Central Bank Boards around the World: Why Does Membership Size Differ?*

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Helge Berger

Free University Berlin
Department of Economics
Boltzmannstr. 20
14195 Berlin
Germany
E-mail: hberger@wiwiss.fu-berlin.de

Volker Nitsch
(corresponding)
ETH Zurich
KOF Swiss Economic Institute
Weinbergstrasse 35
8092 Zurich
Switzerland
E-mail: nitsch@kof.ethz.ch

Tonny Lybek

International Monetary Fund

700 19th Street, N.W.
Washington, DC 20431
U.S.A.
E-mail: tlybek@imf.org

Abstract

This paper analyzes empirically differences in the size of central bank boards (or monetary poliy committees) across countries. We discuss the possible determinants of a board's size. The empirical relevance of these factors is examined using a new dataset that covers the de jure membership size of 84 central bank boards at the end of 2003. We find that larger and more heterogeneous countries, countries with stronger democratic institutions, countries with floating exchange rate regimes, and independent central banks with more staff tend to have larger boards.

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I. INTRODUCTION

Size matters, in particular when it comes to central bank boards or monetary policy committees (MPCs).[1] While monetary policy may be a "science," it is hardly an exact one; it operates in an environment surrounded by considerable uncertainty. As a result, the way MPCs exploit information and agree on decisions may be critical for the quality and success of monetary policy. Current research has particularly emphasized the importance of central bank organization—and especially the size of central bank boards or MPCs—in this regard.[2]

Specifically, academics and policy makers have recently stressed the advantages of larger MPCs.[3] For instance, Blinder (2006) and Blinder and Morgan (2005) argue that multiple decision makers make fewer mistakes and better decisions when information is incomplete—an argument that is loosely based on Condorcet's jury theorem. Gerling, Grüner, Kiel, and Schulte (2005) summarize a larger literature from a game theoretic perspective; they argue that larger MPCs are particularly attractive if information is not public in nature. Auriol and Robert (2007) note that, in general, true representation of a

[1] To avoid confusion, we will hereinafter generally use the terms *MPC* or *central bank board*, instead of the various specific national terms describing the board, committee, council, or body in charge of deciding whether to change the monetary policy stance to achieve a specified target.

[2] Other features of central bank design may also have the potential to affect the quality of monetary policy decision-making; these include: meeting procedures (consensus decisions, voting arrangements, etc.), whether board members are full-time employees with the central bank or part-time external members, and if there are government representative(s), if any, with voting rights or the ability to temporarily postpone decisions. These factors, although important, are outside the scope of this paper.

[3] Our framework is related to the recent discussion on the size of boards of corporations. Reviewing the literature, Hermalin and Weisbach (2001, p. 31) note that: "Board composition [share of outside versus inside directors] is not related to corporate performance, while board size is negatively related to corporate performance. Both board composition and size do appear to be related to the quality of the board's decisions regarding CEO replacement, acquisitions, poison pills, and executive compensation." However, in the case of commercial corporations, the primary objective (e.g., to maximize shareholder wealth) is often clearer than for central banks. Furthermore, central bank boards typically have a smaller role, or none at all, in the appointment of the governor and in compensation decisions than commercial boards have.

politically and economically diverse area will require a larger number of representatives. The surveys by Fujiki (2005), Sibert (2006), Vandenbussche (2006), and Berger (2006) provide a comprehensive overview over this rapidly expanding literature.[4]

As Goodfriend (2005, p. 85) remarks, however, "the efficient size of a policy committee might vary across countries." Countries differ along various economic, political, and institutional dimensions and (some of) these characteristics may also shape the advantages of larger MPCs. For instance, the argument to increase board size to achieve better information processing appears to be of particular relevance when an economy is large or characterized by considerable diversity across regions and industries. Similarly, a country's political institutions may matter for MPC size, with less democratic regimes perhaps preferring a smaller board (since a large MPC could effectively provide insulation from political pressures).[5,6] Finally, MPC size is probably also affected by other elements of central bank design such as the institutional functions performed by a central bank. If the central bank enjoys full autonomy over both policy targets and instruments, the MPC may be larger than when the central bank's autonomy is more limited.

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[4] Schein (1999) is a related contribution from the business literature that looks at group-based decision making. Also see the helpful survey in Erhart and Vasquez-Paz (2007), who, like Sibert (2006) and Vandenbussche (2006), discuss contributions coming from outside economics proper.

[5] One argument along this line is that large board size combined with anonymous majority voting allows individual board members to claim to have been outvoted or otherwise dominated in the decision-making process.

[6] Related to size, it may in practice also make a difference if some of the MPC members are full-time employees of the central bank (i.e., "internal members") whose future careers may depend on the chairman of the MPC, typically the governor, or the members are "external" members. In the case of the former, the meeting dynamics may also be influenced by Keynes's "beauty contest factor," where these members may also be tempted to refine their own interventions in line with those they expect the chairman will favor. The special role of the chairman (see, for instance, Chappell, McGregor, and Vermilyea 2004) and the issue of internal and external members (see, for example, Tuladhar 2005, who provides such information on MPCs in inflation–targeting countries) are indeed important, but lie outside the scope of this paper.

A case in point is the recent discussion of the design of the European Central Bank's (ECB's) 19-member Governing Council, in which there is at least one representative from each member country of the monetary union (see, for instance, Baldwin, Berglöf, Giavazzi, and Widgren, 2001; Berger, de Haan, and Inklaar, 2004). In light of the ongoing increase in euro area membership, the ECB has limited the (future) number of voting members to 21. Even with this restriction, however, the Council appears to be relatively large; most of the 82 central banks surveyed by Fry, Julius, Mahadeva, Roger, and Sterne (2000) have a MPC with about 5–10 members. It is still unclear, though, whether the ECB Governing Council is indeed exceptionally large or just a manifestation of a general pattern where larger countries tend to endow their central banks with larger MPCs.

Despite the considerable interest in MPC size, there is surprisingly little evidence about the cross-country variation in central bank boards and their determinants. Fry, Julius, Mahadeva, Roger, and Sterne (2000) document differences in MPC size across countries but provide no explanations. Erhart and Vasquez-Paz (2007) review a small number of potential determinants of MPC size. However, to the best of our knowledge, a systematic, broad-based empirical analysis of differences in MPC size is missing.

In this paper, we aim to fill this void by systematically characterizing differences in the membership size of decision-making bodies of central banks around the world. Since central banks often operate various boards, committees, and councils, we focus on the central bank's implementation board (or MPC) that makes decisions on whether and when to change policy instruments to achieve a given monetary policy target.[7]

[7] Lybek and Morris (2004) provide a more detailed discussion of the various functions of central bank boards.

Our results indicate that board size is indeed strongly and plausibly associated with a number of country-specific characteristics. We find, for instance, that board size is related to country size and country heterogeneity as well as to a country's political institutions. Also, MPC size is often associated with other central bank characteristics.

The remainder of the paper is organized as follows. In Section II, we provide a detailed discussion of possible determinants of MPC size. Section III presents the data and the empirical results, and Section IV provides a brief conclusion.

II. Possible Determinants of Central Bank Board Size

The size of the central bank board is an important feature of central bank design. In practice, the decision on the number of board members appears to reflect various factors, including the political environment in which the decision on MPC size is made. In fact, one way to picture the decision process on board size is purely political. For instance, the number of central bank board members could be the result of a bargaining process that involves different interest groups (e.g., the financial sector, trade unions, or export industries) aiming at direct or indirect representation in the MPC.[8] Alternatively, the decision on MPC size could take the form of a conscious design decision of a decision-maker based on social or private preferences and subject to more or less binding political constraints.[9] Following the

[8] A case in point are the recent amendments to the central bank law of Hungary in 2004, where the balance in the monetary policy committee was changed by increasing the number of members.

[9] Provided the central bank independence paradigm is acknowledged, the design-scenario may be more relevant for boards that primarily make decisions on whether to change monetary policy instruments to achieve a specified target (instrument autonomy) than for policy boards that are also involved in determining the target of the central bank (target autonomy) or even deciding on its primary objective (goal autonomy), which is much more normative.

more recent literature, however, we will organize our discussion of the determinants of central bank board size around the trade-off of (some of the more obvious) costs and benefits of an increasing number of board members.[10]

A. The Basic Trade-Off

On the benefit side, the most prominent argument in favor of increasing the number of MPC members is that larger MPCs could be in a better position to process, analyze, and interpret economic information—ultimately leading to better monetary policy decisions—than individuals relying mostly on their own information and judgment. Multiple MPC members are able to pool information and exploit divisions of labor in information processing.[11] The argument has been formalized, among others, by Gerlach-Kristen (2006) and Berk and Bierut (2004); supportive experimental evidence is produced by Blinder and Morgan (2005) and Lombardelli, Proudman, and Talbot (2005).[12] Already Blinder (1998) noted that in a committee decisions tend to regress toward the mean, making it very difficult for idiosyncratic (or extreme) views to prevail.

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[10] See, among others, Goodfriend (2005), Berger (2006), and Sibert (2006). It should be noted that the forces shaping any political process relevant for the decision on MPC size may be somewhat similar in nature to the forces considered in a cost-benefit approach.

[11] MPC members may contribute by their differences in various ways, namely by the: (i) underlying model, meaning the underlying paradigms in which they believe; (ii) their experiences, meaning how they "estimate" the parameters in their model; (iii) the information set they use as input in their model; and not least (iv) different objective functions, which explicitly or implicitly may differ from the primary objective of the MPC.

[12] Other contributions pointing in the same direction include Méon (2006) and Riboni and Ruge-Murcia (2006). Méon (2006, p. 1), for instance, shows that: "The volatility of the policy is smaller the smaller the volatility of members' preferences, smaller the larger the size of the committee, and smaller than if it was chosen by a single member." Sibert (2006), however, argues that decision-making by committee may not necessarily result in moderation.

On the cost side, a plausible conjecture is that larger MPCs will generally imply greater effort from all involved for a given decision problem which may translate into less effective monetary policy making.[13] An important aspect is communication among members (and the resulting dynamics of the discussion). For instance, it seems obvious that even if the exchange of ideas at the preparatory stage of a decision is limited to a solitary statement by MPC members addressing their colleagues, larger MPCs would require more time than smaller MPCs in reaching a decision. Moreover, actual decision-making costs are likely to have a non-linear component. If MPC members regularly "sound each other out" during meetings (see, for instance, Barber 2001), the time requirement for preparing a decision will rise exponentially in the number of members (Berger 2006).[14] Moreover, individual representation at the board becomes less important as the number of decision makers increases so that the gains from diversity of skills and perspectives of members become smaller for larger central bank boards.[15]

[13] Sibert (2006, p. 1) notes, in similar fashion, that, "[a]s a result of shirking and coordination problems, smaller committees may be better than larger ones and the optimal size for a committee is an empirical issue."

[14] If there are n MPC members, the number of bilateral discussions is $\frac{1}{2}(n^2-n)$. The need for preparatory communication will be especially pronounced in central bank environments given to consensus-based decision making. This includes roughly half of the more than 80 central banks surveyed by Fry et al. (2000). The view that increasing MPC membership size may reduce the effectiveness of policy-making is also bolstered by real-world experience. The German Bundesbank, for instance, asserts that its 1992 MPC reform triggered by German unification helped to prevent an increase in MPC size which "would have greatly complicated that body's decision-making processes" (Deutsche Bundesbank 1992, p. 50). More recently, the ECB (2003, p. 83) has expressed the fear that the anticipated increase in the number of national central bank governors attending euro area MPC meetings after EMU enlargement "will not necessarily make deliberations easier".

[15] Blinder and Morgan (2005) argue that small but not-too-large-groups of individuals may reach "better" decisions at speeds broadly comparable to an individual. As groups increase, however, individual members may have a stronger incentive to "freeride" on the information processing efforts of others, especially if information processing is a costly activity, which will lead to growing inefficiencies (e.g., Sibert 2006).

B. Determinants of Monetary Policy Committee Size

The trade-off between costs and benefits determining optimal MPC size is likely to be influenced by various country characteristics, which can be exploited empirically. In what follows, we present a number of relevant and empirically testable hypotheses along this line, aiming to make the argument for an association between MPC size and country characteristics operational.

Country size and heterogeneity

As a starting point, it seems safe to assume that a central bank's requirements for information processing are a (positive) function of (within-)country diversity and country size. For instance, for economies with complex structures, a large number of central bank board members might be particularly useful, allowing a review in detail of the (often diverse) information from various sectors and regions (Goodfriend 2005). Also, it is often larger currency areas that host a more heterogeneous population with diverging preferences and/or varying institutional and cultural backgrounds, possibly weighing on monetary policy.[16] For instance, if larger countries tend to produce more federal political structures, these structures may more easily translate into the presence of regional representatives in the MPC.[17] Finally, larger countries may be more independent in their monetary policy, which may make having

[16] Of course, there are also political-economic factors that could translate heterogeneity into larger MPC size. For instance, in the absence of proper democratic institutions, a more politically diverse population might require a larger MPC to represent all relevant interest groups, possibly including external members. We return to this issue below.

[17] On regional representation in MPCs, see, among others, Berger and de Haan (2002), Meade and Sheets (2005), and Berger (2006).

larger MPCs more worthwhile. In sum, we hypothesize that measures of *country size* such as land area or population are positively correlated with MPC size. Similarly, measures of a country's cultural or political *fragmentation* may have a positive influence on the size of the MPC.

Development and openness

Another group of empirically identifiable factors that potentially affect MPC size are the economy's state of economic development and its degree of external openness. One plausible conjecture that links central bank organization to the *level of economic development* is that the existence of a more elaborate monetary policy framework, including perhaps a larger MPC, may be a positive function of the average income level in a country. More specifically, larger and more developed economies could be less inclined to opt for simple monetary rules (such as a fixed exchange rate) and introduce more complex strategies (such as forward-looking inflation targeting), which may require larger MPCs to manage.[18] Also, countries at higher income levels and with more developed financial markets should have a larger supply of well-educated staff and (well-qualified) potential MPC members, thereby loosen any possible constraint imposed on MPC size at lower income levels. Furthermore, more developed and dynamic financial markets may result in more frequent changes in the monetary transmission mechanism which implies the need for more balanced information when adjusting the monetary policy instruments.

[18] Another link pointing in that direction is that more financial development means that more people depend on financial assets and hence are more vulnerable to inflation (Posen, 1995). As they demand more central bank autonomy and accountability, this could imply the establishment of larger central bank boards. In less

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On *openness*, Romer (1993) has argued that economies more open to international trade are more sensitive to currency fluctuations and this sensitivity should lead to a more disciplined economic policy overall. If openness is indeed making the MPC's life easier, by imposing, for instance, greater discipline on fiscal policy, a fewer number of board numbers are needed in more open economies.[19] The same should hold, other things equal, for economies characterized by a high correlation of the national business cycle with the world cycle.[20]

Political institutions

A larger MPC may also have advantages for political economy reasons. Diversity in terms of language or culture may increase the attractiveness of a larger MPC which would allow fuller representation of varying interests and thereby increase the likelihood of gaining political legitimacy. Along similar lines, it could be argued that more developed *democratic institutions* allow for greater diversity in opinion and preferences and, therefore, may be a factor in favor of a more sizable MPC.[21]

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developed countries, which typically have a younger population, the preference toward price stability may be smaller.

[19] Put differently, the size of MPCs is less relevant for (the costs of) decision-making in cases where the central bank runs monetary policy for a small, open, and highly integrated economy so that there is a priori little room for independent policy-making in the first place.

[20] Empirically, a high degree of openness at period *t* may or may not be highly correlated with measures of business cycle correlation in the past. D'Amato and Martina (2005) argue on theoretical grounds that a high degree of business cycle correlation across countries should provide incentives to decrease central bank independence. If this was correct, and larger MPCs and central bank independence were substitutes (see below), this would lead us to expect a positive correlation between a correlation measure and MPC size.

[21] These traditions could also influence the nature of the decision-making process, such as the prevalence of consensus-based traditions, majority voting, or leadership style of the MPC's president. "Group think," the risk that one or a few charismatic persons dominate and prevent valid critical questions be addressed, may be less problematic in larger boards. A more detailed discussion can be found in Berger (2006).

Another potentially relevant argument from a political economy perspective is related to the incentive of governments to dominate monetary policy for *fiscal* reasons. At the extreme, this may lead to fiscal determinacy of the price level, where monetary policy is forced to fully accommodate excessive fiscal behavior, including financing quasi-fiscal activities, and to allow runaway inflation to deflate the level of public debt (see, e.g., Woodford 2003). At a less drastic level, government officials may put pressure on the MPC to ease monetary policy and thereby lower the interest burden for the public finances. To insulate monetary policy from these pressures, optimal central bank design would aim for a high degree of central bank independence (see, e.g., Rogoff 1985), which may include establishing a large MPC (since larger boards may be less easily swayed by government influence).[22] As a consequence, we might observe a positive correlation between MPC size and measures of fiscal pressure. Similarly, under the assumption that such pressures are present, MPC size may be complemented by stricter limits on central bank financing of fiscal deficits.[23]

Other central bank characteristics

Finally, if the membership size of the central bank board is part of a multidimensional design process of central bank organization, we may expect that other design choices are

[22] Blinder (2006, p. 3) argues that, "[w]hen the central bank was just following orders communicated by the government, there was not much reason to have a committee on the other end of the phone. An individual governor sufficed–and also limited the phone bill."

[23] Strictly speaking, the latter argument is an element of central bank design rather than the political environment (see following section). In practice, deficit financing is increasingly being alleviated by central bank legislation explicitly prohibiting direct or indirect central bank financing of the fiscal deficits and the financing of quasi-fiscal activities.

reflected in MPC size as well. For instance, with reference to the discussion above, if central banks have greater autonomy (e.g., the authority to prioritize their objectives and specify the target to pursue generally), they are likely to have larger MPCs. More generally, central banks that are more *independent* from government are expected to operate under larger MPCs.

In similar fashion, the monetary policy strategy and the *exchange rate regime* in which a central bank operates may be relevant determinants of MPC size. Decisions on changing interest rates require less deliberation and forward-looking analysis, and thus a smaller MPC, under a fixed exchange rate regime (where the central bank essentially follows the monetary policy of the anchor country) than monetary policy under floating exchange rates.

In addition, one may argue that there is a negative association between MPC size and the (envisaged) average *term length* of MPC members since smaller groups require longer terms to ensure continuity.[24] Alternatively, larger groups are able to accommodate higher fluctuation frequencies without endangering the independence of the MPC from the government (which is likely to be involved in the nomination of new members).[25]

Another factor that might be associated with MPC size is the number of central bank *staff*. A possible link between the two variables is the number of functions performed by the central bank, which may require both more staff and a larger MPC (e.g., if the MPC has also

[24] Another possible link could be the so-called stabilization bias of monetary policy (e.g., Woodford 2003): if larger groups mean slower decision-making, larger MPCs could be a means to introduce optimal inertia into interest rate setting—albeit perhaps not an efficient one. See Mirzoev (2004) for an argument for lowering the meeting frequency of MPCs to achieve the same effect.

[25] A related literature discusses central bank appointments and staggered contracts; see, for instance, Waller (1989, 1992, 2002) and Waller and Walsh (1996).

duties other than to decide on monetary policy).[26] The central bank's *operating expenditures* may be another proxy for the functions performed by the central bank. Finally, path dependencies (possibly captured by the *age* of the institution) may play a role for MPC size, with younger institutions being plausibly characterized by (yet) smaller boards.

III. EMPIRICAL ANALYSIS

In the following, we test the above predictions empirically. Our strategy is to examine the association between MPC size and country characteristics in a very general fashion. Instead of emphasizing a particular variable or estimation method, we use a (large) number of alternative measures and a variety of simple econometric specifications to identify possible structural correlations in the data. This approach also helps to take account of a few data limitations for individual variables. We begin this section by describing our data, and then turn to testing the relationships between MPC size and various country characteristics, including features of central bank design.

A. Data Description

At the heart of our data set is the MPC size data obtained from Lybek and Morris (2004). This publication surveys 101 central bank laws (covering 113 countries) at the end of 2003 and classifies the governance structure of central banks along various dimensions. Lybek and Morris (2004) distinguish between different types of central bank boards (policy

[26] Alternatively, there could be specialized "boards" to deal with other functions. The Reserve Bank of Australia is a case in point having a special Payment System Board.

boards, implementation boards, pure supervisory boards, and advisory bodies) depending on the *type* of autonomy. We use information on the most relevant and powerful central bank board, the "implementation board," i.e., the body that decides whether to change monetary policy instruments to achieve a specified target. Since Lybek and Morris (2004) have grouped MPCs into size classes of three members, we use effectively a board size index that takes the value of one if the MPC consists of 1–3 members, the value of two if there are 4–6 members, and so on.[27] Figure 1 provides a histogram of our MPC size measure. The 84 countries included in our sample are listed in Appendix I.[28]

Our accompanying data on country characteristics and central bank features come from a number of different sources. Most of the data on country characteristics are taken from Rose (2006), who has compiled a large and comprehensive data set of country attributes, including physical, cultural, economic, political, geographic, and social phenomena. To this data set, we add information on various central bank features such as the term length of board members, the type of legal independence, the establishment year, staff size, and operational expenses of the central bank. This information is mainly obtained from Lybek and Morris (2004); other sources are the *Morgan Stanley Central Bank Directory*, Fry et al. (2000), and Ize (2006). Finally, we have compiled macroeconomic data (e.g., on a country's fiscal position) from the International Monetary Fund's *International Financial*

[27] Lybek and Morris (2004) provide no information on the precise number of MPC members. It should be noted, however, that also some central bank laws stipulate no fixed number but give a range for the number of required board members. Another qualification of the Lybek and Morris data is that they focus on boards and committees and therefore provide no information on central banks where the governor alone is responsible for decisions on how to implement the policy. Thus, de facto our smallest size category for board membership covers boards with 2–3 members.

Statistics. We also use three different exchange rate regime classifications: the well-known de facto classifications from Levy-Yeyati and Sturzenegger (2005) and Reinhart and Rogoff (2004), and the de jure classification from the IMF (2003). Detailed sources for variables are tabulated in Appendix II. Appendix III provides descriptive statistics.[29]

B. Methodology

We now turn to the correlates of central bank board size. We estimate both simple bivariate models and models augmented with a few key controls. In particular, we estimate regressions of the form:

$$MPC = \alpha + \beta\, x + \gamma\, Y + \varepsilon$$

where MPC is our ordered MPC (or board) size index, x is the variable of interest, Y is a set of control variables and ε is a well-behaved residual. Due to the discrete categorical nature of our dependent variable, we estimate our equation using ordered probit techniques.

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[28] The main difference to the Lybek and Morris (2004) sample of 101 central bank laws is that we drop central banks that are involved in a multilateral currency union (since these central banks have either no responsibility for monetary policy or make decisions on monetary policy for a larger currency area).

[29] Most explanatory variables are either time-invariant or contemporaneous to MPC size. The underlying hypothesis is that the size of MPCs (as any element of central bank design) is subject to constant re-evaluation, either through the relevant authorities or the underlying political process. If this is indeed the case, we expect our explanatory variables to show a significant impact on MPC size. The alternative hypothesis is that MPC size is determined in a "one shot" game or design decision and not subject to change. In this case, finding a significant relationship with current country characteristics would be less likely, at least if the determinants of MPC size change over time. In practice, however, with many of the explanatory variables showing considerable inertia themselves (and the recent wave of central bank reforms having changed MPC sizes in a number of

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C. Bivariate Results

Tables 1–5 present the benchmark estimation results. For each variable, we report three sets of estimates. The first column records the slope coefficients obtained from simple bivariate estimation.[30] In column 2, we report the results of an augmented regression, in which population and per capita income are added as control variables.[31] Finally, the last column presents the bivarate results with the MPC size measure transformed into a binary index that takes the value of one if the MPC comprises more than six members and zero otherwise; these results are based on standard probit estimates. In practice, it turns out that all of our key findings are robust to this transformation of board size into small and large boards; this also suggests that our results are not sensitive to outliers.[32] In the following, we group variables along the lines of arguments outlined in the previous section.

Table 1 examines the linkage between (various indicators of) country size and MPC size. Most of the estimated coefficients are positive and statistically significant, suggesting that larger countries tend to have larger central bank boards. Reviewing the results in detail, the measure that is most directly related to membership size of a committee is a country's total population. The estimated coefficient on this variable is strongly positive (across all specifications) and statistically highly significant, indicating that more populous countries have more MPC members. For other useful proxies of country size, such as land area (as a

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countries including, for instance, the U.K. and Sweden), the distinction between both views is somewhat less sharp than what one might think. Ultimately, however, this is an empirical question.

[30] Appendix IV shows accompanying scatter plots (for most variables).

[31] We have also experimented with other sets of controls (e.g., central bank staff). The main findings were basically unaffected.

measure of a country's physical extension) or the gross domestic product (as a proxy for economic mass), the results are basically identical (which is not totally surprising given the generally strong positive correlation between these measures).

There is also some evidence that heterogeneity is associated with larger central bank boards (Table 2). As argued in Section II, greater diversity provides good reason for the creation of larger MPCs. This reasoning, however, may be more relevant for policy boards than for more technical boards such as MPCs that determine whether to change interest rates to achieve a specified target. To explore this issue empirically, we examine a broad range of variables on population heterogeneity, including various measures of ethnic, linguistic, and religious diversity, indicators of the spread in income distribution and geographic location, and a country's political fragmentation as measured by the number of its first-order administrative divisions. While most of the coefficients on these variables take a positive sign, only the point estimate on the ethnolinguistic fractionalization measure, a variable that is available for only a small share of the sample, is statistically different from zero. The number of a country's administrative units is also slightly (positively) correlated with central bank board size.

In comparison, there is only weak evidence that measures of a country's level of economic development or the degree of external openness influence MPC size; results are reported in Table 3. Reviewing the coefficients, there is only one relationship of reasonable statistical strength: landlocked countries have smaller boards. Broadly in line with this finding, we find that trade openness is consistently negatively associated with MPC size,

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[32] As another test for possible non-linearities, we re-estimated all equations with squared values of the variables of interest entered; see below.

although the coefficient is not statistically different from zero in any of the specifications. In contrast, most variables typically associated with economic and financial development and material well-being neither show the expected sign nor are they statistically significant.

The empirical results for indicators of a country's political regime, tabulated in Table 4, seem to suggest that well-established democratic institutions and countries with stronger governance performance are associated with larger central bank boards. In terms of statistical significance, however, results appear to be somewhat mixed. In the simple bivariate specification, none of the coefficients on measures of institutional quality is statistically different from zero. Still, for some variables, the estimated coefficients at least border conventional levels of significance, an impression that is also observable from the scatter plots (shown in the Appendix). Moreover, when we control for size and income, the estimated coefficients increase in magnitude and become statistically highly significant.

At a more detailed level, it turns out that the standard *Polity IV* scores (democracy, autocracy, polity), which comprise composite measures of institutionalized characteristics of the political regime, are weakly but consistently linked with MPC size across specifications. Countries with open and democratic political institutions tend to have large MPCs, while countries with autocratic structures have relatively small MPCs, though none of the nine coefficients is statistically different from zero. The estimates for the *Freedom House* measure on the state of civil liberties (political rights, civil rights) are not only supportive to this hypothesized relationship but also somewhat stronger statistically; the results indicate that "free" countries (as measured by low scores) have on average more members on their central bank boards than countries with a low freedom ranking. Finally, we experiment with several indicators on various dimensions of democracy, governance, and anti-corruption (voice and

accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law)—measures that were compiled by the World Bank. The results seem to support the idea that a better quality of governance is accompanied by larger MPCs. Most notably, the voice and accountability measure, which is an indicator of the extent to which citizens of a country are able to participate in the selection of their government, is significantly positively related to MPC size in the augmented model.[33]

In a final iteration, we find that larger government debt (in percent of GDP) is often associated with larger MPCs. However, the estimate is drawn from a relatively limited sample of countries, and no such relation can be found for the fiscal deficit.

Table 5 examines the association between the size of MPCs and other central bank features. We begin with several (binary) measures of central bank independence, taken from Lybek and Morris (2004) and a recent Bank of England survey among central banks (Fry et al., 2000). Overall, the evidence is mixed. Most of the legal measures obtained from Lybek and Morris, classifying different types of legal autonomy of a central bank, are uncorrelated with the number of board members.[34] Some results based on Fry et al.'s (2000) independence scores, in contrast, indicate that more independent central banks have relatively larger boards, thereby providing mild support for Blinder (2006); these results, however, are derived from a smaller sample.[35] Moreover, there is a positive correlation between the extent

[33] The indicator summarizes a number of aspects of the political process, civil liberties, and political rights.

[34] Note that different types of autonomy (goal autonomy, target autonomy, instrument autonomy, and limited or no autonomy) refers to the type of decisions the central bank determines, but that the quality of independence depends on a range of other factors discussed in, for instance, Lybek (1998, 1999).

to which there are limits on central bank financing of government deficits and MPC size (in the augmented specification).

A country's exchange rate regime appears to be a useful proxy for the complexity of the central bank's monetary policy strategy. Based on the most commonly used de jure and de facto exchange rate regime classifications, we have compiled binary measures for both hard-fixed and fully free-floating exchange rates (leaving the various intermediate forms of exchange rate pegs and inconclusive regimes as a control group). While the coefficients on the dummy variables for a fixed exchange rate regime (which are expected to be negative) are rarely significant in our regressions, the estimated coefficients on the floating exchange rate dummies often take on a significantly positive sign, implying that countries with flexible exchange rates tend to have larger boards.

Concerning the term length of board members, we explore two features: the (de jure) term length in years, and whether the term length is stipulated in the central bank law. Neither coefficient is statistically different from zero.[36]

Finally, we find a significant (positive) correlation between the size of a central bank and the size of the central bank board. Central banks with more staff and higher operating expenditures (and, thus, possibly more functions) also operate larger MPCs, while recently established central banks tend to have smaller boards, although only the former relations are significant at conventional statistical levels.

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[35] We also tried a number of alternative measures of central bank independence that are frequently used in the literature, without much success. For most of these measures, sample size gets extremely small when member countries of the euro area (which are not covered in our analysis) are removed.

[36] Our measure of term length for MPC members is obtained from Lybek and Morris (2004); the measure is highly positively correlated with equivalent information for central bank governors that is reported in the *Morgan Stanley Central Bank Directory*.

D. Nonlinear Specification

In most cases, the scatter plots collected in Appendix IV suggest that linear models capture the correlation between MPC size and its possible determinants reasonably well. Still, to allow for possible non-linearities, we also estimate our ordered probit models with quadratic terms.

Table 6 presents the results. Reassuringly, almost all variables for which we find a significant non-linear effect on MPC size were also relevant determinants of MPC size in the linear specification; that is, they produced significant coefficients in at least one of the specifications reported in Tables 1–5. In addition, the target independence score becomes a significant determinant of MPC size, thereby reinforcing the bivariate results for other indicators of central bank independence. Other variables, in contrast, lose their significance in the non-linear model, such as real GDP and ethnolinguistic fractionalization.

A second observation is that the majority of variables display, if anything, a concave relationship with MPC size.[37] This holds for population, administrative divisions, economic security, government effectiveness, rule of law, debt, and the number of central bank staff. The estimation results imply that the marginal benefits of increasing MPC size are declining in the relevant country characteristic. That is, a given increase in population size, for instance, seems to have a smaller impact on MPC size at lower population levels.

Our results for the term length of board members deviate from these two general findings. The term length of board members is significantly associated with MPC size only in

the non-linear specification. Also, the relationship is convex rather than concave. As illustrated in Appendix V, board members tend to have longer legislated terms in both relatively large and relatively small MPCs.

E. Multivariate Results

Next, we aim to explain cross-country differences in MPC size by combining various explanatory variables. The aim of this exercise is twofold. First, we are interested in exploring the robustness of our empirical findings, after controlling for the effect of other factors on MPC size. Second, we want to explore the empirical fit of our specification (i.e., the extent to which we are able to explain the variation in MPC size in our sample).

Our empirical approach is essentially guided by data availability; it is constrained by possible multicollinearity. Specifically, we select from each group of determinants a representative variable that has a particularly strong bivariate correlation with central bank board size and is available for a large fraction of the sample. To this baseline specification, we then add other variables of intrinsic interest.

Table 7 reports the results. The first column reports the benchmark specification which jointly includes a measure of country size (population), level of economic and financial development (real per capita income), openness (landlockedness), political regime (voice and accountability), and central bank size (staff; we obtain similar results for operating expenditures) to explain the size of the board. As shown, the results indicate that country

[37] Using the ordered probit coefficients can be misleading in this respect, but we find very similar results based on the OLS models. Results are not shown.

size, a democratic political regime, and a large number of central bank staff are associated with larger MPCs, while landlocked and/or richer countries tend to have smaller boards. More notably, compared with the bivariate results, all variables (except for landlockedness) remain economically relevant and statistically highly significant. Finally, it should also be noted that our estimation results are derived from a still large sample of 83 observations. While the significance levels of individual variables later vary with the set of regressors (and sample size), the benchmark estimates generally turn out to be reasonably robust.

Adding other control variables yields further insights. In column two, we experiment with an alternative control for country size, replacing population with land area. This modification has little effect on the overall estimation results, though the empirical fit appears to be somewhat stronger for some R^2-measures. In the remaining columns, we report results for other variables of theoretical interest. Among those variables, the strongest results are found for central bank independence and ethnolinguistic fractionalization; the estimated coefficients on these variables take on the expected sign and are statistically highly significant. Also the exchange rate regime and the degree to which there are limits to central bank financing of government debt appear to play (at least marginally) a significant role in explaining MPC size in a multivariate framework.[38] In all cases, the results in Table 7 confirm the (previously reported) direction of the bivariate relationship. Openness and the correlation of the national with the world business cycle, in contrast, remain unrelated to MPC size.

[38] Government debt, which played a role in the bivariate setup, does not show a significant influence on MPC size in the multivariate model.

Statistically, the overall fit of the multivariate models is encouraging. Pseudo-R^2 values (as measured by the McKelvey and Zavoina method) are between 0.3 and 0.6. An alternative measure, the Count R^2, is generally even higher (in the 0.5 to 0.6 range), indicating that we are able to explain a considerable share of the variation in MPC size across countries.[39]

IV. CONCLUSIONS

Recent research emphasizes the importance of central bank design for the success of monetary policy. One of the features that have received particular interest is the membership size of the central bank's decision-making body—that is, how many people should decide whether to take measures to achieve a specified monetary policy target?

In theory, the membership size of an MPC depends on the costs and benefits of appointing members. On the benefit side, larger MPCs promise improvements in information processing along the lines of Condorcet's jury theorem. At the same time, decision making typically becomes more difficult and time consuming as the number of MPC members increases. Also, members may have a stronger incentive to "freeride" on the information-processing efforts of others in larger MPCs. Since factors affecting the costs and benefits of board size are likely to differ across countries (e.g., the information-processing requirement might vary with the size and diversity of the economy), it seems reasonable to assume that also "the efficient size of a policy committee might vary across countries" (Goodfriend 2005, p. 85).

[39] As a robustness check, we also performed (unreported) OLS regressions. While the coefficient estimates

(continued…)

Around the world, central bank boards do indeed come in different sizes. In New Zealand, for instance, the governor alone is responsible for policy-making, while the European Central Bank (ECB) Governing Council currently comprises 19 members. Moreover, the pending increase in euro area membership has triggered a preemptive ECB reform that generally limits the overall number of voting members to 21. This, however, still seems to be a relatively large number compared with the membership size of other central bank decision-making bodies such as the U.S. Federal Reserve's Federal Open Market Committee. The average MPC in our sample of central banks has 7–9 members.

In this paper, we characterize differences in the structure of central bank governance. Our analysis is based on a dataset that covers the (de jure) membership size of 84 central bank boards around the world at the end of 2003 that make decisions on whether to increase or decrease interest rates to achieve a specified target.[40] We find that board size is indeed significantly and plausibly correlated to various country and central bank characteristics. For instance, MPC size tends to increase with country size and population heterogeneity, thereby providing empirical support for the notion that information-processing requirements affect central bank board size. There is also evidence that MPC size is correlated to political institutions, with more democratic countries having, on average, larger boards. For some variables, we find a hump-shaped effect on MPC size.

Finally, although the size of the central bank's policy committee has been the focus of much debate recently, there are indications that it should not be viewed as independent of other features of central bank design. MPC size is often associated with other central bank

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were qualitatively unchanged, the adjusted R^2 values were typically on the upper end of that range.

characteristics. For instance, central banks tend to have larger MPCs if they have more staff or higher operational expenditure. More importantly, countries with floating exchange rate regimes, which typically have more complicated monetary policy frameworks, also seem to operate larger boards. Along similar lines, we find that more independent central banks often have larger MPCs. Viewed in conjunction with the results discussed previously, this suggests that the institutional setup of central banks may indeed be tailored to reflect country-specific factors.

[40] In a companion paper, Berger and Nitsch (2007), we examine the effect of various features of MPC design on the outcome of monetary policy.

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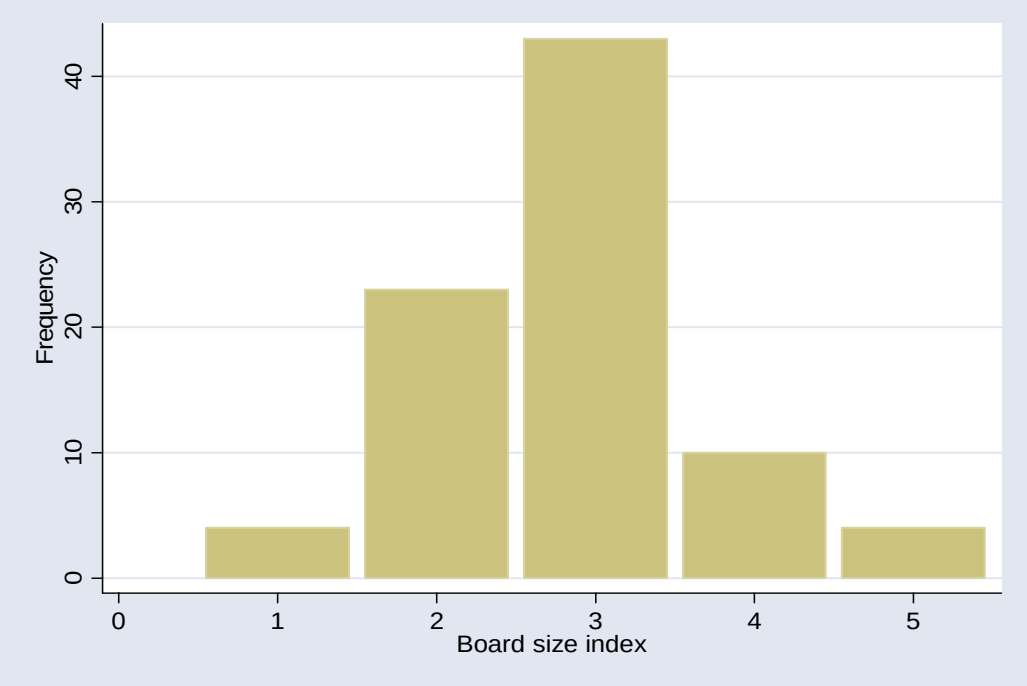
Figure 1. Histogram of Board Size



N = 84 / mean = 2.85 / std. dev. = 0.87

Table 1. Characterizing MPCs: Size

	Obs.	Bivariate ordered probit	Augmented ordered probit	Probit with binary dep. variable
Population	84	0.009** (0.002)	0.010** (0.002)	0.02* (0.01)
Area	84	0.22** (0.04)	0.19** (0.07)	0.29# (0.16)
Real GDP (USD)	81	0.15** (0.03)	-0.13 (0.12)	2.71# (1.58)
Log Real GDP (USD)	81	0.20** (0.06)	0.31** (0.09)	0.23** (0.08)
Real GDP (PPP)	79	0.19** (0.05)	-0.07 (0.13)	2.07* (0.97)
Log Real GDP (PPP)	79	0.25** (0.07)	0.28* (0.12)	0.26** (0.10)

Note: Standard errors are in parentheses. **, * and # denote significant at the 0.01, 0.05 and 0.10 level, respectively.

Table 2. Characterizing MPCs: Heterogeneity

	Obs.	Bivariate ordered probit	Augmented ordered probit	Probit with binary dep. variable
Ethnolinguistic Fractionalization	50	1.12* (0.55)	1.04# (0.61)	0.97 (0.67)
Ethnic Fractionalization, CH	64	0.009# (0.005)	0.007 (0.006)	0.007 (0.006)
Ethnic Fractionalization, ADEKW	38	0.19 (0.72)	-0.40 (0.89)	0.77 (0.93)
Linguistic Diversity	84	0.21 (0.39)	0.21 (0.40)	0.48 (0.49)
Linguistic Fractionalization	80	-0.04 (0.44)	-0.21 (0.50)	-0.08 (0.55)
Religious Fractionalization	83	0.75 (0.53)	0.65 (0.55)	0.90 (0.63)
Gini Coefficient	62	-0.003 (0.012)	-0.01 (0.01)	-0.02 (0.02)
Geographic Dispersion	59	0.07 (0.74)	0.04 (0.70)	-0.55 (0.91)
Administrative Divisions	83	0.006# (0.003)	0.002 (0.002)	0.02* (0.01)

Note: Standard errors are in parentheses. **, * and # denote significant at the 0.01, 0.05 and 0.10 level, respectively.

Table 3. Characterizing MPCs: Level of Development and Openness

	Obs.	Bivariate ordered probit	Augmented ordered probit	Probit with binary dep. variable
Real GDP per capita (USD)	83	-0.006 (0.015)	-0.02 (0.01)	-0.0001 (0.015)
Real GDP per capita (PPP)	80	0.004 (0.017)	-0.006 (0.017)	0.009 (0.018)
Human Development Index	61	0.48 (0.79)	1.47 (1.05)	0.56 (1.01)
Urbanization	84	0.003 (0.005)	0.008 (0.006)	0.38 (0.65)
M3	80	-0.0007 (0.0034)	0.0009 (0.0035)	0.003 (0.004)
Domestic Bank Credit	80	0.0003 (0.0023)	-0.002 (0.003)	-0.00002 (0.00246)
Trade Openness	78	-0.005 (0.003)	-0.002 (0.003)	-0.003 (0.004)
Landlocked	83	-0.57* (0.26)	-0.51# (0.28)	-0.45 (0.33)
Business Cycle Correlation	83	0.27 (0.41)	0.44 (0.38)	0.26 (0.50)

Note: Standard errors are in parentheses. **, * and # denote significant at the 0.01, 0.05 and 0.10 level, respectively.

Table 4. Characterizing MPCs: Political Regime

	Obs.	Bivariate ordered probit	Augmented ordered probit	Probit with binary dep. variable
Democracy	76	0.05 (0.03)	0.05 (0.03)	0.06 (0.04)
Autocracy	76	-0.07 (0.05)	-0.07 (0.05)	-0.06 (0.05)
Polity	76	0.03 (0.02)	0.03 (0.02)	0.03 (0.02)
Political Rights	84	-0.07 (0.06)	-0.12* (0.06)	-0.09 (0.07)
Civil Rights	84	-0.07 (0.08)	-0.16* (0.08)	-0.08 (0.09)
Economic Freedom	63	-0.10 (0.18)	0.12 (0.21)	-0.09 (0.18)
Economic Security	46	0.47 (0.72)	2.37* (1.17)	0.30 (1.07)
Voice & Accountability	84	0.18 (0.16)	0.44** (0.16)	0.23 (0.18)
Political Stability	82	0.06 (0.13)	0.36* (0.14)	0.18 (0.16)
Government Effectiveness	83	0.12 (0.15)	0.62** (0.19)	0.22 (0.17)
Regulatory Quality	84	0.14 (0.17)	0.40* (0.19)	0.27 (0.17)
Rule of Law	84	0.08 (0.14)	0.71** (0.24)	0.18 (0.16)
Deficit	61	-0.02 (0.03)	0.02 (0.03)	0.004 (0.050)
Debt	50	0.009* (0.004)	0.007# (0.004)	0.011 (0.007)

Note: Standard errors are in parentheses. **, * and # denote significant at the 0.01, 0.05 and 0.10 level, respectively.

Table 5. Characterizing MPCs: Central Bank Characteristics

	Obs.	Bivariate ordered probit	Augmented ordered probit	Probit with binary dep. variable
Central Bank Independence	84	-0.004 (0.140)	-0.10 (0.15)	0.05 (0.18)
CB Independence Score	59	-0.004 (0.009)	0.02* (0.01)	0.02# (0.01)
Goal Independence	84	-0.26 (0.32)	-0.46 (0.28)	-0.04 (0.37)
Price Stability Focus	59	-0.56 (0.81)	-0.39 (1.11)	-0.05 (1.07)
Target Independence	84	0.17 (0.23)	0.15 (0.24)	-0.005 (0.296)
Target Independence Score	59	-0.33 (0.41)	-0.46 (0.44)	-0.32 (0.66)
Instrument Independence	84	0.13 (0.25)	0.28 (0.26)	0.23 (0.30)
Instrument Independence Score	59	-0.04 (0.53)	1.24** (0.42)	1.45** (0.60)
Limited or No Autonomy	84	-0.60# (0.32)	-0.70* (0.34)	-0.77 (0.59)
Limited Central Bank Financing of Government Deficit	59	-0.37 (0.57)	1.41** (0.54)	0.75 (0.75)
Authority over Exchange Rate Policy	84	0.06 (0.24)	0.05 (0.27)	0.14 (0.30)
Goal Independence or Exchange Rate Policy Authority	84	-0.16 (0.25)	-0.31 (0.25)	0.07 (0.32)
Fixed Exchange Rate, RR	84	0.26 (0.25)	0.43 (0.28)	0.57 (0.46)
Floating Exchange Rate, RR	84	0.90* (0.37)	0.57 (0.50)	7.71** (0.16)
Fixed Exchange Rate, LYS	84	0.04 (0.23)	0.32 (0.23)	0.22 (0.29)
Floating Exchange Rate, LYS	84	0.67** (0.26)	0.51# (0.27)	0.56# (0.33)
Fixed Exchange Rate, IMF	84	-0.45# (0.24)	-0.31 (0.27)	-0.21 (0.31)
Floating Exchange Rate, IMF	84	0.40# (0.23)	0.22 (0.25)	0.15 (0.29)
Term Length	65	-0.04 (0.08)	-0.12 (0.08)	-0.09 (0.09)
Term Length in CB Law	84	0.22 (0.23)	0.05 (0.24)	0.18 (0.36)
Staff	84	0.10** (0.03)	0.03** (0.01)	0.05* (0.02)
Log Staff	84	0.50** (0.09)	0.47** (0.15)	0.54** (0.16)
Staff % Population	84	-7.31 (8.31)	-2.04 (7.77)	-10.42 (8.64)
Operating Expenditures	65	0.52** (0.19)	0.32 (0.38)	3.01# (1.82)

Table 5 (concluded). Characterizing MPCs: Central Bank Characteristics

Log Operating Expenditures	65	0.28** (0.09)	0.41* (0.18)	0.24# (0.13)
Establishment Year	84	-0.0005 (0.0020)	-0.0009 (0.0021)	-0.0005 (0.0030)
Establishment Year (>1900)	77	-0.008 (0.006)	-0.006 (0.007)	-0.006 (0.006)

Note: Standard errors are in parentheses. **, * and # denote significant at the 0.01, 0.05 and 0.10 level, respectively.

Table 6. Quadratic Results

Variable	Coefficient 1	Std. dev.	Coefficient 2	Std. dev.
Population	0.018**	(0.007)	-0.00004#	(0.00002)
Area	0.172	(0.139)	0.005	(0.012)
Real GDP (USD)	0.459	(0.362)	-0.033	(0.035)
Real GDP (PPP)	0.850#	(0.443)	-0.069	(0.042)
Ethnolinguistic Fractionalization	-0.218	(2.228)	1.538	(2.566)
Ethnic Fractionalization, CH	-0.010	(0.021)	0.0002	(0.0002)
Ethnic Fractionalization, ADEKW	-0.666	(2.733)	1.036	(3.197)
Linguistic Diversity	-4.954	(1.605)	0.818	(1.772)
Linguistic Fractionalization	-1.484	(1.609)	1.712	(1.876)
Religious Fractionalization	-2.340	(2.030)	3.652	(2.364)
Gini Coefficient	0.031	(0.071)	-0.0004	(0.0008)
Geographic Dispersion	0.311	(3.785)	-0.205	(3.494)
Administrative Divisions	0.024*	(0.011)	-0.0001*	(0.00005)
Real GDP per capita (USD)	0.030	(0.038)	-0.001	(0.002)
Real GDP per capita (PPP)	0.043	(0.042)	-0.001	(0.002)
Human Development Index	1.027	(7.154)	-0.411	(5.479)
Urbanization	0.026	(0.020)	-0.0002	(0.0002)
M3	0.005	(0.010)	-0.00003	(0.00005)
Domestic Bank Credit	-0.005	(0.006)	0.00002	(0.00002)
Trade Openness	-0.016#	(0.008)	0.00005	(0.00003)
Business Cycle Correlation	0.526	(0.416)	-0.931	(1.322)
Democracy	0.083	(0.136)	-0.003	(0.014)
Autocracy	-0.155	(0.130)	0.011	(0.016)
Polity	0.033	(0.024)	-0.00009	(0.0041)
Political Rights	0.096	(0.287)	-0.023	(0.038)
Civil Rights	0.553	(0.411)	-0.086	(0.054)
Economic Freedom	0.427	(1.969)	-0.040	(0.150)
Economic Security	4.039*	(2.004)	-3.713#	(2.029)
Voice & Accountability	0.196	(0.154)	-0.255	(0.165)
Political Stability	0.014	(0.140)	-0.185	(0.127)
Government Effectiveness	0.330*	(0.140)	-0.307*	(0.128)
Regulatory Quality	0.138	(0.173)	-0.252#	(0.136)
Rule of Law	0.399**	(0.145)	-0.408**	(0.146)
Deficit	-0.017	(0.024)	0.004	(0.004)
Debt	0.029**	(0.011)	-0.0002*	(0.00007)
Central Bank Independence	1.251	(0.650)	-0.233	(0.126)
CB Independence Score	0.072	(0.045)	-0.0004	(0.0003)
Price Stability Focus	1.272	(2.055)	-0.579	(1.760)
Target Independence Score	3.192*	(1.242)	-3.087*	(1.275)
Instrument Independence Score	2.212	(1.861)	-0.786	(1.646)
Lim. CB Financing of Gov't Deficit	7.912#	(4.505)	-5.437#	(3.177)
Term Length	-0.590**	(0.204)	0.040**	(0.012)
Staff	0.131**	(0.043)	-0.001#	(0.0005)
Staff % Population	-1.902	(21.51)	-73.4	(208.7)
Staff % Population	-1.902	(21.51)	-73.4	(208.7)
Operating Expenditures	1.909#	(1.000)	-0.0004#	(0.0003)

Notes: The table reports the results of an ordered probit regression of the following equation: $MPC = \alpha + \beta x + \gamma x^2 + \varepsilon$, where β is coefficient 1 and γ is coefficient 2. Standard errors are in parentheses. **, * and # denote significant at the 0.01, 0.05 and 0.10 level, respectively. Evaluation calculates $\beta x + \gamma x^2$ based on the estimated coefficients and the mean of the respective variables—excluding those non-significant.

Table 7. Empirical Determinants of MPC Size

Population	0.744** (0.254)		0.533 (0.325)	0.730 (0.456)	0.599* (0.263)	0.874** (0.278)	0.908* (0.435)	1.540** (0.394)
Area		0.186* (0.081)						
Real GDP per capita (USD)	-0.431* (0.175)	-0.463** (0.175)	-0.473* (0.200)	-0.593** (0.227)	-0.389* (0.174)	-0.608** (0.185)	-0.697** (0.236)	-0.378 (0.244)
Landlocked	-0.428 (0.280)	-0.485# (0.283)	-0.563# (0.294)	-0.990** (0.368)	-0.433 (0.279)	-0.544# (0.320)	-0.842** (0.320)	-0.931** (0.415)
Voice & Accountability	0.425** (0.156)	0.382* (0.166)	0.386* (0.177)	0.395* (0.158)	0.375* (0.154)	0.707** (0.212)	0.429* (0.179)	0.497** (0.253)
Staff	0.385** (0.131)	0.709 (0.464)	0.444** (0.169)	0.376# (0.217)	0.410** (0.120)	0.360** (0.087)	0.345# (0.200)	0.765 (0.508)
Trade Openness			-0.004 (0.003)					
Business Cycle Correlation			0.573 (0.447)					
CB Independence Score				0.020* (0.009)				
Float'g Exchange Rate, LYS					0.482# (0.284)			
Term Length						-0.457# (0.271)		
Term Length Squared						0.022 (0.016)		
Lim. CB Financing of Gov't Def.							1.109# (0.601)	
Ethnolinguistic Fractionalization								1.485* (0.618)
Number Observations	83	83	78	53	83	64	53	50
Count R2	0.542	0.530	0.551	0.604	0.530	0.563	0.604	0.580
Pseudo-R2	0.334	0.568	0.368	0.492	0.356	0.477	0.469	0.431

Notes: Ordered probit regression. Dependent variable is board size index. Pseudo-R^2 is the McKelvey and Zavoina R^2. Standard errors are in parentheses. **, * and # denote significant at the 0.01, 0.05 and 0.10 level, respectively.

APPENDIX I. COUNTRIES IN THE SAMPLE

Angola	Namibia
Argentina	Nepal
Armenia	Nicaragua
Australia	Nigeria
Bahamas, The	Norway
Bahrain	Oman
Barbados	Pakistan
Bolivia	Paraguay
Bosnia and Herzegovina	Peru
Botswana	Philippines
Brazil	Poland
Bulgaria	Qatar
Cambodia	Romania
Canada	Russian Federation
Cape Verde	Rwanda
Chile	Serbia and Montenegro
Colombia	Sierra Leone
Croatia	Singapore
Cyprus	Slovenia
Czech Republic	South Africa
El Salvador	Sudan
Estonia	Sweden
Fiji	Switzerland
Georgia	Tajikistan
Guatemala	Tanzania
Honduras	Trinidad and Tobago
Hungary	Tunisia
Iceland	Turkey
Jamaica	Turkmenistan
Japan	Ukraine
Jordan	United Arab Emirates
Kazakhstan	United Kingdom
Kenya	United States
Korea, Rep. of	Uzbekistan
Kuwait	Venezuela, República Bolivariana de
Kyrgyz Republic	Yemen, Rep. of
Lao PDR	Zambia
Latvia	
Lesotho	
Liberia	
Lithuania	
Macedonia, FYR of	
Madagascar	
Malawi	
Malaysia	
Moldova	
Mozambique	

II. DEFINITIONS AND SOURCES OF VARIABLES

Variable	Description	Source
MPC	Board size index; implementation board	Lybek and Morris
Population	Total population	Rose
Area	Land area	Rose
Real GDP (USD)	Real GDP in US dollar	Rose
Real GDP (PPP)	Real GDP in PPP terms	Rose
Ethnolinguistic Fractionalization	Ethnolinguistic Fractionalization, Mauro	Rose
Ethnic Fractionalization, CH	Ethnic Fractionalization, Collier & Hoeffler	Rose
Ethnic Fractionalization, ADEKW	Ethnic Fractionalization, Alesina et al.	Rose
Linguistic Diversity	Linguistic Diversity, Ethnologue	Rose
Linguistic Fractionalization	Linguistic Fractionalization, Alesina et al.	Rose
Religious Fractionalization	Religious Fractionalization, Collier & Hoeffler	Rose
Gini Coefficient	Gini Coefficient, CIA World Factbook	Rose
Geographic Dispersion	Geographic Dispersion, Collier & Hoeffler	Rose
Administrative Divisions	Number of first-order administrative divisions	CIA World Factbook
Real GDP per capita (USD)	Real GDP per capita in US dollar, WDI	Rose
Real GDP per capita (PPP)	Real GDP per capita in PPP terms, WDI	Rose
Human Development Index	Human development index, UNDP	Rose
Urbanization	Urban population/Total population, WDI	Rose
M3	M3/GDP, WDI	Rose
Domestic Bank Credit	Domestic bank credit/GDP, WDI	Rose
Trade Openness	(Exports+Imports)/GDP, WDI	Rose
Landlocked	Dummy =1 if country is landlocked	Rose
Business Cycle Correlation	Correlation with world GDP, 20-year average	IFS
Democracy	Democracy index, Polity IV (10 = democratic)	Rose
Autocracy	Autocracy index, Polity IV (10 = autocratic)	Rose
Polity	Polity index, Polity IV (-10 = autocratic; 10 = democratic)	Rose
Political Rights	Political rights index, Freedom House	Rose
Civil Rights	Civil rights index, Freedom House	Rose
Economic Freedom	Freedom status, Freedom House	Rose
Economic Security	Economic security index, ILO	Rose
Voice & Accountability	Voice & Accountability, World Bank	Rose
Political Stability	Political Stability, World Bank	Rose
Government Effectiveness	Government Effectiveness, World Bank	Rose
Regulatory Quality	Regulatory Quality, World Bank	Rose
Rule of Law	Rule of Law, World Bank	Rose

Deficit	Overall budget balance/GDP, 10-year average	WDI
Debt	Central government debt/GDP, 20-year average	WDI
Central Bank Independence	Summary index (goal = 1; target = 2; instrument = 3; other = 4)	Lybek and Morris
CB Independence Score	Independence score (0 = low; 100 = high)	Fry et al. (BoE)
Goal Independence	Dummy = 1 if CB has goal independence	Lybek and Morris
Price Stability Focus	Statutory/legal objectives focus on price stability? (0 = weak; 1 = strong)	Fry et al. (BoE)
Target Independence	Dummy = 1 if CB has target independence	Lybek and Morris
Target Independence Score	Independence score (0 = low; 1 = high)	Fry et al. (BoE)
Instrument Independence	Dummy = 1 if CB has instrument independence	Lybek and Morris
Instrument Independence Score	Independence score (0 = low; 1 = high)	Fry et al. (BoE)
Limited or No Autonomy	Dummy = 1 if CB has goal independence	Lybek and Morris
Limited Central Bank Financing of Government Deficit	Independence score (0 = low; 1 = high)	Fry et al. (BoE)
Authority over Exchange Rate Policy	Dummy = 1 if CB has authority over exchange rate policy	Lybek and Morris
Goal Independence or Exchange Rate Policy Authority	Dummy = 1 if CB has either goal independence or authority over exchange rate policy	Lybek and Morris
Fixed Exchange Rate, RR	Dummy = 1 if fixed exchange rate regime	Reinhart and Rogoff
Floating Exchange Rate, RR	Dummy = 1 if floating exchange rate regime	Reinhart and Rogoff
Fixed Exchange Rate, LYS	Dummy = 1 if fixed exchange rate regime	Levy-Y. & Sturzenegger
Floating Exchange Rate, LYS	Dummy = 1 if floating exchange rate regime	Levy-Y. & Sturzenegger
Fixed Exchange Rate, IMF	Dummy = 1 if fixed exchange rate regime	IMF
Floating Exchange Rate, IMF	Dummy = 1 if floating exchange rate regime	IMF
Term Length	Term length of board members (de jure)	Lybek and Morris
Term Length in CB Law	Dummy = 1 if term length stipulated in central bank law	Lybek and Morris
Staff	Staff number	Central Bank Directory
Staff % Population	Staff/Population	Central Bank Directory & Rose
Operating Expenditures	Operating expenditures	Ize
Establishment Year	Establishment year	Central Bank Directory

III. DESCRIPTIVE STATISTICS

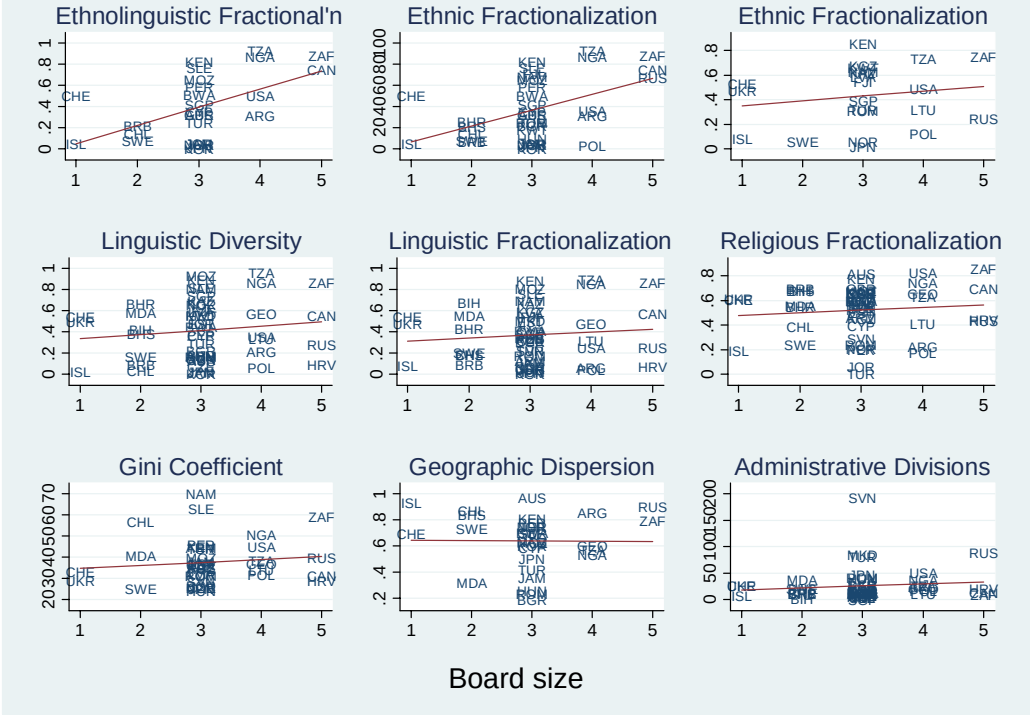
Variable	Obs.	Mean	Std. Dev.	Min.	Max.
MPC	84	2.85	0.87	1	5
Population	98	37.44	132.02	0.27	1262.65
Area	98	0.997	2.588	0.0004	17.075
Real GDP (USD)	95	0.313	1.194	0.0004	10.300
Real GDP (PPP)	93	0.430	1.308	0.002	10.300
Ethnolinguistic Fractionalization	62	0.38	0.29	0.00	0.93
Ethnic Fractionalization, CH	77	36.92	27.70	0.00	93.00
Ethnic Fractionalization, ADEKW	47	0.42	0.25	0.01	0.86
Linguistic Diversity	98	0.43	0.29	0.003	0.99
Linguistic Fractionalization	94	0.37	0.27	0.002	0.90
Religious Fractionalization	97	0.46	0.23	0.002	0.86
Gini Coefficient	74	40.00	10.83	24.40	70.00
Geographic Dispersion	72	0.63	0.18	0.19	0.97
Administrative Divisions	97	22.65	29.35	0	195
Real GDP per capita (USD)	94	10.02	9.53	0.46	35.13
Real GDP per capita (PPP)	97	7.48	10.09	0.13	39.32
Human Development Index	74	0.74	0.17	.34	0.95
Urbanization	98	59.10	22.60	6.15	100.00
M3	85	48.80	38.26	8.17	193.41
Domestic Bank Credit	94	65.14	57.20	3.83	317.22
Trade Openness	91	83.14	38.08	20.18	228.88
Landlocked	98	0.21	0.41	0	1
Business Cycle Correlation	97	0.18	0.31	-0.49	0.80
Democracy	90	6.03	3.78	0	10
Autocracy	90	1.68	2.83	0	10
Polity	90	4.36	6.36	-10	10
Political Rights	98	3.18	2.09	1	7
Civil Rights	98	3.36	1.69	1	7
Economic Freedom	76	6.65	0.96	4.66	8.56
Economic Security	58	0.52	0.23	0.05	0.98
Voice & Accountability	98	0.14	0.92	-1.75	1.64
Political Stability	96	0.17	0.98	-2.38	1.73
Government Effectiveness	97	0.23	1.04	-1.58	2.48
Regulatory Quality	98	0.25	0.91	-2.14	2.27
Rule of Law	98	0.25	1.07	-1.52	2.22
Deficit	82	-2.90	3.34	-13.65	10.85
Debt	76	49.23	35.76	0	189.53
Central Bank Independence	98	2.67	0.83	1	4
CB Independence Score	93	73.5	16.2	24	98
Goal Independence	98	0.16	0.37	0	1
Price Stability Focus	93	0.76	0.20	0	1
Target Independence	98	0.42	0.50	0	1
Target Independence Score	93	0.58	0.31	0	1
Instrument Independence	98	0.35	0.48	0	1
Instrument Independence Score	93	0.82	0.29	0	1

Limited or No Autonomy	98	0.07	0.26	0	1
Limited Central Bank Financing of Government Deficit	93	0.76	0.27	0	1
Authority over Exchange Rate Policy	98	0.09	0.29	0	1
Goal Indep. or Exch. Rate Policy Auth.	98	0.33	0.47	0	1
Fixed Exchange Rate, RR	98	0.22	0.42	0	1
Floating Exchange Rate, RR	98	0.06	0.24	0	1
Fixed Exchange Rate, LYS	98	0.45	0.50	0	1
Floating Exchange Rate, LYS	98	0.30	0.46	0	1
Fixed Exchange Rate, IMF	98	0.37	0.48	0	1
Floating Exchange Rate, IMF	98	0.53	0.50	0	1
Term Length	70	5.19	1.97	3	14
Term Length in CB Law	98	0.84	0.37	0	1
Staff	89	4.04	18.03	0.10	150.00
Staff % Population	89	0.01	0.01	0.002	0.09
Operating Expenditures	99	0.243	0.567	0.004	3.626
Establishment Year	98	1939	59.33	1668	1997

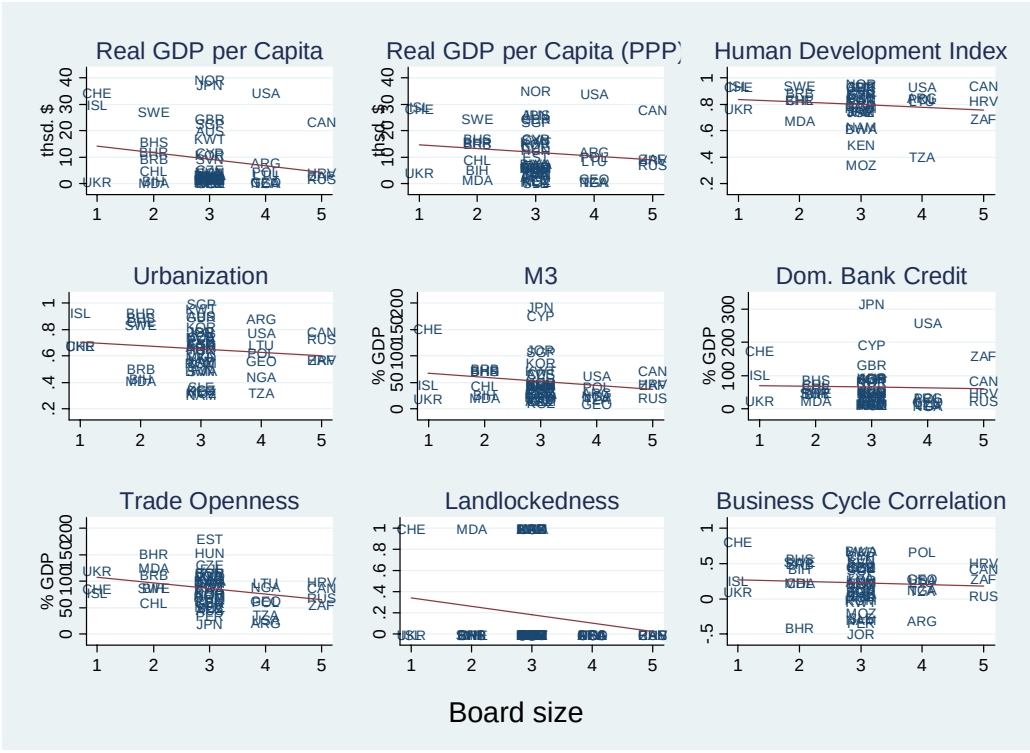
IV. SCATTER PLOTS

Panel A1: Size

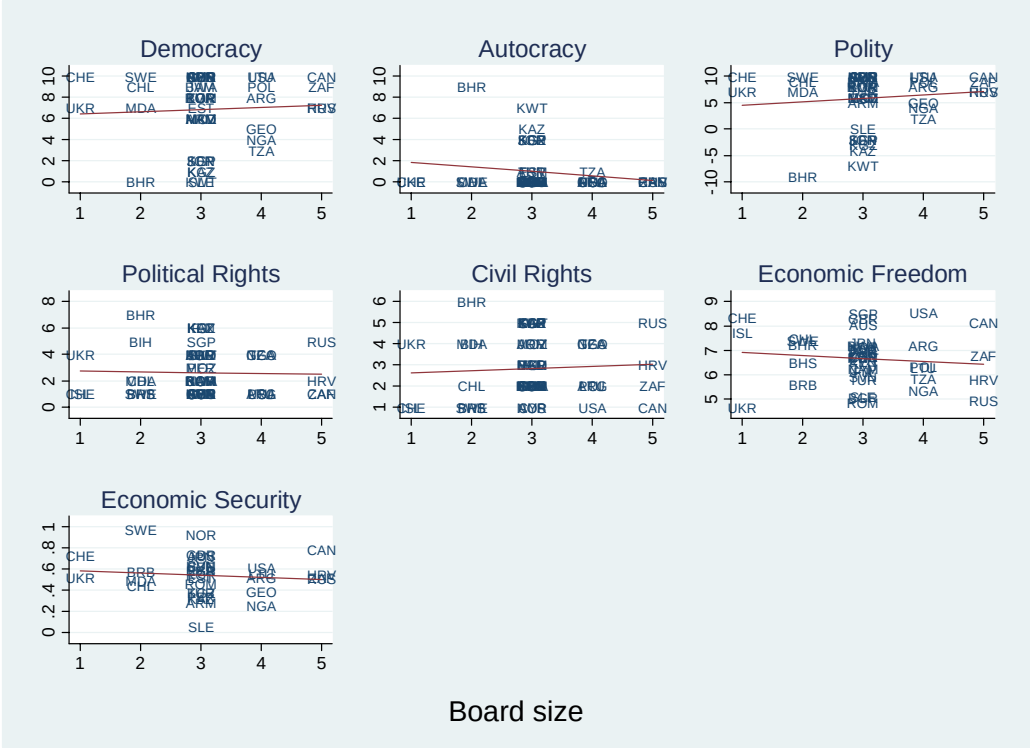
Panel A2: Heterogeneity



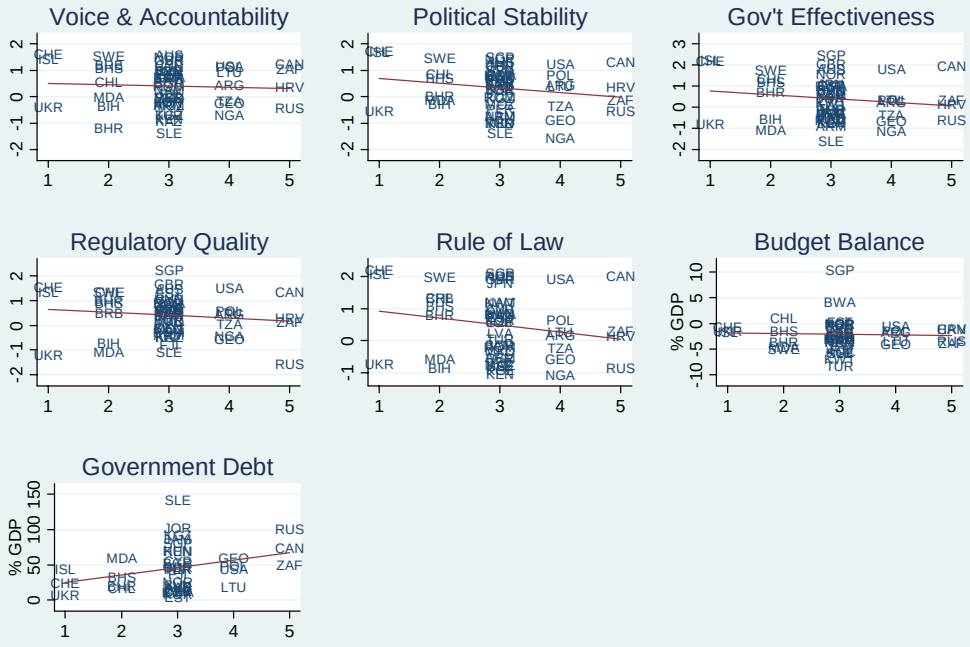
Panel B: Level of Development and Openness



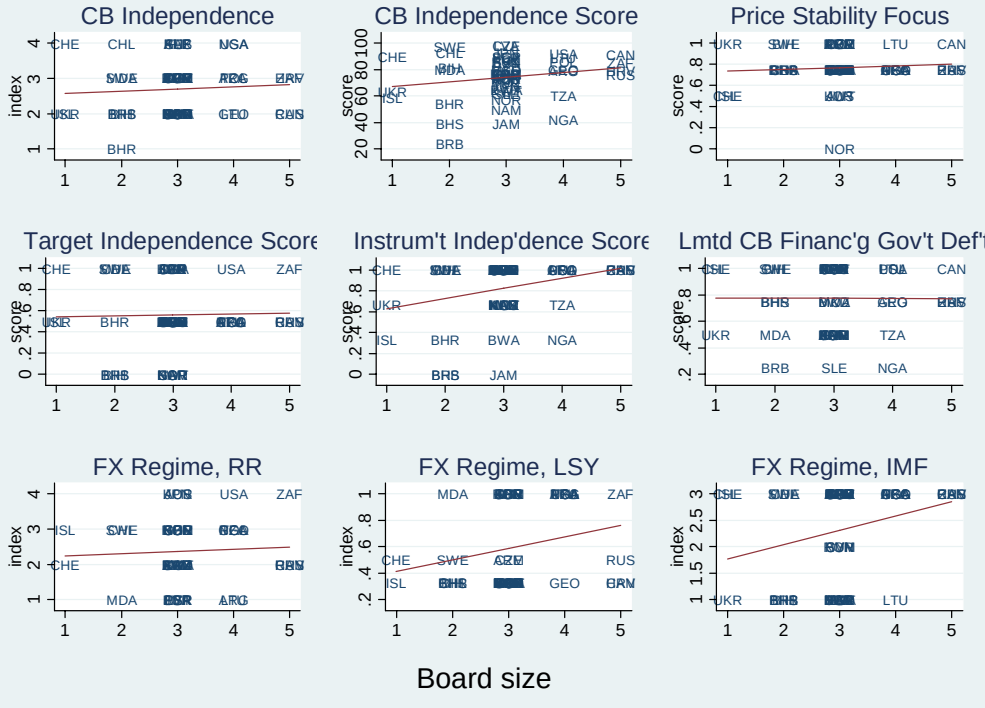
Panel C: Political Regime



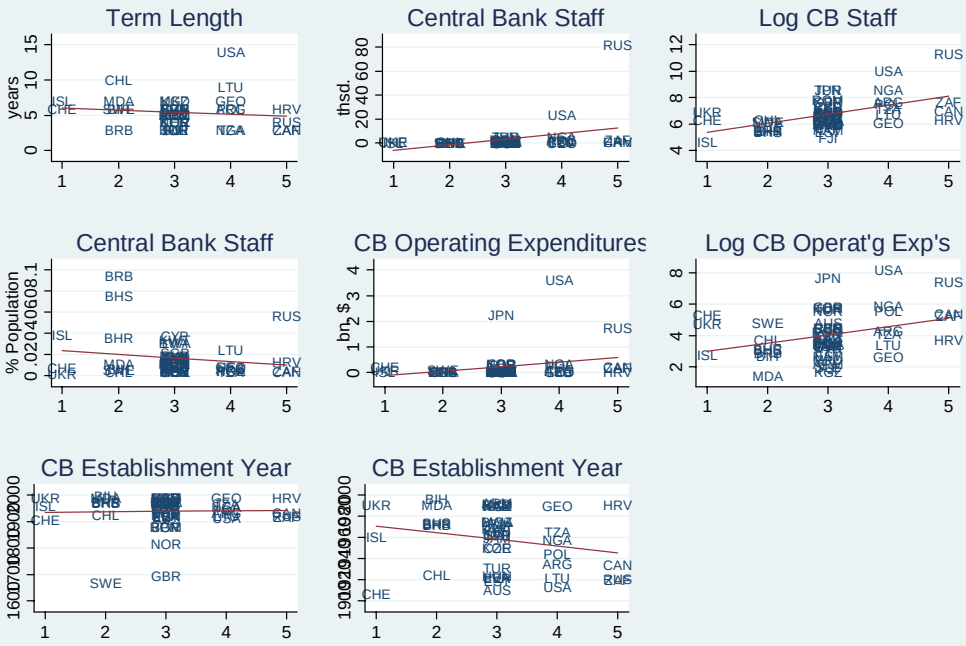
Panel C (*concluded*): Political Regime



Panel D: Central Bank Characteristics



Panel D (*concluded*): Central Bank Characteristics



V. BOARD SIZE AND TERM LENGTH