that not even one governor out of ten can be fired for performing poorly, a criterion commonly applied in corporations.

If we go down to country-level data, then at least in theory the governor with the least job security appears to be the Chairman of the Board of Governors of the Federal Reserve System: he can be dismissed by the President of the United States for any “cause”. At the other extreme are those governors whose dismissal requires a decision of Court of Law, like the president of the ECB.

Overall, the stylized facts presented in Figures 14 to 16 clearly illustrate that central bankers tend to be appointed by non-partisan or multi-partisan institutions. Although governors can be dismissed in theory, they appear very difficult to fire in practice. These findings seem to be in line with the conclusions of Maskin and Tirole (2004) and Alesina and Tabellini (2003): if citizens largely agree on the objectives of the central bank, and these preferences (e.g. for low and stable inflation) are unlikely to change, then it is efficient to insulate the governor from political influences. However, does this mean that we should also view generous private benefits and tolerance of slack or mistakes as an intrinsic feature of the optimal institutional arrangement for central banks? We find “yes” to be a potential though implausible answer, and regard this as an important open issue for future research.

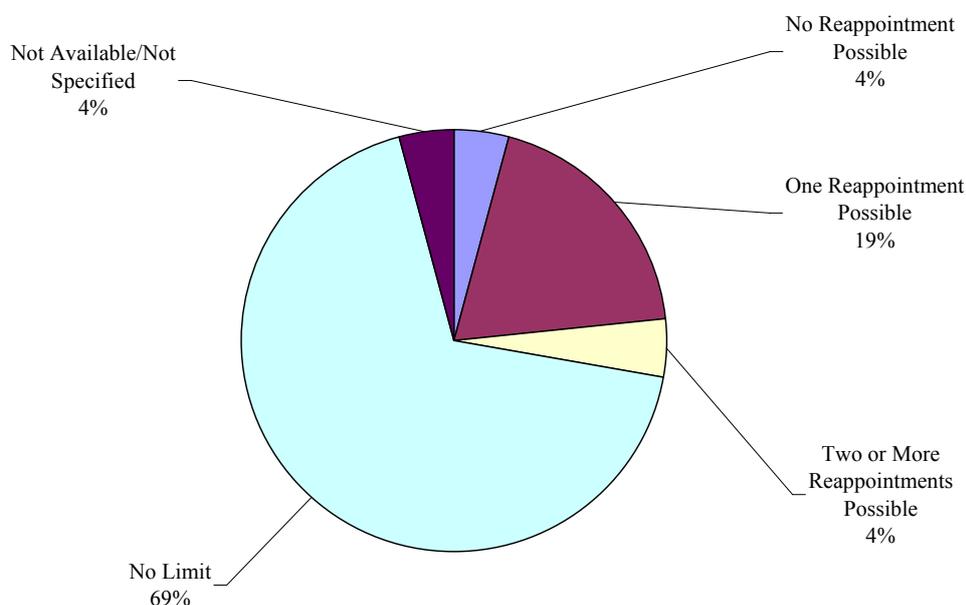
2.5 Term Limits, Revolving Doors and Term Length

Term Limits

The fact that several high public offices around the world have term limits – a phenomenon virtually unheard of in the private sector – appears to stem from two sources. First, the lack of an objective performance measure – profit – makes it easier for insiders to choose and define their own performance indicators. This makes it harder for constituents (voters, tax payers) to evaluate their performance; the incumbent “sets the agenda” and thus gets an advantage over challengers. If this insider advantage grows with tenure, as can be suspected, term limits may be efficient. Second, the more diluted are stakeholders, and the greater is distributional conflict among them, the more severe becomes the problem of asymmetric information and patronage. In our case, while moving towards independence, many central banks have become accountable to parliament (or representatives of

Figure 17. Reappointment of Governors

The pie chart shows the relative frequency in which different reappointment rules are used for the appointment of governors at central banks [Source: Frisell Roszbach Spagnolo, N=47].



parliament) rather than to the government, which in several cases has coincided with the introduction of term limits. Roughly expressed, it should be much harder for a parliament to agree to dismiss a governor – and agree on a successor – than it is for a government. Figure 16 indicates that term limits are present for one out of four central banks, but absent for the vast majority.

In the United States, term limits for public officials trace back a long time, and the idea regained popularity during the 1990s when it was imposed by several states on various public offices.³² The most common argument in favor of term limits is that, in their absence, incumbents may become too powerful relative to outsiders, so that competition for public offices is distorted with tenure. In turn, this advantage allows incumbents to engage in unproductive or wasteful activities.³³ In addition, Glazer and Wattenberg (1996) make the argument that without term limits, the value of holding office may be “too large”, which means that incumbents will spend too many resources on ensuring re-election and divert time from productive work.

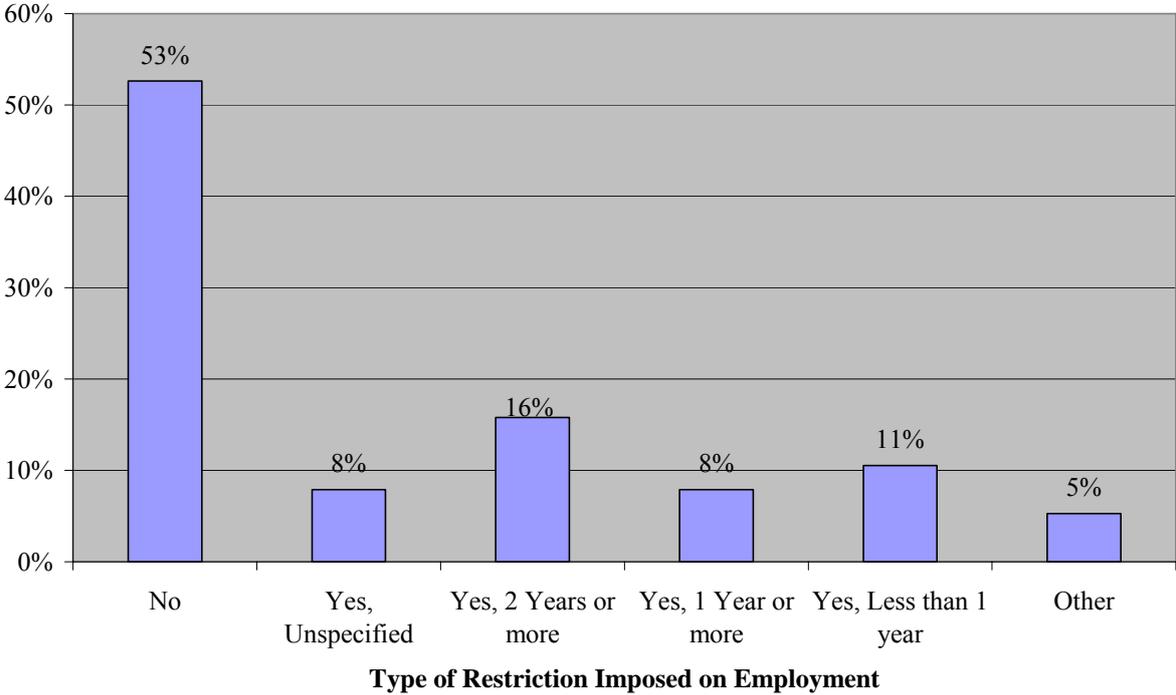
The literature also recognizes at least three potential costs of term limits. First, high-quality policymakers will sometimes be forced out of office, which is obviously wasteful. Second, by introducing term limits, the (maximum) value of winning office is reduced, which – similar to the effect of reducing a governor’s compensation – may lead to a lower quality in the pool of aspirants for

³² For a recent survey, see Lopez (2003).

³³ In particular, political incumbents may be able to divert funds to their own constituencies, thereby increasing their re-election chances (Dick and Lott 1993, Buchanan and Congleton 1994, Chari 2003).

Figure 18. Employment Restrictions after End of Mandate

The bars illustrate to what extent cooling-off periods are imposed on governors after leaving their post at a central bank [Source: Frisell Roszbach Spagnolo, N=47].



the job. Third, the term limit may give rise to a “lame duck” effect. In general, when an official’s term limit is binding, she may be prone to shirk, spend more resources, or engage in “short-termism”, i.e., give priority to projects with high returns in the short term (Palley 1998).³⁴ In addition, if a bureaucrat or politician is known to have no future in office, his ability to lead the organization may be severely reduced.

Figure 17 shows that in practice, disagreement on whether the costs or benefits of term limits dominate is as strong as it is in theory and therefore, further research on this subject is badly needed.

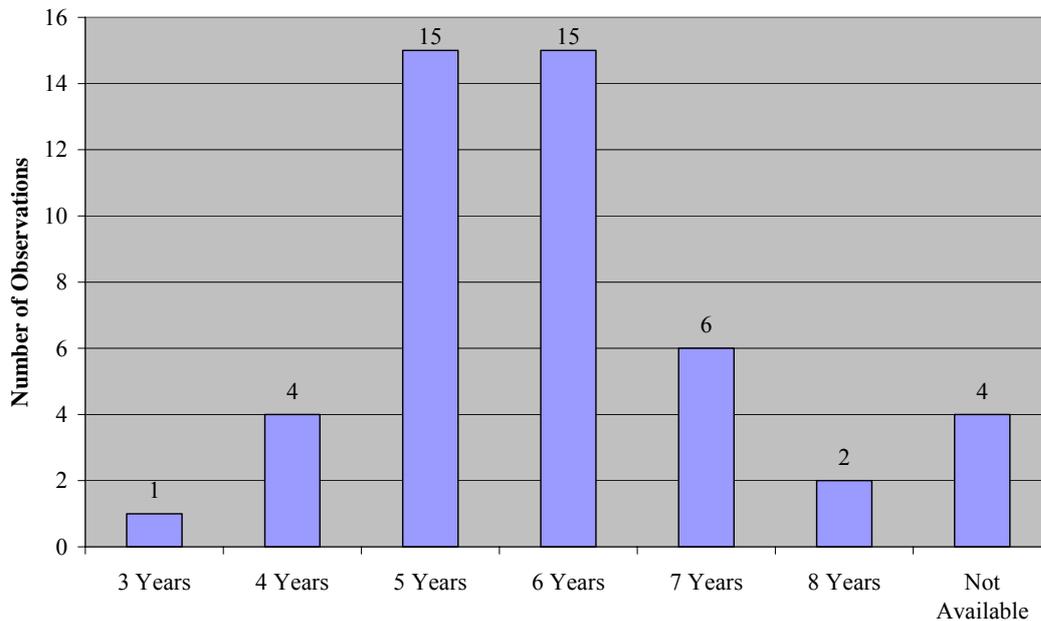
Revolving Doors

The possibility of regulators starting to work for the firms they were formerly regulating is known as a “revolving door”. On the one hand, an obvious danger in the case of central bank governors is that, as they approach the end of their final term, they will pursue, say, lax monetary or supervisory policy to favor commercial banks or other economic agents, in exchange for a well-paid job.³⁵ In order to reduce

³⁴ See Besley and Case 1995 for some evidence on last-term spending increases by U.S. governors.
³⁵ On the empirical side, Horiuchi and Shimizu (2001) found that Japanese banks associated with higher risk-taking and more bad loans are more commonly involved in *amakudari*, i.e. the practice of offering directorships to retired financial regulators from the Bank of Japan and the Ministry of Finance. However, the causality of this relationship is unclear.

Figure 19. Governor Term Length

The bars show the frequency of different term lengths for the governor [Source: Frisell Roszbach Spagnolo, N=47].



the risk of regulatory capture, staff of regulatory agencies is often, for a certain time period, prevented from taking on employment in the sector of relevance, a so-called “cooling off” period. However, Figure 18 shows that among the central banks on which we were able to collect information, less than half have some kind of cooling off period.

On the other hand, if career concerns are the main force inducing central bankers to perform – as argued by Alesina and Tabellini (2004) – governors must be able to go on with their careers, once they leave the central bank. Moreover, Che (1995) shows that while being bad from an ex-post point of view, revolving doors may have the positive ex-ante effect of inducing regulators to invest in acquiring non-contractible industry-specific skills, which also benefit regulatory activity. These arguments would speak against the use of cooling off periods.

These remarks highlight how complex is the interaction between career concerns, term limits and optimal regulation. Whether there should be a “cooling off” period to limit the influence of “revolving doors” on central bankers’ behavior appears to be another open issue in need of both theoretical and empirical research.

Term Length

Closely related to the issue of term limits is the probably less controversial issue of term length. It is widely recognized that by lengthening and staggering the terms of central bank governors, the central

bank becomes insulated from political pressure during election years, which promotes policy stability (see, e.g., Waller 1992). This should imply that, as a minimum, the governor's term should be longer than one election cycle, which holds for almost all countries in our sample. However, long tenure reduces accountability and decreases the public's ability to change the course of monetary policy if it so desires (O'Flaherty 1990, Tirole 1994, Waller and Walsh 1996).

Figure 19 displays term lengths for central bank governors in 47 countries. It shows that most terms are longer than the typical electoral cycle, but not much longer, much like what would be expected. An interesting practical question is whether term lengths (and limits) depend on the tasks and responsibilities of the central bank. In particular, since national central banks in the EMU-area have handed over the responsibility for monetary policy to the ECB, their focus might shift to other tasks (such as financial stability and financial infrastructure). This should reduce the central banks' need for insulation and result in shorter terms.

2.6 Financial Independence

According to Quintyn and Taylor (2002), budgetary freedom is one component of a central bank's independence, both vis-à-vis the government and with respect to the banks it supervises. They contend that for the Bank's supervisory function to be effective, this freedom must be definite and only independent central banks can be made truly accountable.

In an essay on the governance and independence of the Swiss National Bank, Von Ungern-Sternberg (2003) argues against the idea that independence and accountability complement each other. On the contrary, he believes there to be a natural trade-off between the independence and the accountability of a central bank and that "the emphasis on the independence aspect has contributed to creating situations, where the central banks' accountability is largely deficient". As an example, he describes how, due to vague legal definitions of the profit concept, the Swiss National Bank has managed to maintain substantial leeway in determining how much profit to retain and how much to pay out to the Swiss Kantons.

Other recent episodes involving European central banks appear to support Von Ungern-Sternberg's criticism. As mentioned in the introduction, these incidents include granting generous remuneration and pension packages to their own management and accepting favors from banks under their regulation. Are these events coincidental or part of a general trend?

Intimately related to the issue of budgetary freedom and profit allocation is the management of central bank reserves. In recent years, central banks have started investing their reserves in a wider array of

Figure 20. Laws Set Upon the Central Bank Regarding Allocation of Profits

The bars show to what extent allocation of profits at central banks is regulated by law [Source: Frisell Roszbach Spagnolo, N=47].

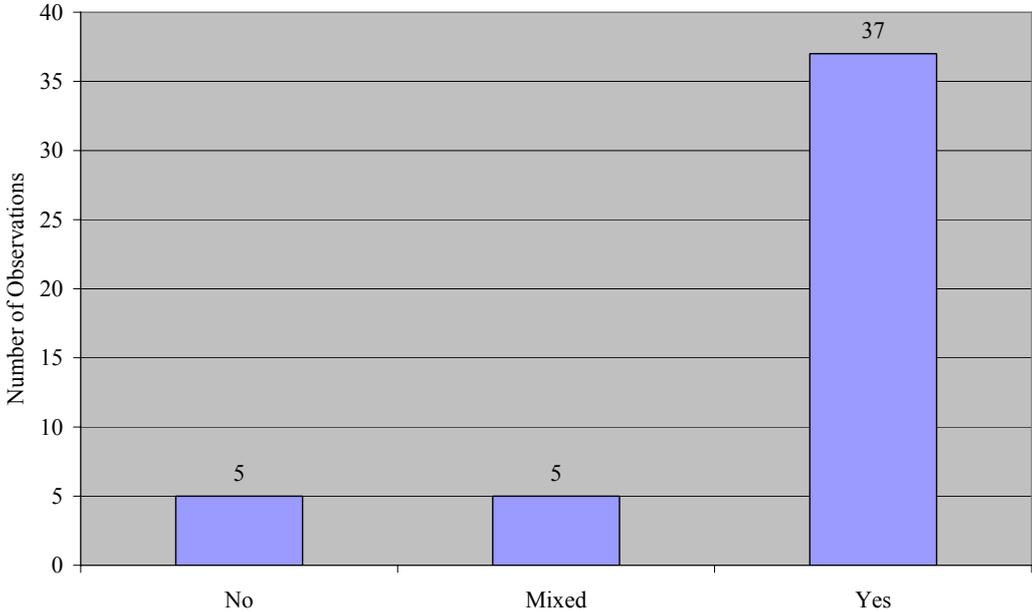
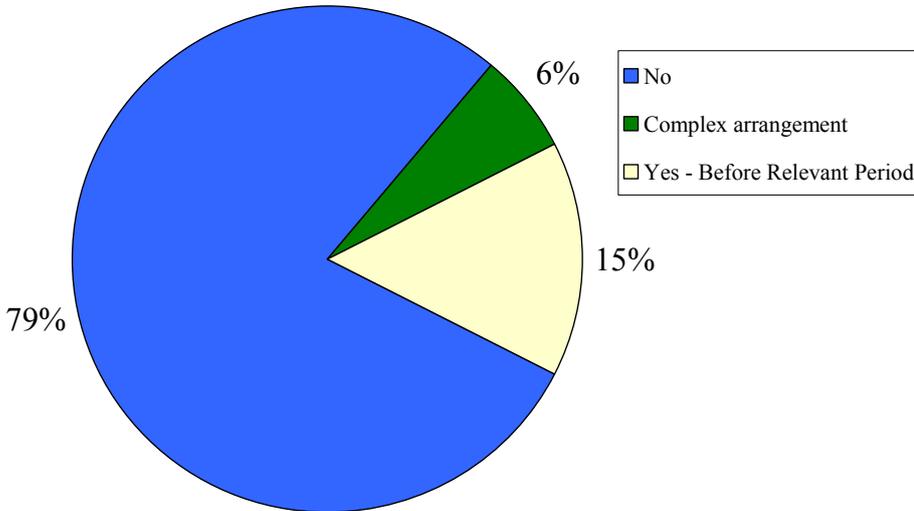


Figure 21. Central Bank Budgetary Independence.

The pie charts show whether or not central banks need approval from their respective governments for their annual budgets. Complex arrangements refer to countries where no approval is required for the budget, but the ex-post approval procedure of the annual accounts requires information about next year’s budget to be included. [Source: Frisell Roszbach Spagnolo, N=47].



securities and markets than what has traditionally been the case. Corporate bonds, asset-backed securities and even equities feature in modern central bank reserves portfolios. An important impetus for this development has, somewhat ironically, been the low level of inflation that central banks have managed to achieve. Enduring low inflation has led to lower interest rates and has been associated with a lower interest spread between the central bank's assets and liabilities. In addition, the growth in e-money is gradually holding back the growth of outstanding currency which, in turn, curtails seignorage. Together, these developments work to erode central bank profits which, in the longer term, may lessen or even threaten financial independence. However, the fact that central banks expand their assets to include higher-yielding instruments does not only raise the issue of what the precise purpose of holding reserves is. It also brings up questions about how much risk central banks should take and how much capital they should hold as a buffer against these and other task related risks – precisely not to jeopardize their independence.

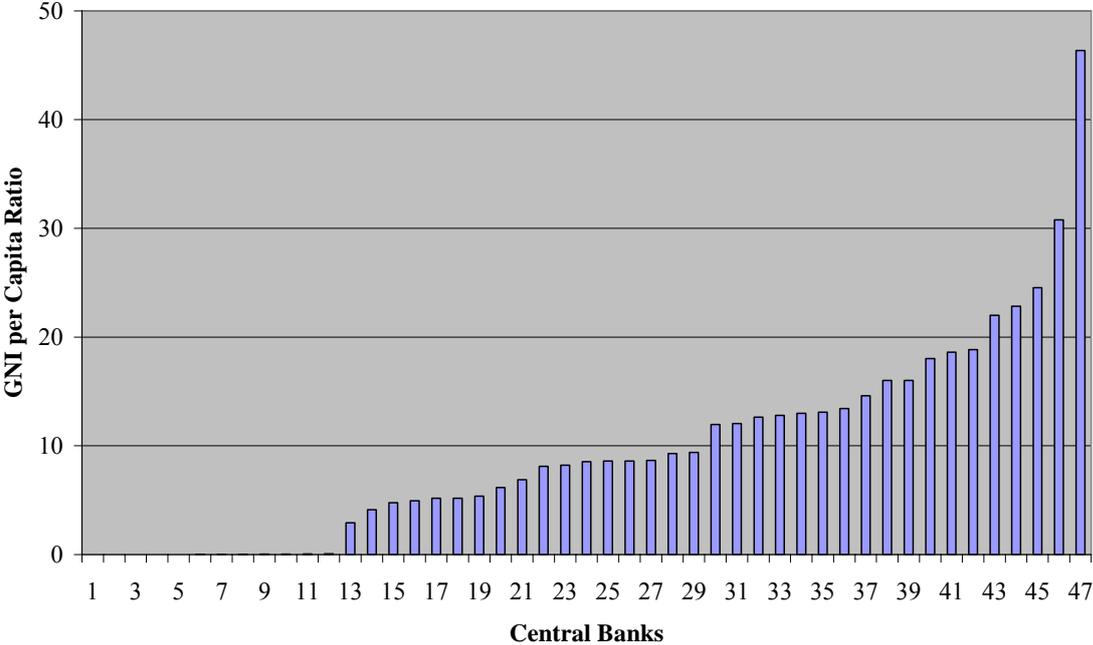
Figures 20 and 21 summarize the information available to us about banks' financial independence. In nearly eight countries out of ten, the legislator has imposed laws on the bank that regulate the allocation of profits to reserves and the government. The most common way of doing this is to specify either a decision-making process or fixed shares or even predetermined amounts. However, profits are largely an endogenous variable, since costs are endogenous and since only one bank out of ten banks requires a government approval of its expenditure budget in advance, and three out of four do not need any budget approval at all. Considering the fact that government control is likely to be smaller when it only has an ex-post veto right, as opposed to a right of initiative – as is generally the rule in the case of government agencies – central banks do appear to have a large degree of financial freedom.

2.7. Governor Compensation and Benefits

Two frequently recurring questions in the debate on central banks are what the “market value” of a central bank governor is and how much he or she should be paid relative to it. Answering the first question requires a judgment of which skills are more important for the job – those typical of commercial bankers, financial economists or macroeconomists? Figure 22 shows the governor's pay normalized by the respective country's GDP per capita. The variation in governors' pay is stunning. For rather similar tasks, governors in our sample are paid anything from three to 47 times their country's GDP per capita. It is also known that many central banks offer board members subsidized housing and other perks, while they limit the possibility of receiving compensation from other appointments.

Figure 22. The Remuneration of Governors

The bars show for each central bank how much its governor earns relative to country-specific GNI per capita. GNI per capita values have been constructed using the Atlas method. A ratio of 0 indicates that there was no governor remuneration data provided to us by the central bank. Observations are sorted according to the magnitude of their governors’ relative remuneration [Source: Frisell Roszbach Spagnolo].



If the salary of a professor in macroeconomics were the relevant benchmark, central bankers’ compensation appears quite above market value on average, very much above it for some countries, and very much below it for others. If the salary of a banker or financial economist ought to be the benchmark, then compensation appears far below it. The ensuing questions are then whether it is a good idea to pay central bankers above (or perhaps below) market value, and whether the enormous variation can be rationalized.

The economic literature purports two main arguments of why one may wish to pay bureaucrats above the market wage. The first argument is a classical “efficiency wage” argument (Becker and Stigler, 1974; Shapiro and Stiglitz 1984): bureaucrats enjoying substantial rents from office will be less prone to corruption or shirking, as they stand more to lose. This kind of argument appears to suggest – at first sight – that central bankers’ wages should be particularly high in countries with high levels of corruption. The second is an “adverse selection” argument: “low quality” individuals have lower reservation wages than high quality ones. Hence, paying low wages deters high-quality individuals from applying for the job, thus leading to a poorer pool of applicants (Weiss 1980; Caselli and Morelli 2004). This suggests that central bankers’ wages should track the wage levels of top economists (or bank managers) in general.

However, Besley and McLaren (1993) show that the intuitive argument that high wages deter shirking might be less robust than it appears. In particular, rents deter misbehavior only when efficient monitoring is present, i.e., when there is a significant probability of a misbehaving bureaucrat being detected and fired. If this probability is small, the rents necessary to deter misbehavior may become too large, so that this method of securing performance is inefficient. This argument directly clashes with the one that central bankers should not be held accountable and largely be left independent.

The adverse selection story is not completely compelling either. For organizations that possess a “mission status”, finding employees that subscribe to that mission becomes more important than providing monetary incentives. Organizations that are poor at sorting employees will have to provide monetary incentives instead, but this only yields a second-best solution. Besley and Ghatak (2005) show that in a cross-section of organizations, bonus payments and effort will be negatively correlated in the mission-oriented sector. In many countries, including the U.S., there is a long tradition of imposing low wages to public servants in order to select people with a “vocation” for public service (see the introduction in Besley 2004). Indeed, one of the most well known examples of a low-wage public office is probably the Board of Governors of the Federal Reserve System.

To what extent the efficiency wage – the adverse selection – and the vocation argument should weight into the wage package of governors has been far from settled in the literature. Further research on governor compensation therefore appears a must.

3. Exploratory Statistical Analysis

In this section, we attempt to identify recurrent ‘patterns’ of central bank governance, i.e. clusters of institutional features – among those discussed in the previous section – that tend to be present simultaneously, as well as clusters of countries that tend to have similar governance arrangements for their central banks.³⁶

3.1 Methodology

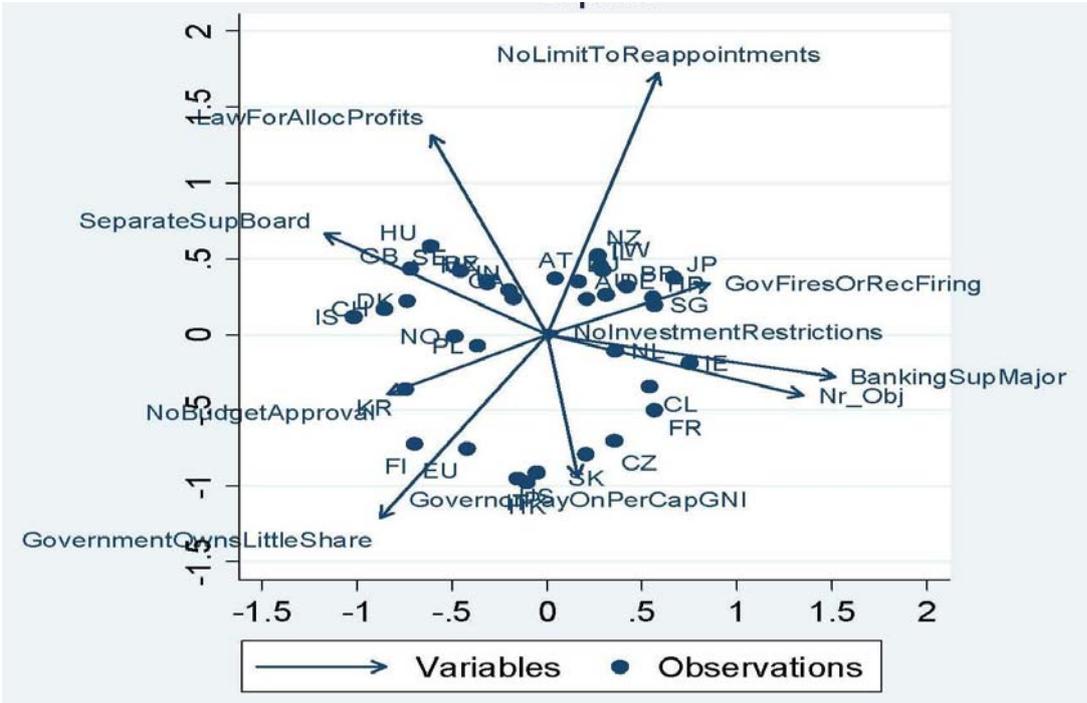
To identify clusters of governance features and countries, we will use an instrument for statistical analysis that allows us to explore our data with a minimum of underlying assumptions, the so-called biplot.³⁷ A biplot is a statistical tool that displays in one figure (i) the values of observations (on

³⁶ We thank Mathias Dewatripont for suggesting going in this direction.

³⁷ For an overview of the theory and implementation of the biplot, see Gabriel (1971) and Kohler and Luniak (2005).

Figure 23. Biplot with large set of variables

Number of countries: 34; total explained variance 0.4204. Country abbreviations are described in Appendix III. The variables are the following: *LawForAllocProfits* is a dummy variable that takes the value of 1 if there is a law regulating the allocation of profits of the CB; *SeparateSupBoard* takes the value of 1 if there exists a separate supervisory board in the CB’s organization, and 0 otherwise; *GovFiresOrRecFiring* is a dummy variable that takes the value of 1 if someone among the Government, the Head of Government, the Head of State and the Ministry of Finance can fire the CB governor, or recommend his firing; *GovernorPayOnPerCapGNI* is the ratio between the CB governor’s pay and the per capita GNI of the same nation; *NoLimitToReappointments* is a dummy variable that takes the value of 1 if there are no legal limits to the number of possible reappointments of the governor of the CB; *NoInvestmentRestrictions* takes the value of 1 if there are no restrictions on personal investments or transactions for the officers and the employees of the CB, and 0 otherwise; *NoBudgetApproval* is a dummy variable that takes the value of 1 if there is no legal obligation for the Government or the Parliament to approve CB’s expenditure budget. *GovernmentOwnsLittleShare* takes the value of 1 if the state owns less than 50% of the CB, and 0 otherwise; *BankingSupMajor* is a dummy variable that takes the value of 1 if the CB has an important role in the banking supervision system of the country; *Nr_Obj* indicates the number of tasks for broad objectives that are legally stipulated.



variables) in a dataset, (ii) the Euclidean distances between these observations in the multidimensional space of variables and (iii) the variances and correlations of the variables. Biplots are therefore helpful tools for revealing clustering (besides multicollinearity and multivariate outliers) in a dataset.

Graphically, biplots consists of lines and dots in a two-dimensional space. Lines reflect the variables of the dataset, and dots are used to show the observations (see e.g. Figure 23 below). The cosine of the angle between the lines approximates the correlation between the variables they represent. The closer the angle is to 90, or 270 degrees, the smaller the correlation, while an angle of 0 or 180 degrees reflects a correlation of 1 and -1, respectively. For example, the biplot in Figure 23 on the one hand shows a strong relationship between a central bank having major bank supervision responsibility (*BankingSupMajor*) and the number of objectives included in the bank’s statute (*Nr Obj*). On the other

hand, it displays a weak relationship between these variables and the maximum number of terms a governor can serve (NoLimitsToReappointment). The latter variable and private ownership of the bank (GovernmentOwnsLittleShares) are instead negatively correlated.

The intersection of a perpendicular from a specific observation to (the extension of) a variable line approximates the value of that observation on the variable represented by that line. If the intersection occurs close to the origin, this implies that the value of the observation is approximately equal to the average of the respective variable. Intersections far off in the direction of the variable line indicate high values, while those in the opposite direction (relative to the origin) represent low values.

The distance between two points approximates the Euclidean distance between two observations in the multivariate space.³⁸ Observations that are far away from each other have a large Euclidean distance, and vice versa. In Figure 23, for example, one of the larger Euclidean distances is observed between Korea (KR) and Portugal (PT).

Finally, the total explained amount of variance in a biplot gives you a hint of what groups of variables have more or less explanatory power. In the normalized biplot we employ, all variable arrows will be within the unit circle; the closer an arrow is to the circumference, the more of the variance in the variable is being “explained” by the biplot. This property will thus help eliminate less informative and less useful variables from the data when subsequently aiming at applying other statistical methods, e.g. for a causal analysis .

3.2 Analysis

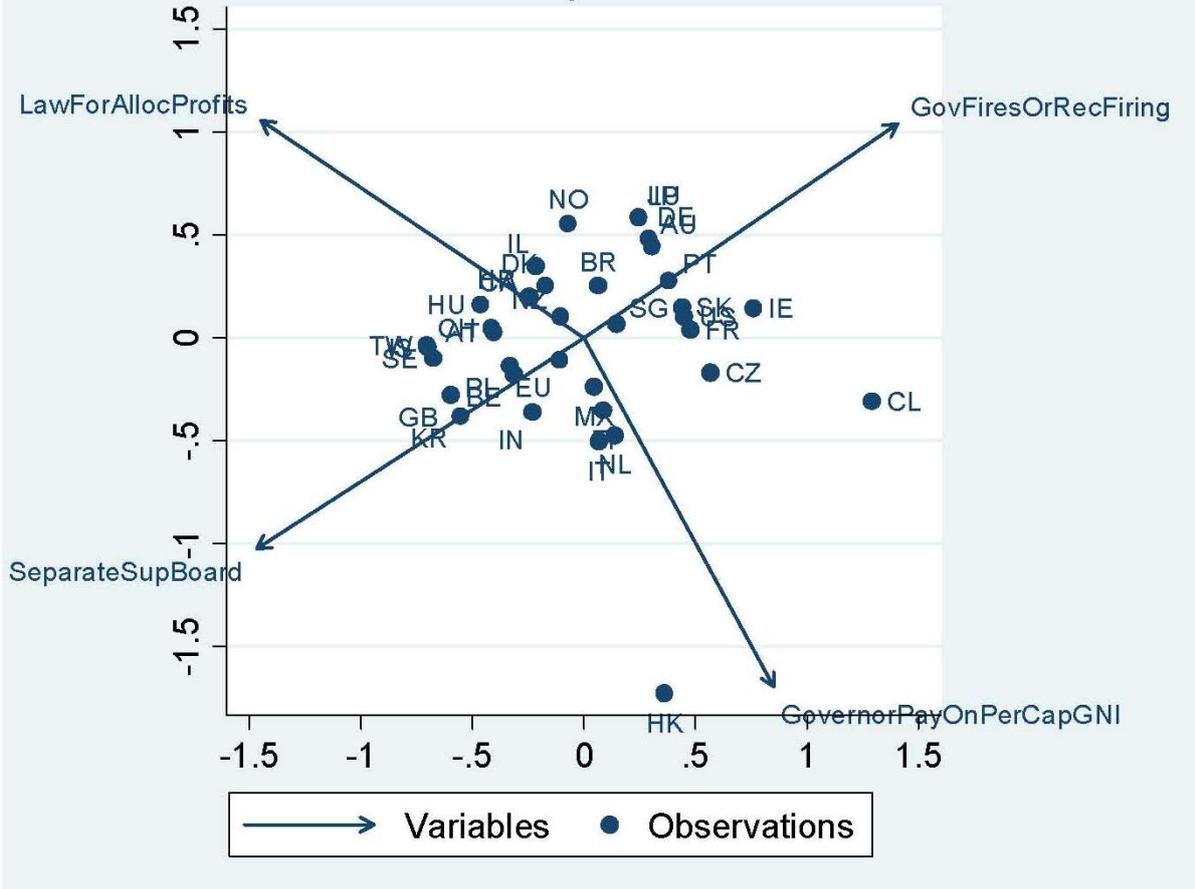
In Figure 23 the explorative biplot includes most of the relevant variables and, at first sight, it appears to tell us little about how different governance features and countries form groups. However, further inspection aimed at identifying stable relationships, recurring patterns of governance variables in central bank’s organization uncovered some interesting regularities. By drafting biplots for all combinations of variables, we identified the following stable patterns.

Pattern 1: Regulation of Profits and Governor Pay. Consider first the biplot in Figure 24 (we will return to Figure 23 later on). The presence of a law regulating the allocation of profits of the central bank (LawForAllocProfits) is strongly and negatively correlated with the level of governor wage (GovernorPayOnPerCapGNI). That is, discretion on the allocation of profits and a high wage for the governor seem to go hand in hand. This pattern appears rather robust with respect to changes in the

³⁸ It should be kept in mind that the Biplot requires a normalization of the Euclidean distances. The distance measure is not fully invariant to the choice of the denominator.

Figure 24. Biplot with small set of variables

Number of countries: 36; total explained variance 0.6052. Country abbreviations are described in Appendix III. The variables are the following: *LawForAllocProfits* is a dummy variable that takes the value of 1 if there is a law regulating the allocation of profits of the CB; *GovFiresOrRecFiring* is a dummy variable that takes the value of 1 if someone among the Government, the Head of Government, the Head of State and the Ministry of Finance can fire the CB governor, or recommend his firing; *SeparateSupBoard* takes the value of 1 if there exists a separate supervisory board in the CB’s organization, and 0 otherwise; *GovernorPayOnPerCapGNI* is the ratio between the CB governor’s pay and the per capita GNI of the same nation.



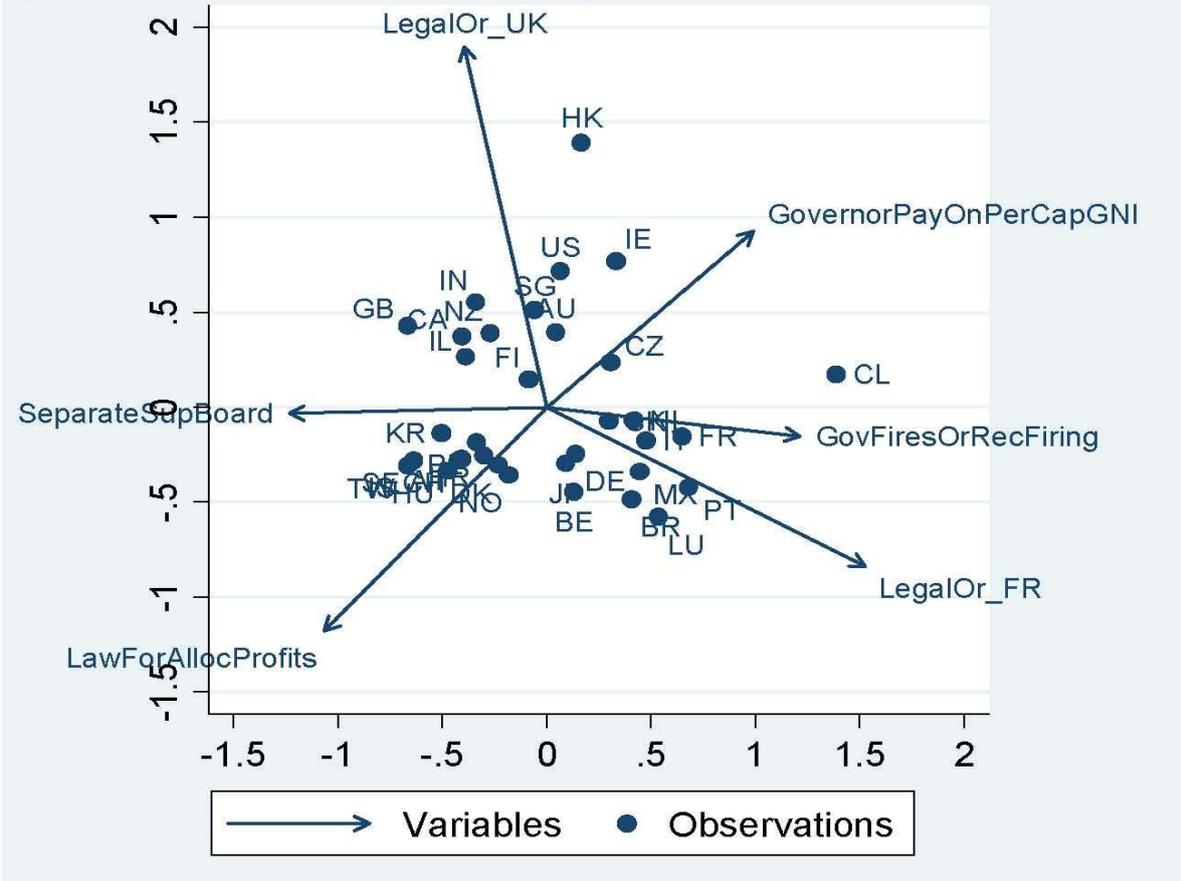
variables included in the biplot. Note that the biplot in Figure 24 explains more than 60% of the variance.

Pattern 2: Independence from Government and Supervisory Board. The presence of a separate supervisory board (*SeparateSupBoard*) and the ability of the government to fire the governor (*GovFiresOrRecFiring*) are also almost perfectly negatively correlated. That is, supervisory boards are present more often when central bank leadership is more independent from the government, suggesting that supervisory boards are introduced to monitor more government-independent central banks, which may otherwise have lower levels of accountability.

Returning to Figure 23, we might now deduce more than at first sight. On the east side of the biplot, variables indicating multiple objectives (*Nr_Obj*) and major responsibilities for banks’ supervision (*MajorBankSup*) are highly positively correlated to those indicating absence of stringent rules on

Figure 25. Biplot

Number of countries: 35; total explained variance 0.4914. Country abbreviations are described in appendix III. The variables are the following: *LawForAllocProfits* is a dummy variable that takes the value of 1 if there is a law regulating the allocation of profits of the CB; *GovFiresOrRecFiring* is a dummy variable that takes the value of 1 if someone among the Government, the Head of Government, the Head of State and the Ministry of Finance can fire the CB governor, or recommend his firing; *GovernorPayOnPerCapGNI* is the ratio between the CB governor’s pay and the per capita GNI of the same nation; *SeparateSupBoard* takes the value of 1 if there exists a separate supervisory board in the CB’s organization, and 0 otherwise; *LegalOr_UK* takes the value of 1 if the country has British legal origins, and 0 otherwise; *LegalOr_FR* takes the value of 1 if the country has French legal origins, and 0 otherwise.



investment decisions (*NoInvestmentRestrictions*) and government control in terms of ability to recommend or directly fire the governors (*GovFiresOrRecFiring*). In turn, the first two variables are negatively correlated with variables pointing west, characterizing more independent central banks. Examples of such variables are: having a law rather than the government regulating the allocation of profits (*LawForAllocProfits*), not having their budgets subject to approval from a political body (*NoBudgetApproval*), and instead having a supervisory board to ensure accountability (*SeparateSupBoard*). Although the near-assumption-free setup of the biplot does not allow us to draw any conclusions about causal relations in our data, one plausible interpretation of this structure of correlations, among several other possible ones consistent with the biplot, is as follows.

Pattern 3: Bank Supervision and Political Control. When banks’ supervision is a major task, a central bank tends to be less independent, i.e. more subject to discretionary-political control by the government, though less subject to government-independent rules and supervisory board control.

Regarding the possible clustering of countries in groups with similar central bank governance structures, we could not find any clear separation in clusters. Figure 25 shows the strongest clustering of countries in groups we could find, and interpreting the clustering does not appear to be easy. Countries appear to cluster in three groups mainly driven by the Legal Origin variables. The north-northwest group mainly appears to be characterized by its Anglo-Saxon legal origin (LegalOr_UK). The southwest group, with mixed legal origin, appears to be characterized by variables typical of more independent central banks, such as the presence of laws that regulate the allocation of profits (LowForAllocProfits) and an independent supervisory board (SeparateSupBoard). The third, southeast, group instead appears to be characterized by both French legal origin (LegalOr_Fr) and the strong power of the government to fire the CB governor, which is typical for less independent central banks (GovFiresoOrRecFiring).

4. Concluding Remarks

In the light of the recent debate in a number of European countries about the structure of and efficiency and remuneration at central banks, we have described the corporate governance problems of central banks in their complex role as inflation guardians, bankers' banks, financial industry supervisors and, in some cases, even competition authorities and insurance deposit agencies. Drawing on the theoretical work on corporate governance, bank supervision, regulated firms and regulatory agencies, we have tried to make clear from which side governance pressure could be exercised to ensure good central bank performance.

We have looked empirically at the current governance structures in central banks in OECD countries, in terms of board independence, governors' incentives, and stakeholders' incentives to monitor. While comparing these with the structures suggested in the literature, we have highlighted several interesting problems. At the very least, our study shows that aligning central banks' incentives with their (assigned) multiplicity of objectives is a very complex task, given the paucity of reliable performance indicators. The large variation between countries, be it with regard to board structure, governor remuneration, term lengths, appointment rules or which tasks are allocated to the central bank, pose a challenge to research.

In particular, the question of the accountability of central banks appears to be unsatisfactorily addressed by existing research. To the extent that the accountability issue has been tackled, this has generally only been so with respect to the formation of optimal monetary policy. We would like to

raise the question of whether governments have sacrificed the accountability of central banks in other dimensions for the sake of (greater) independence to facilitate monetary policy, and whether recent scandals are a product of this choice?

With respect to avenues for future research, we have noted many issues on which economic research appears to be badly needed. In addition, we believe that it could be fruitful to follow the path of the law and finance literature and study how central bank performance is related to a range of governance variables. Ultimately, however, good central bank governance will require a theoretical foundation in the same way as monetary policy did in the 1980s and 1990s.

Appendix

Appendix I. Countries included in all N=47 graphs and tables;

Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Croatia, Czech Republic, Denmark, ECB, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, India, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Saudi Arabia, Singapore, Slovak Republic, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Kingdom, United States.

Appendix II. Countries included in all N=96+ graphs and tables;

Angola, Argentina, Armenia, Australia, Austria, Bahamas, Bahrain, Barbados, Belgium, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Cambodia, CAMU, Canada, Cap Verde, Chile, China PDR, Columbia, Croatia, Cyprus, Czech Republic, El Salvador, Eritrea, Estonia, European Central Bank, Fiji, Finland, France, Georgia, Germany, Guatemala, Honduras, Hungary, Iceland, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Korea, Kuwait, Kyrgyz Republic, Lao PDR, Latvia, Lesotho, Liberia, Lithuania, Macedonia, Madagascar, Malawi, Malaysia, Moldova, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Oman, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russia, Rwanda, Serbia, Sierra Leone, Singapore, Slovenia, South Africa, Spain, Sudan, Sweden, Switzerland, Tajikistan, Tanzania, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, UAE, Uzbekistan, Venezuela, West African States, Yemen, Zambia

Note that the list in Appendix II includes 101 countries, and the source of the data is Lybek (2006). Sometimes data were missing for certain countries and hence the number of observations varies.

Appendix III. Country abbreviations in the biplots.

Argentina	AR
Australia	AU
Austria	AT
Belgium	BE
Brazil	BR
Bulgaria	BG
Canada	CA
Chile	CL
China	CN
Croatia	HR
Czech Republic	CZ
Denmark	DK
ECB	EU
Finland	FI
France	FR
Germany	DE
Greece	GR
Hong Kong	HK
Hungary	HU
Iceland	IS
India	IN
Ireland	IE
Israel	IL
Italy	IT
Japan	JP
Korea	KR
Luxembourg	LU
Malaysia	MY
Mexico	MX
Netherlands	NL
New Zealand	NZ
Norway	NO
Poland	PL
Portugal	PT
Russia	RU
Saudi Arabia	SA
Singapore	SG
Slovak Republic	SK
South Africa	ZA
Spain	ES
Sweden	SE
Switzerland	CH
Taiwan	TW
Thailand	TH
Turkey	TR
United Kingdom	GB
United States	US

REFERENCES

Adams, Renée and Mehran, Hamid, 2003, "Is Corporate Governance Different For Bank Holding Companies?", (*Federal Reserve Bank of New York Economic Policy Review*, 9(1), pp. 123-142.

Adams, Renée and Mehran, Hamid, 2003, "Board Structure and Banking Firm Performance. And the Bank Holding Company Organizational Form", Unpublished paper, Federal Reserve Bank of New York.

Adams, Renée and Ferreira, Daniel, 2007, "A Theory of Friendly Boards", "A Theory of Friendly Boards," with Daniel Ferreira, *Journal of Finance*, 62(1), pp. 217-250.

Alesina, Alberto and Tabellini, Guido, 2003, "Bureaucrats Or Politicians?", National Bureau of Economic Research Working Paper Series 10241.

Allen, Franklin and Gale, Douglas, 2000, "Corporate Governance and Competition" in X. Vives (ed.) *Corporate Governance: Theoretical and Empirical Perspectives*, Cambridge University Press, Cambridge, UK.

Bank for International Settlements, 2007, Central Bank Governance Forum: Network on Central Bank Governance Survey, <http://www.bis.org/hub/cbgf.htm>.

Barro, R., Gordon, D., 1983, "A Positive Theory of Monetary Policy in a Neutral-Rate Model", *Journal of Political Economy*, 91(4), pp. 589-610

Becht, Marco; Bolton, Patrick and Roell, Alisa, 2002, "Corporate Governance and Control", National Bureau of Economic Research Working Paper 9371.

Beck, Thorsten and Demirgüç-Kunt, Asli and Levine, Ross, 2005, "Bank Supervision and Corruption In Lending", National Bureau of Economic Research Working Paper No. W11498

Becker, G., Stigler, G., 1974, "Law Enforcement, Malfeasance and Compensation of Enforcers, 3 *Journal of Legal Studies* 1

Berger, Helge, Volker Nitsch and Tonny Lybek, 2006, "Central Bank Boards Around the World: Why Does Membership Size Differ?", *IMF Working Paper* No. 06/281.

- Bertrand, Marianne and Mullainathan, Seendhil, 2003, “Enjoying The Quiet Life; Corporate Governance And Managerial Preferences”, *Journal of Political Economy*, 111(5), pp. 1043-1076
- Besley, Timothy and Coate, Stephen, 2003, “Elected Versus Appointed Regulators: Theory and Evidence”, *Journal of the European Economic Association*, 1(5). pp. 1176-1206
- Besley, Timothy, 2004, “Paying Politicians: Theory and Evidence”, *Journal of the European Economic Association*, 2(2-3), pp. 193 – 215
- Besley, Timothy and McLaren, John, 1993, “Taxes and Bribery: The Role Of Wage Incentives”, *The Economic Journal*, 103, pp. 119-141
- Besley, Timothy and Ghatak, Maitreesh, 2001, “Government versus public ownership of public goods”, *Quarterly Journal of Economics*, 116(3), pp. 1343-1372.
- Besley, Timothy and Ghatak, Maitreesh, 2005, “Competition and Incentives with Motivated Agents”, *American Economic Review*, 95, pp. 616-36.
- Boot, Arnoud W. A., and Thakor, Anjan V., 1993 “Self-Interested Bank Regulation”, *American Economic Review*, 83(2), pp. 206-212
- Buchanan, J., Congleton, R., 1994, “The Incumbency Dilemma and Rent Extraction by Legislators”, *Public Choice*, 79(1-2), pp. 47-60
- Caprio, Gerard and Laeven, Luc and Levine, Ross, 2004, “Governance and Bank Valuation”, *National Bureau of Economic Research Working Paper No. 10158*
- Caselli, F., Morelli, M., 2004, “Bad Politicians”, *Journal of Public Economics*, 88(3-4), pp. 759-82
- Chari V. V., Kehoe P. J., 2003, “Hot Money”, *Federal Reserve Bank of Minneapolis Research Department Staff Report 228*.
- Che, Yeon-Koo, 1995, “Revolving Doors and the Optimal Tolerance for Agency Collusion”, *RAND Journal of Economics*, 26(3), pp. 78-397.

Demirgüç-Kunt, Asli and Laeven, Luc and Levine, Ross, 2004, "Regulations, Market Structure, Institutions, And The Cost Of Financial Intermediation", *Journal of Money, Credit and Banking* 36(3), pp. 593-622.

Denis, Diane K. and McConnell, John J., 2003, "International Corporate Governance" *Journal of Financial and Quantitative Analysis*, 38(1), pp. 1-36.

Dewatripont, Mathias and Jewitt, Ian and Tirole, Jean, 1999, "The Economics Of Career Concerns. Part II: Application To Missions And Accountability Of Government Agencies", *Review of Economics Studies*, 66(1), pp. 199 – 217

Dick, A., Lott, R., 1993, "Reconciling Voters' Behavior with Legislative Term Limits", *Journal of Public Economics*, 50(1), 1-14

Di Noia, C. and Di Giorgio, G., 1999, "Should Banking Supervision and Monetary Policy Tasks be Given to Different Agencies?", "Should Banking Supervision and Monetary Policy Tasks Be Given To Different Agencies?", *International Finance*.

Eijffinger, Sylvester C. W. and Hoeberichts, Marco, 2002, "Central Bank Accountability and Transparency: Theory and Some Evidence" *International Finance*, 5(1), 73-96.

Eisenbeis, Robert A. 2004, "Agency Problems and Goal Conflicts", Federal Reserve Bank of Atlanta, Working Paper No 24

Fama, E.F., 1980, "Agency Problems and the Theory of the Firm", *Journal-of-Political-Economy*,.88(2), pp. 288-307

Gabriel, K.R., 1971, " The biplot graphic display of matrices with application to principal component analysis", *Biometrika* 58, pp. 453-467.

Glazer, A. and Wattenberg, M., 1996, "How Will Term Limits Affect Legislative Work?", In Grofman, B. (ed.), *Legislative Term Limits: Public Choice Perspectives*, Boston, Dordrecht and London: Kluwer Academic.

Goodhart, C., 1988, *The Evolution of Central banks*, Cambridge, Mass. And London: MIT Press, viii, 205

Graf Lambsdorff, Johann and Michael Schinke, 2002, "Non-Benevolent Central Banks," CeGE Discussion paper 16, University of Göttingen

Guiso, Luigi and Sapienza Paola and Zingales, Luigi, 2006, “The Cost of Banking Regulation”, *CEPR*, Discussion Paper No 5864

Harris, Milton and Raviv, Arthur, 2006, “A Theory of Board Control and Size”, *The Review of Financial Studies*, forthcoming.

Hart, Oliver and Shleifer, Andrei and W. Vishny, Robert, 1997, “The Proper Scope Of Government: Theory And An Application To Prisons”, *The Quarterly Journal of Economics*, 112(4), pp. 1127-61.

Haubrich, Joseph G., 1996, “Combining Banking Supervision and Monetary Policy,” *Federal Reserve Bank of Cleveland Economic Commentary*.

Hermalin, Benjamin E. and Weisbach, Michael S., 1998, “Endogenously Chosen Boards of Directors and Their Monitoring of the CEO”, *American Economic Review* 88, pp. 96-118

Hermalin, Benjamin E. and Weisbach, Michael S., 2003, “Boards Of Directors As An Endogenously Determined Institution: A Survey Of The Economic Literature”, *Federal Reserve Bank of New York Economic Policy Review*

Holmström, B. and Milgrom, P., 1991, “Multitask Principal-Agent Analyses: Incentive Contracts, Asset Ownership, and Job Design”, *Journal of Law, Economics, and Organization*, 7, pp. 24–52

Holmstrom, Bengt, 1999. Managerial Incentive Problems: A Dynamic Perspective, *Review of Economic Studies*, 66, pp. 169-182.

Horiuchi, Akiyoshi and Shimizu, Katsutoshi, 2000, “Did Amakudari Undermine The Effectiveness Of Regulator Monitoring In Japan?”, *Journal of Banking and Finance*, 25, pp. 573–596

Jensen, Michael., 1993. “The Modern Industrial Revolution, Exit, and the Failure of Internal Control Systems”, *Journal of Finance* 48(3), pp. 831-80.

Kahn M., Charles and Santos, Joao A.C., 2004, “Allocating Bank Regulatory Powers: Lender Of Last Resort, Deposit Insurance And Supervision” *European Economic Review*, 49(8), pp. 2107-2136.

Keefer, Philip, and David Stasavage, 2001, "Bureaucratic Delegation and Political Institutions: When Are Independent Central Banks Irrelevant?", World Bank Policy Research Working Paper 2356.

Kohler, Ulrich, and Magdalena Luniak, 2005, "Data inspection using biplots", *The Stata Journal* 5(2), pp. 208–223.

Kydland, F., Prescott, E., 1977, "Rules Rather Than Discretion: The Inconsistency of Optimal Plans", *Journal-of-Political-Economy*,.85(3), pp. 473-91

La Porta, Roberto, Lopez-de-Silanes, Florencio, Schleifer Andrei and Vishny Robert, 1998, "Law and Finance", *Journal of Political Economy*, 106(6), pp. 1113-1155.

Levine, Ross, 2003, "The Corporate Governance of Banks: a Concise Discussion of Concepts and Evidence", Discussion Paper No. 3, Global corporate governance forum, Washington

Lopez, E. 2003, "Term Limits: Causes and Consequences", *Public Choice*, 114(1-2), pp. 1-56.

Lybek, Tonny and JoAnne Morris, 2004, "Central Bank Governance: A Survey of Boards and Management", *IMF Working Paper* 04/226.

Manne, Henry G., 1965, "Mergers and the Market for Corporate Control," *Journal of Political Economy* 73, pp. 110-120.

Maskin, Eric and Tirole, Jean, 2004, "The Politician and the Judge: Accountability in Government", *American Economic Review*, 94, pp. 1034-1054.

Moser, Peter, 1999, "Checks and balances, and the supply of central bank independence", *European Economic Review*, 43(8), pp. 1569-1593.

Murphy, Kevin J., 1999, "Executive Compensation", in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics*, Vol. 3

O'Flaherty, B., 1990, "The Care and Handling of Monetary Authorities", *Economics and Politics*, 2(1), pp. 25-44.

Palley, T., 1998, "Managerial turnover and the theory of short-termism" *Journal of Economic Behavior & Organization*, 32(4), pp. 547-557.

Persson, Torsten and Tabellini, Guido, 1993, "Designing institutions for monetary stability," *Carnegie-Rochester Conference Series* 39, pp. 53-84,

Persson, Torsten and Tabellini, Guido, 2000, *Political Economics: Explaining Economic Policy*, MIT Press.

Potters, Jan, Rockenbach, Bettina, Sadrieh, Abdolkarim and van Damme, Eric, 2003, "Collusion Under Yardstick Competition An Experimental Study", CENTER Discussion Paper No.97

Quintyn, Marc, and Michael Taylor, 2002, "Regulatory and Supervisory Independence and Financial Stability", *IMF Working Paper* No 46.

Rogoff, K., 1985, "The Optimal Degree of Commitment to an Intermediate Monetary Target," *Quarterly Journal of Economics* 100, pp. 1169-1189.

Sapienza, Paola, 2003, "The Effects of Government Ownership on Bank Lending", *Journal of Financial Economics*, 72(2), pp. 357-84.

Schoenmaker, Dirk, 1992, "Institutional Separation between Supervisory and Monetary Agencies" Financial Markets Group, London School of Economics, *FMG Special Papers* No. 52

Shapiro, C., Stiglitz, J, 1984, "Equilibrium Unemployment as a Worker Discipline Device," *American Economic Review*; 74(3), pp. 433-44

Shleifer, Andrei, 1998, "State versus Private Ownership", *Journal of Economic Perspectives*, 12(4), pp. 133-150.

Schleifer, A., 1985, "A Theory of Yardstick Competition." *Rand Journal of Economics*, #16, pp. 319-327

Shleifer, Andrei and Vishny, W. Robert, 1997, "A Survey of Corporate Governance", *Journal of Finance*, 52(2), pp. 737-83

Stigler, G., 1971, "The Theory of Economic Regulation", *Bell Journal of Economics*, 2, pp. 3 – 21

Tirole, Jean, 2005, *The Theory of Corporate Finance*, Princeton University Press.

Tirole, Jean, 1994, "The Internal Organization of Government". *Oxford Economic Papers*, 21(4), pp. 1-29.

Von Ungern-Sternberg, Thomas, 2003, "Governance und Unabhängigkeit von Nationalbanken: das Beispiel der Schweizerischen Nationalbank", Université de Lausanne, *DEEP Working Paper*

Waller, Christopher J, 1992. "The Choice of a Conservative Central Banker in a Multisector Economy," *American Economic Review*, vol. 82(4), pp. 1006-12

Waller, Christopher J. and Walsh, Carl E., 1996, "Central-Bank Independence, Economic Behavior, and Optimal Term Lengths", *American Economic Review*, 86(5), pp. 1139-1153.

Walsh, Carl E., 1995, "Optimal Contracts For Central Bankers", *The American Economic Review*, 85(1), pp. 150-167.

Walsh, Carl E., 2002, "When should central bankers be fired?". *Economics of Governance*, 3(1), pp. 1-21.

Weiss, A., 1980, "Job Queues and Layoffs in Labor Markets with Flexible Wages", *Journal of Political Economy*, 88, pp. 526-538

Earlier Working Papers:

For a complete list of Working Papers published by Sveriges Riksbank, see www.riksbank.se

Estimation of an Adaptive Stock Market Model with Heterogeneous Agents by <i>Henrik Amilon</i>	2005:177
Some Further Evidence on Interest-Rate Smoothing: The Role of Measurement Errors in the Output Gap by <i>Mikael Apel</i> and <i>Per Jansson</i>	2005:178
Bayesian Estimation of an Open Economy DSGE Model with Incomplete Pass-Through by <i>Malin Adolfson</i> , <i>Stefan Laséen</i> , <i>Jesper Lindé</i> and <i>Mattias Villani</i>	2005:179
Are Constant Interest Rate Forecasts Modest Interventions? Evidence from an Estimated Open Economy DSGE Model of the Euro Area by <i>Malin Adolfson</i> , <i>Stefan Laséen</i> , <i>Jesper Lindé</i> and <i>Mattias Villani</i>	2005:180
Inference in Vector Autoregressive Models with an Informative Prior on the Steady State by <i>Mattias Villani</i>	2005:181
Bank Mergers, Competition and Liquidity by <i>Elena Carletti</i> , <i>Philipp Hartmann</i> and <i>Giancarlo Spagnolo</i>	2005:182
Testing Near-Rationality using Detailed Survey Data by <i>Michael F. Bryan</i> and <i>Stefan Palmqvist</i>	2005:183
Exploring Interactions between Real Activity and the Financial Stance by <i>Tor Jacobson</i> , <i>Jesper Lindé</i> and <i>Kasper Roszbach</i>	2005:184
Two-Sided Network Effects, Bank Interchange Fees, and the Allocation of Fixed Costs by <i>Mats A. Bergman</i>	2005:185
Trade Deficits in the Baltic States: How Long Will the Party Last? by <i>Rudolfs Bems</i> and <i>Kristian Jönsson</i>	2005:186
Real Exchange Rate and Consumption Fluctuations following Trade Liberalization by <i>Kristian Jönsson</i>	2005:187
Modern Forecasting Models in Action: Improving Macroeconomic Analyses at Central Banks by <i>Malin Adolfson</i> , <i>Michael K. Andersson</i> , <i>Jesper Lindé</i> , <i>Mattias Villani</i> and <i>Anders Vredin</i>	2005:188
Bayesian Inference of General Linear Restrictions on the Cointegration Space by <i>Mattias Villani</i>	2005:189
Forecasting Performance of an Open Economy Dynamic Stochastic General Equilibrium Model by <i>Malin Adolfson</i> , <i>Stefan Laséen</i> , <i>Jesper Lindé</i> and <i>Mattias Villani</i>	2005:190
Forecast Combination and Model Averaging using Predictive Measures by <i>Jana Eklund</i> and <i>Sune Karlsson</i>	2005:191
Swedish Intervention and the Krona Float, 1993-2002 by <i>Owen F. Humpage</i> and <i>Javiera Ragnartz</i>	2006:192
A Simultaneous Model of the Swedish Krona, the US Dollar and the Euro by <i>Hans Lindblad</i> and <i>Peter Sellin</i>	2006:193
Testing Theories of Job Creation: Does Supply Create Its Own Demand? by <i>Mikael Carlsson</i> , <i>Stefan Eriksson</i> and <i>Nils Gottfries</i>	2006:194
Down or Out: Assessing The Welfare Costs of Household Investment Mistakes by <i>Laurent E. Calvet</i> , <i>John Y. Campbell</i> and <i>Paolo Sodini</i>	2006:195
Efficient Bayesian Inference for Multiple Change-Point and Mixture Innovation Models by <i>Paolo Giordani</i> and <i>Robert Kohn</i>	2006:196
Derivation and Estimation of a New Keynesian Phillips Curve in a Small Open Economy by <i>Karolina Holmberg</i>	2006:197
Technology Shocks and the Labour-Input Response: Evidence from Firm-Level Data by <i>Mikael Carlsson</i> and <i>Jon Smedsaas</i>	2006:198
Monetary Policy and Staggered Wage Bargaining when Prices are Sticky by <i>Mikael Carlsson</i> and <i>Andreas Westermark</i>	2006:199
The Swedish External Position and the Krona by <i>Philip R. Lane</i>	2006:200
Price Setting Transactions and the Role of Denominating Currency in FX Markets by <i>Richard Friberg</i> and <i>Fredrik Wilander</i>	2007:201
The geography of asset holdings: Evidence from Sweden by <i>Nicolas Coeurdacier</i> and <i>Philippe Martin</i>	2007:202
Evaluating An Estimated New Keynesian Small Open Economy Model by <i>Malin Adolfson</i> , <i>Stefan Laséen</i> , <i>Jesper Lindé</i> and <i>Mattias Villani</i>	2007:203
The Use of Cash and the Size of the Shadow Economy in Sweden by <i>Gabriela Guibourg</i> and <i>Björn Segendorf</i>	2007:204
Bank supervision Russian style: Evidence of conflicts between micro- and macro-prudential concerns by <i>Sophie Claeys</i> and <i>Koen Schoors</i>	2007:205

Optimal Monetary Policy under Downward Nominal Wage Rigidity by <i>Mikael Carlsson</i> and <i>Andreas Westermark</i>	2007:206
Financial Structure, Managerial Compensation and Monitoring by <i>Vittoria Cerasi</i> and <i>Sonja Daltung</i>	2007:207
Financial Frictions, Investment and Tobin's q by <i>Guido Lorenzoni</i> and <i>Karl Walentin</i>	2007:208
Sticky Information vs. Sticky Prices: A Horse Race in a DSGE Framework by <i>Mathias Trabandt</i>	2007:209
Acquisition versus greenfield: The impact of the mode of foreign bank entry on information and bank lending rates by <i>Sophie Claeys</i> and <i>Christa Hainz</i>	2007:210
Nonparametric Regression Density Estimation Using Smoothly Varying Normal Mixtures by <i>Mattias Villani</i> , <i>Robert Kohn</i> and <i>Paolo Giordani</i>	2007:211
The Costs of Paying – Private and Social Costs of Cash and Card by <i>Mats Bergman</i> , <i>Gabriella Guibourg</i> and <i>Björn Segendorf</i>	2007:212
Using a New Open Economy Macroeconomics model to make real nominal exchange rate forecasts by <i>Peter Sellin</i>	2007:213
Introducing Financial Frictions and Unemployment into a Small Open Economy Model by <i>Lawrence J. Christiano</i> , <i>Mathias Trabandt</i> and <i>Karl Walentin</i>	2007:214
Earnings Inequality and the Equity Premium by <i>Karl Walentin</i>	2007:215
Bayesian forecast combination for VAR models by <i>Michael K Andersson</i> and <i>Sune Karlsson</i>	2007:216
Do Central Banks React to House Prices? by <i>Daria Finocchiaro</i> and <i>Virginia Queijo von Heideken</i>	2007:217
The Riksbank's Forecasting Performance by <i>Michael K. Andersson</i> , <i>Gustav Karlsson</i> and <i>Josef Svensson</i>	2007:218
Macroeconomic Impact on Expected Default Frequency by <i>Per Åsberg</i> and <i>Hovick Shahnazarian</i>	2008:219
Monetary Policy Regimes and the Volatility of Long-Term Interest Rates by <i>Virginia Queijo von Heideken</i>	2008:220



Sveriges Riksbank
Visiting address: Brunkebergs torg 11
Mail address: se-103 37 Stockholm
Website: www.riksbank.se
Telephone: +46 8 787 00 00, Fax: +46 8 21 05 31
E-mail: registratorn@riksbank.se