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## What Determines Institutional Arrangements for Macprudential Policy?

Eri Egawa\*, Akira Otani\*\*, and Toshiyuki Sakiyama\*\*\*

### Abstract

We use information on institutional arrangements for macroprudential policy in 66 countries to examine the recent developments in and characteristics on institutional arrangements for macroprudential policy. Then we conduct empirical analyses on drivers behind the choice of institutional arrangements, especially the roles of a central bank and a government. We show that many countries have recently developed their institutional arrangements with respect to the set-up of a mandate for macroprudential policy and a multi-agency communication/coordination framework. In addition, the current arrangements can be largely divided into two types: *centralization in the central bank*, where the central bank or a committee of the central bank is the sole owner of the macroprudential mandate; and *coordination by the government*, where the government coordinates views or policies among multiple agencies with the macroprudential mandate as the sole chairperson of the financial stability committee. Our empirical analyses suggest that wide-ranging features including economic and financial characteristics, the exchange rate regime, and the degree of democracy influence the differences in the roles the central bank and the government play in macroprudential policy in each country.

**Keywords:** Macroprudential policy; Ordered probit analyses; Institutional arrangements; Financial stability committee

**JEL classification:** E58, E61, G28, O57

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## 1. Introduction

In the wake of the financial crisis in 2007–08, macroprudential policy has become increasingly important to international financial circles as a useful tool to address financial stability, which underpins the stability of the macroeconomy jointly with price stability. For example, in March 2009, a report by the G20 stated that a macroprudential approach should address the stability of the financial system as a supplement to microprudential regulation and market integrity regulation.<sup>1</sup> Against this background, as pointed out by Clement (2010), the term “macroprudential” has become a buzzword.<sup>2</sup> What, however, does macroprudential policy actually mean?

Since the global financial crisis, efforts have been made around the globe to clarify the meaning of macroprudential policy. The International Monetary Fund (IMF) (2011a) as well as the Financial Stability Board (FSB), IMF, and Bank for International Settlements (BIS) (2011) provided a formal definition of macroprudential policy as “*a policy that uses primarily prudential tools to limit systemic or system-wide financial risk, thereby limiting the incidence of disruptions in the provision of key financial services that can have serious consequences for the real economy.*” The defining elements of macroprudential policy are the objective, the scope of the analysis, and policy instruments.<sup>3</sup> These papers emphasize, however, that institutional arrangements are another core element for ensuring effective implementation of macroprudential policy.

Two elements play key roles in effective institutional arrangements for macroprudential policy: (1) authorities with a clear mandate for macroprudential policy; and (2) a

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<sup>1</sup> See G20 Working Group 1 (2009).

<sup>2</sup> Clement (2010) reported that a quick Internet search on use of the term “macroprudential” revealed no fewer than 123,000 hits from January 2008, while there were only about 5,000 hits for the period between 2000 and the end of 2007.

<sup>3</sup> With respect to instruments for macroprudential policy tools, the FSB, IMF, and BIS (2011) discuss tools in terms of a time dimension to address the buildup of financial risk and procyclicality such as interaction between the financial risk and the real economy, and tools in terms of a cross-sectional dimension to address the spillover of risks among financial institutions through their interconnectedness. For empirical studies on the effect of these tools, see Lim *et al.* (2011).

mechanism for policy coordination and communication of assessment of the issues related to financial stability (IMF [2011a]). The need to identify authorities with such a mandate shows that it is indispensable to clarify who is responsible for decision making for timely policy action, because multiple agencies may become involved in macroprudential policy, which includes a range of processes such as analysis of systemic risk and interaction with other economic policies, decision making, and calibration of policy instruments. The need to establish a mechanism for coordination and communication among policies or agencies arises because macroprudential policy is linked to other economic policies and the involvement of multiple agencies requires effective coordination and communication.

Institutional arrangements for macroprudential policy vary among jurisdictions. In the United States, the formal mandate for macroprudential policy is given to the Financial Stability Oversight Council as well as multiple regulatory and supervisory authorities. The heads of nine agencies, including these regulatory and supervisory authorities,<sup>4</sup> are members with voting rights in the council, and the Secretary of the Treasury chairs it as a coordinator. In Singapore, in stark contrast to the United States, the central bank plays a unitary role both in microprudential and macroprudential policy. That is, the central bank unitarily has not only a microprudential mandate of supervising financial institutions but also a mandate for macroprudential policy as well as the authority to calibrate macroprudential policy tools. These examples show the divergent roles played by the central bank and the government, depending on the country.

However, as far as we know, few empirical analyses have been conducted on what drives the diverse choice of institutional arrangements for macroprudential policy.<sup>5</sup>

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<sup>4</sup> These include Federal Reserve Board, Office of the Comptroller of the Currency, Federal Deposit Insurance Corporation, and Securities and Exchange Commission.

<sup>5</sup> The IMF has intensively studied institutional arrangements for macroprudential policy to propose a typology of existing models of the arrangements. For example, Nier *et al.* (2011) show seven typological models using five key dimensions of existing arrangements: (1) the degree of institutional integration between the central bank and financial regulatory and supervisory functions; (2) the ownership of macroprudential policy; (3) the role of a government in macroprudential policy; (4) the degree to which there is organizational separation of decision making and control over tools; and (5) whether or not there is a coordinating committee.

Accordingly, we expect that empirical research would contribute to the international debate on the key desirables for institutional arrangements and the effort to achieve efficient macroprudential arrangements.

This paper aims to clarify empirically the elements causing differences in the choice of institutional arrangements for macroprudential policy. In 2010, the IMF conducted a survey of 51 member countries, comprising 23 advanced economies and 28 emerging market economies, on their macroprudential policy frameworks. The IMF (2011b) has summarized the survey results to show several characteristics of the actual institutional arrangements. First, the central bank has a mandate for macroprudential policy in a large majority of countries and the governor of the central bank chairs the financial stability committee<sup>6</sup> in a great number of countries. Second, in some countries the ministry of finance (MOF) representing the government chairs the committee, implying that it tends to play an important role in macroprudential policy<sup>7</sup> as the chairperson or a coordinator of the committee. Based on these findings, our paper analyzes the driving forces behind differences in the choice of the roles a central bank and a government play in macroprudential policy<sup>8</sup>. Since 2010, when the IMF conducted its survey, some countries have put in place their own institutional arrangements. Therefore, we update the information on the respondents to the IMF survey and expand the country list in that survey with more recently available information. Then we use the latest information on the institutional arrangements of 66 countries (32 advanced economies and 34 emerging market economies) to analyze recent trends and characteristics and conduct empirical analyses.

The findings of this paper can be summarized as follows. First, many countries have

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<sup>6</sup> Although the name for the mechanism of policy coordination and communication of the assessment of the issues related to financial stability differs by country, we call it the “financial stability committee,” following the IMF (2011b).

<sup>7</sup> In a number of countries, the ministry of finance is responsible for economic policies as a representative of the government, because it has legislative power on economic policies and accountability to congress. Therefore, in a country where the ministry of finance plays an important role, the government can be considered to play an important role.

<sup>8</sup> See Footnote 32.

recently developed institutional arrangements for macroprudential policy in the sense that they have set up a mandate for macroprudential policy and established a multi-agency communication/coordination framework. Second, the current arrangements can be largely divided into two types: (1) *centralization in the central bank*, in which the central bank or a committee of the central bank is the sole owner of the macroprudential mandate; and (2) *coordination by the government*, where the government coordinates views or policies among multiple agencies with the macroprudential mandate as the sole chairperson of the financial stability committee. The prevalence of types of institutional arrangements, however, varies among the advanced and emerging market economies. While the most prevalent type of institutional arrangements is *coordination by the government* in the advanced economies, *centralization in the central bank* is chosen by the largest portion of the emerging market economies. Third, our empirical analyses suggest that diverse features such as economic and financial characteristics, the exchange rate regime, and the degree of democracy influence the different roles played by the central bank and the government in macroprudential policy.

The paper is structured as follows. Section 2 explains the latest information on institutional arrangements for macroprudential policy. Then, we construct two indices for the roles a central bank and a government play in macroprudential policy and provide actual values for them based on information on the actual institutional arrangements. Section 3 discusses potential determinants of the institutional arrangements for macroprudential policy. Section 4 uses actual data to provide empirical analyses based on two methodologies. Finally, Section 5 concludes with a brief summary of this paper and the implication of our findings for desirable institutional arrangements for macroprudential policy. Appendix I provides detailed data on the explanatory variables. Appendix II provides empirical analyses of factors influencing the degree to which a central bank is engaged in microprudential regulation/supervision and discusses the differences behind the choice of institutional arrangements for microprudential regulation/supervision and macroprudential policy.

## **2. Measuring Institutional Arrangements for Macroprudential Policy**

### **A. Information on Real-life Institutional Arrangements for Macroprudential Policy**

Precedent researches demonstrate that the roles a central bank and a government play in macroprudential policy vary significantly among jurisdictions. In this regard, Lim *et al.* (2013b) quantify the importance of their roles in macroprudential policy by paying special attention to three characteristics of institutional arrangements: (1) ownership of a mandate for macroprudential policy or financial stability; (2) existence of a financial stability committee that facilitates policy coordination and exchange of views among multiple agencies; and (3) the roles a central bank and a government play in the financial stability committee. It should be noted that Lim *et al.* (2013b) assume that both the mandate for macroprudential policy and that for financial stability are important, based on two observations. First, the mandate for macroprudential policy which focuses on the stability of the financial system as a whole is not clarified in a large number of countries, because it is a relatively new concept. Second, for the countries that have not set up a mandate for macroprudential policy, the mandate for financial stability is considered to be an alternative mandate for macroprudential policy, because macroprudential policy is a part of the broad concept of financial stability ranging from the stability of the payment system and individual financial institutions to the stability of the financial system as a whole.<sup>9</sup>

Table 1 shows information on these three characteristics in 66 countries (32 advanced economies and 34 emerging market economies). While the IMF survey in 2010 covers approximately 50 countries in many areas including Asia, the Americas, and Europe, we take account of the regional balance and add 17 countries mainly in the Middle East and

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<sup>9</sup> Because macroprudential policy is a part of the broad concept of financial stability ranging from the stability of the payment system and individual financial institutions to the stability of the financial system as a whole, Lim *et al.* (2013b) use the mandate of financial stability as an alternative mandate for macroprudential policy in countries that have not set up a mandate for macroprudential policy.



Central and Eastern Europe to the country list of the IMF survey.<sup>10</sup> What is important in considering institutional arrangements is how they work in reality rather than what is provided in law. Even in countries with financial stability committees, how they work in reality differs: some countries hold them regularly and others hold them only when threats to financial stability arise. Due to difficulty in obtaining these *de facto* information, however, the description of the institutional arrangements in this paper is not based on a *de facto* basis but a *de jure* basis, referring to Lim *et al.* (2013b). Thus, we use mainly legal sources such as agency settlement laws and memoranda of understanding (MOUs), and various reports on institutional arrangements by national authorities and international organizations, all of which were available through the end of August 2014. Table 1 describes an institution with a mandate for macroprudential policy as an institution that is explicitly given the mandate or the responsibility to address systemic or system-wide financial risk by its settlement law.

Table 1 reveals the following characteristics of the actual institutional arrangements for macroprudential policy:

- *Establishment of a mandate for macroprudential policy/financial stability:* A mandate for macroprudential policy has been established and given to specific agencies in 64 percent of the sample countries.<sup>11</sup> Compared with the IMF survey that showed 43 percent of the respondents had established a mandate for macroprudential policy, our result indicates many countries have recently developed institutional arrangements for macroprudential policy. As for the mandate for financial stability, all sample countries have established it.
- *Ownership of a mandate for macroprudential policy/financial stability:* A mandate for macroprudential policy is given to a single agency in 76 percent of countries

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<sup>10</sup> These comprise Albania, Armenia, Bahrain, Croatia, Cyprus, Denmark, Estonia, Israel, Korea, Kuwait, Lithuania, Luxembourg, Malta, Oman, Qatar, Saudi Arabia, and Slovenia. Jordan is excluded from the country list due to information restrictions. The European Central Bank (ECB) is also excluded, because we do not consider any international arrangements.

<sup>11</sup> A total of 63 percent of countries in the country list of the IMF survey in 2010 have established a mandate for macroprudential policy.

that have established it. The central bank has the mandate in 63 percent of the advanced economies, followed by the financial stability committee (42 percent). On the other hand, in a majority of the emerging market economies (78 percent), the central bank has the mandate, followed by the financial stability committee (44 percent).<sup>12</sup> As for the mandate for financial stability, it is shared by multiple agencies in a majority of the sample countries (67 percent). The central bank has the mandate in every sample country.

- *Existence of a multi-agency communication/coordination process:* Most of the sample countries have established a communication/coordination mechanism (92 percent), in which the central bank always participates as a member or a chair.<sup>13</sup> While some emerging market economies in Asia and Latin America set up a financial stability committee immediately after their currency crises, some advanced economies, especially in Europe, established the committee after 2013<sup>14</sup>.
- *The difference between the roles of the central bank and the government:* A mandate for macroprudential policy/financial stability is more likely to be assigned to the central bank than the government. In contrast, the government is more likely than the central bank to play the role of coordinating interagency communications as the chairperson of such a mechanism for interagency cooperation. As for the mandate for macroprudential policy/financial stability, the central bank has either of the mandates in all the sample countries, in 39 percent of which it is the sole owner of the mandate. On the other hand, the government has either of the mandates in 67 percent of the sample countries, in few of which it is the sole owner of the mandate.

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<sup>12</sup> In some countries, the mandate is given to both the central bank and the financial stability committee. Thus, the sum of the two numbers can exceed 100 percent.

<sup>13</sup> The IMF survey shows that only 44 percent of respondents had a financial stability committee. Our paper's findings on the share of countries that have established a financial stability committee demonstrate that many countries have recently developed institutional arrangements for macroprudential policy.

<sup>14</sup> One of the drivers for the recent establishment of institutional arrangements in Europe was the recommendation by the European Systemic Risk Board (ESRB). In December 2011, ESRB issued a recommendation to advise Member States to provide clarified information on the institutional frameworks for macroprudential policy, especially on the ownership of the mandate for macroprudential policy, by 30 June 2013.

As for the role of the financial stability committee, the government chairs the committee in 45 percent of the countries, while the central bank chairs it in 36 percent of the countries.

## **B. The Role of the Central Bank and the Government**

We construct two indices for the roles of the central bank and the government, referring to Lim *et al.* (2013b). In constructing the indices, we take account of the difference in the roles played by the central bank and the government. The two indices below assign a score of 1 to 3, with the higher value indicating the more important role. We should note that we substitute a mandate for financial stability for a mandate for macroprudential policy in countries that have not established the latter.

- The CB index:<sup>15,16</sup>

1 = The macroprudential policy/financial stability mandate is shared by multiple agencies including the central bank, and the central bank is a member of the financial stability committee<sup>17</sup>.

2 = The mandate is shared by multiple agencies including the central bank, and the central bank chairs the financial stability committee.<sup>18</sup>

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<sup>15</sup> The case in which the mandate is shared by multiple agencies is thought to include the case where the mandate is given solely to the financial stability committee consisting of multiple agencies, except for the case in which the committee is inside the central bank.

<sup>16</sup> The CB index is based on two assumptions. First, when a mandate for macroprudential policy is shared by multiple agencies, a central bank that chairs the financial stability committee has greater influence on macroprudential policy than a central bank that is only a member of the committee. Second, a central bank that is the sole owner of the macroprudential mandate has even greater influence on macroprudential policy than a central bank as a co-owner of the mandate, even if the central bank chairs the financial stability committee.

<sup>17</sup> In the sample countries, there are three countries—Finland, Norway and Sweden—where a governmental agency is the sole owner of the macroprudential policy/financial stability mandate, although the central bank participates in the financial stability committee as a member or the chairperson. Because the degree of involvement of the central bank in macroprudential policy is low in these countries, we consider their CB indices as 1, in which the central bank plays the least important role in macroprudential policy. It should be noted that the empirical results shown in this paper do not significantly change even if we use the data of countries excluding these three countries.

<sup>18</sup> This score of the index includes the cases where the central bank co-chairs the committee with the heads of the other agencies.

3 = The central bank, or a committee of the central bank, is the sole owner of the mandate.

- The Gov index:

1 = There is no financial stability committee, or no governmental agency is a member.

2 = A governmental agency is a member/observer of the financial stability committee.

3 = A governmental agency chairs the financial stability committee.

Table 2 shows the actual values of the CB index and the Gov index in the sample countries, which are constructed from the information of Table 1. Table 2 finds the following characteristics:

- *Differences between advanced and emerging market economies:*<sup>19</sup> The CB index is higher in the emerging market economies than in the advanced economies. The average of the CB index is 1.8 in the advanced economies and 2.1 in the emerging market economies. The result implies that the central banks in emerging market economies play a more leading role in decision making and implementation of macroprudential policy than those in advanced economies. The Gov index, on the other hand, does not exhibit significant difference between the advanced and the emerging market economies: the average is 2.4 in the advanced economies and 2.3 in the emerging market economies.
- *The relation between the CB index and the Gov index:* A higher (lower) value of the

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<sup>19</sup> While the European Union has the ESRB, many member countries have their own financial stability committees. Central banks play leading roles in the ESRB, while governments play leading roles in the financial stability committees of member countries. The difference between the roles played by the central banks and the governments in the ESRB and those they play in the financial stability committees of member countries may be explained by the difference in the mandates of the ESRB and the financial stability committees of member countries. The ESRB is obligated to collect all the relevant and necessary information on systemic risks, identify them, and then issue warnings to member countries. The financial stability committees of member countries, on the other hand, use the warnings to decide on their own macroprudential policy.

CB index is associated with a lower (higher) value of the Gov index in the sample countries. In fact, the rank correlation<sup>20</sup> between the two indices is  $-0.68$ .

The choice of the institutional arrangements concerning the CB index and the Gov index seems to be related to the number of agencies engaged in macroprudential policy. Because a large number of agencies involved in macroprudential policy make policy coordination and communication a challenge, a country with a large number of agencies engaged in macroprudential policy tends to have a lead coordinator. Figure 1 shows that the CB index is high in a country with a small number of agencies engaged in macroprudential policy (that is, a number of members comprising the financial stability committee), while the Gov index increases in countries with a large number of agencies. The result indicates that the government tends to play a key role in facilitating coordination and communication among many agencies, as noted in Lim *et al.* (2013a).

### **C. Types of Institutional Arrangements for Macroprudential Policy**

Based on the two dimensions of the CB index and the Gov index, we can classify conceptually the actual institutional arrangements for macroprudential policy into five types (Table 3):

- *Centralization in the central bank*: The central bank, or a committee of the central bank, is the sole owner of the macroprudential mandate.
- *Coordination by the central bank*: The central bank coordinates views or policies among multiple agencies, to which the macroprudential mandate is assigned, as the sole chairperson of the financial stability committee.
- *Coordination by the government*: The government coordinates views or policies among multiple agencies, to which the macroprudential mandate is assigned, as the sole chairperson of the financial stability committee.
- *Checks and balances*: The central bank and the government constitute the financial

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<sup>20</sup> We use Spearman's rank correlation coefficient to estimate the correlation between ordered indices.

stability committee as co-chairpersons or members with equal authority to discuss and decide on macroprudential policy.

- *Decentralization*: Multiple agencies with the macroprudential mandate decide on macroprudential policy without any coordination or communication mechanism.

The classification of the institutional arrangements based on Table 2 shows that three-quarters of the sample countries choose one of the two types: *centralization in the central bank*<sup>21</sup> or *coordination by the government*.<sup>22</sup> *Centralization in the central bank* occupies the largest share of the sample (39 percent) and *coordination by the government* takes the second largest share (38 percent), followed by *coordination by the central bank*<sup>23</sup> (15 percent) and *checks and balances*<sup>24</sup> (8 percent). *Decentralization* is

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<sup>21</sup> As an example of *centralization in the central bank*, let us examine the institutional arrangement of the United Kingdom. There, the Financial Policy Committee (FPC) of the Bank of England (BOE) has the ownership of a mandate for macroprudential policy. The FPC has 11 members, including one who is non-voting: members from the BOE (the BOE Governor, who is the chairperson, the Deputy Governors for Financial Stability, Monetary Policy and Prudential Regulation, and the Executive Director appointed by the BOE Governor); the chief executive of the Financial Conduct Authority; a representative of the Treasury; and four members appointed by the Chancellor of the Exchequer. It should be noted that a representative of the Treasury is a non-voting member of the FPC.

<sup>22</sup> As an example of *coordination by the government*, we cite the institutional arrangement in France. In France, the High Council for Financial Stability (HCSF) has the ownership of a mandate for macroprudential policy. The HCSF has eight members: the Minister of Finance, who is the chairperson; the Governor of the Bank of France; the Vice-Chair of the Prudential Control and Resolution Authority (the banking and insurance supervisor and resolution authority); the Chair of the Financial Market Authority (the securities regulator); the Chair of the Accounting Standards Authority; and three qualified experts, appointed respectively by both of the chairpersons of the upper and lower houses and the Minister of Finance.

<sup>23</sup> As an example of *coordination by the central bank*, we cite the institutional arrangement in Australia. In Australia, no legislation has been made regarding the ownership of a mandate for macroprudential policy. As for ownership of a financial stability mandate, however, four authorities are assigned ownership: the Reserve Bank of Australia (RBA); the Australian Prudential Regulation Authority (APRA); the Australian Securities and Investments Commission (ASIC); and the Treasury (Lim *et al.* [2013a]). As for the multi-agency communication/coordination mechanism, the Council of Financial Regulators (CFR) provides a forum for cooperation among financial regulatory agencies on the efficiency and effectiveness of financial regulation and promotion of the stability of the Australian financial system. The CFR consists of representatives of the four agencies; the RBA, which is the chairperson; the APRA; the ASIC; and the Treasury.

<sup>24</sup> As an example of *checks and balances*, we cite the institutional arrangement in Japan. In Japan, no legislation has been made regarding the ownership of a mandate for macroprudential policy. As for ownership of a financial stability mandate, however, four authorities are assigned ownership: the Financial Services Agency (FSA); the Bank of Japan; the Ministry of Finance; and the Deposit Insurance Corporation of Japan (Lim *et al.* [2013a]). As for the multi-agency communication/coordination mechanism, the FSA and the Bank of Japan together established in June 2014 a task force to hold regular joint meetings semiannually to exchange views on financial stability issues, although the task force is non-statutory.

not chosen by any single country.

Prevalence of types of institutional arrangements varies among the advanced and emerging market economies. In the advanced economies, the largest portion (44 percent) adopts *coordination by the government*, followed by *centralization in the central bank* (34 percent). On the other hand, in the emerging market economies, *centralization in the central bank* occupies the largest share (44 percent), followed by *coordination by the government* (32 percent).

### **3. Potential Determinants of Institutional Arrangements for Macroprudential Policy**

Previous empirical research on prudential policy arrangements focuses on regulation/supervision structures for financial sectors to show that economic and financial structures are the main drivers behind the structures.<sup>25</sup> Macroprudential policy, however, addresses the stability of the financial system as a whole and the interaction between the financial system and the real economy rather than just the resilience of individual financial institutions. Therefore, institutional arrangements for macroprudential policy may reflect a number of determinants including not only economic and financial structures but also the impact of external capital flows, the political system, and interactions with other economic policies. We provide a detailed discussion on potential determinants of the roles played by the central bank and the government, referring to prior research.<sup>26</sup>

#### **A. Potential Determinants**

##### **Domestic economic and financial factors**

###### **a. Complexity of the financial system**

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<sup>25</sup> See Melecky and Podpiera (2012).

<sup>26</sup> See Berger, Nitsch, and Lybek (2006), Nier *et al.* (2011), and Melecky and Podpiera (2012).

Complexity of the financial system appears to have some bearing on the roles the central bank and the government play in macroprudential policy. The prominent presence of nonbank financial institutions in the financial system can lower the importance of the role of central bank's supervision mainly over the banking sector but enhance that of the other supervising agencies over nonbank financial sectors, implying that a large number of agencies take part in the decision-making process for macroprudential policy. If this is the case, the government tends to play an important role as a coordinator.

#### **b. Size of the economy and financial system**

Macroprudential policymaking can benefit from the views of a range of sectors and regions in a country with a large economic and financial system. Such characteristics may translate into a large number of agencies related to macroprudential policy, which would enhance the necessity of the coordinator role that the government would play. If this is the case, the role of the central bank may be of relatively less importance.

#### **c. Development stage**

More developed economies may be less inclined to use a single simple tool for macroprudential policy. They tend instead to introduce multiple sophisticated tools. If this is the case, multiple agencies responsible for these tools must participate in the decision making on macroprudential policy. This would enhance the necessity of the coordinator role that the government would play, while the role of the central bank would be of relatively less importance.

### **Exchange rate regime and international capital transactions**

#### **a. Exchange rate regime**

Under the fixed exchange rate regime, the authority tends to use macroprudential policy to stabilize the economy due to the inability to implement an autonomous monetary policy. In this case, the central bank, which has many staff specializing in analyses and projections regarding the economy, is likely to be the agency responsible for



macroprudential policy. As a consequence, we may expect the fixed exchange rate regime to be associated with a more important role for the central bank. In addition, a limited number of agencies involved in macroprudential policy may reduce the necessity of the coordinator role that the government would play.

#### **b. International capital transactions**

The effect of international capital transactions on the roles of the central bank and the government is ambiguous. A large volume of international capital transactions has a large impact on domestic economic and financial conditions. In such a case, the authority tends to resort to capital control (tax policy) as a macroprudential policy tool to avoid devastating effects from volatile capital flows, as is frequently observed in small open economies. Given this consideration, in a country with a larger volume of international capital transactions, the agencies responsible for capital control tend to participate in macroprudential policy. This may lead to a relatively less important role for the central bank and enhance the importance of the role of the government. On the other hand, according to the trilemma of international finance, free capital transactions require either the combination of a fixed exchange rate regime and dependent monetary policy or that of a floating exchange rate regime and autonomous monetary policy. In this regard, many small open economies tend to choose a fixed exchange rate regime due to “fear of floating.” If this is the case, as mentioned above, it may enhance the role of the central bank and reduce the necessity of the coordinator role that the government would play.

#### **Characteristics of the central bank**

##### **a. The central bank’s objective**

The central bank’s objective can be related to institutional arrangements for macroprudential policy. If the objective of financial stability is explicitly second to the price stability objective, the central bank, which is required to put more focus on the latter, may tend to play a less important role in macroprudential policy. In this case, a

government may play an important role as a coordinator because many agencies are involved in macroprudential policy.

#### **b. Size of the central bank**

A central bank with a large number of staff can perform many functions. Therefore, a large central bank may tend to play a leading role in macroprudential policy.<sup>27</sup> If this is the case, a limited number of agencies involved in macroprudential policy may reduce the necessity of the coordinator role that the government would play.

#### **c. Degree of price stability**

In a country with low and stable inflation, the central bank tends to have a high degree of credibility. As a result, it may be given an important role in macroprudential policy. In this case, because there would be a little room for agencies other than the central bank to be involved in macroprudential policy, there may be less necessity of the role of coordinator that a government would play. On the other hand, if price stability results from the central bank law stipulating that the central bank's objective is price stability and that financial stability is explicitly second, then the role of the central bank in macroprudential policy should be less significant, which means that agencies other than the central bank would participate actively in macroprudential policy. This may translate into the government having a central role as coordinator instead. As a consequence, the effect of the degree of price stability on the roles of the central bank and the government can be positive or negative.

#### **Political factor**

##### **Degree of democracy**

Political factors are important elements influencing the choice of institutional arrangements for macroprudential policy. Because a democratic country allows greater

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<sup>27</sup> We might observe reverse causality, in which the central bank must have a large staff to fulfill its central role in macroprudential policy.

diversity in opinions and preferences to influence policymaking (Berger, Nitsch, and Lybek [2006]), many agencies are likely to be involved in macroprudential policy and the authority to make policy decisions tends to be decentralized. As a result, in a democratic society it might be possible to observe that the government has an important role as a coordinator and the central bank has a relatively less important role. On the other hand, delegation to an independent macroprudential policymaker is useful, because macroprudential policymaking requires technical expertise and is subject to strong lobbying by special interest groups (Nier *et al.* [2011]). In such a case, the central bank, as an institution that is independent of political considerations, may be expected to play a central role, and a limited number of agencies involved in macroprudential policy may reduce the necessity of the role of coordinator that the government would play. As a consequence, the effect of the degree of democracy on the roles of the central bank and the government can be positive or negative.

## **B. Summary of the Expected Effects of Potential Determinants**

Table 4 summarizes the expected effects of potential determinants of institutional arrangements for macroprudential policy on the roles of the central bank and the government. The next section uses actual data to investigate which factors genuinely influence the choice of institutional arrangements for macroprudential policy. Our data on the potential determinants come from a number of different sources. We refer to Berger, Nitsch, and Lybek (2006), who analyzed empirically the determinants of the size of monetary policy committees, in compiling the data for the determinants. Most of the data are taken from the sources specified in Rose (2006), who compiled a variety of datasets of country characteristics including physical, cultural, economic, geographic, and political attributes. To this dataset, we add data on characteristics of the financial system, the exchange rate regime, and the central bank's objectives.<sup>28</sup>

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<sup>28</sup> Appendix I provides a description of the data for the potential determinants and their sources.

## **4. Empirical Analysis**

To examine the association between the two indices for institutional arrangements for macroprudential policy (the CB index and the Gov index) and potential determinants, this paper uses two approaches. The first is a simple approach, which calculates averages of data on each determinant with respect to the scores of the indices and compares these averages. The second is a more sophisticated approach, ordered probit analysis.<sup>29</sup> Because our dependent variables are discrete variables, we cannot use ordinary least squares techniques, which apply only to dependent variables with a continuous categorical nature. Therefore, we use ordered probit techniques for the regression analysis.

### **A. Simple Approach**

A number of factors, including the economic and financial structure, the exchange rate regime, characteristics of the central bank, and the degree of democracy, seem to be deeply related to the choice of roles played by the central bank and the government. Our calculation of averages of the data on potential determinants with respect to each score of the indices and an examination of simple trend lines, which are calculated in linear regression, clearly shows expected relations between the two indices and potential determinants except for the central bank's objectives and the degree of price stability (Figure 2). Specifically, we find the following.

- Countries with a complex financial system, with a large economic/financial size or a high development stage, have a low CB index and a high Gov index.
- Countries with a large volume of international capital transactions or a fixed exchange rate regime have a high CB index and a low Gov index.
- Countries with a large number of central bank staff have a high CB index and a low

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<sup>29</sup> In Appendix II, we propose an index to explain the degree to which the central bank is involved in microprudential regulation/supervision and construct a dataset for the 66 sample countries. Then we analyze the factors behind the degree of the central bank's engagement in microprudential regulation/supervision with ordered probit techniques.

Gov index.

- Countries with a high degree of democracy have a low CB index and a high Gov index.

Important caveats apply to these conclusions, however. Because Figure 2 simply shows the relation between each determinant and the two indices, it is necessary to disentangle the effects of other determinants to demonstrate statistically meaningful causality. A more sophisticated analysis is described below to demonstrate the effects of potential determinants on the choice of the institutional arrangements for macroprudential policy.

## **B. Ordered Probit Analysis**

The second approach is to use ordered probit techniques, which can apply to discrete dependent variables, to conduct multivariate analyses. The strategy we employ consists of three steps. First, we use ordered probit techniques to execute single variate analyses for all the data on potential determinants as preparatory analyses. Second, we take account of the explanatory power of each datum obtained from the first step, data availability, and possible multicollineality to construct the baseline specification for estimation. As explanatory variables in the baseline specification, we choose “population” as the size of economy, “real GDP per capita” as the economic development stage and “democracy” as the degree of democracy.<sup>30</sup> As the third and final step, we add other variables that are suggested to be significant by the simple approach to the baseline specification.<sup>31</sup>

Tables 5 and 6 show the estimation results on the CB index and the Gov index. They indicate that not only economic and financial characteristics but also other diverse features such as institutional and political factors influence the choice of the roles of the central bank and the government for macroprudential policy. Table 5 shows the

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<sup>30</sup> The effect of “real GDP per capita” on the Gov index is not statistically significant. Nevertheless, we choose “real GDP per capita” as an explanatory variable in the baseline model, because its effect on the CB index is statistically significant.

<sup>31</sup> We exclude “central bank’s objective” and “degree of price stability,” because the simple approach and the preparatory single variable analyses suggest that they do not satisfy the expected sign condition.

estimation results on the CB index. The first column shows that all the variables for the baseline specification meet the expected sign condition and are statistically significant. Adding the other determinants to the baseline specification (the second to sixth columns) confirms that the baseline specification is fairly robust in the sense that all the variables in the baseline specification are statistically significant and the estimated coefficients do not significantly change. Financial system complexity and international capital transactions are also statistically significant. Table 6 shows the results for the same estimation of the Gov index. The first column of Table 6 indicates that the size of the economy and the degree of democracy are statistically significant. Inclusion of other determinants suggests that the effects of these two variables are robust. Moreover, international capital transactions and the exchange rate regime meet the expected sign condition and are statistically significant.

### **C. Robustness Analysis**

This paper conducts two additional analyses to check the robustness of the results from the ordered probit analysis<sup>32</sup>. The first is to reconstruct the CB index and the Gov index and to use the indices for empirical analysis. The alternative CB index is a binary variable with a value of 1 if the central bank or a committee of the central bank is the sole owner of the mandate and 0 otherwise. The alternative Gov index is also a binary variable with a value of 1 if the government chairs the financial stability committee and 0 otherwise. Binary probit analysis is then applied to these alternative indices. The second analysis is also to conduct binary probit analysis on a new index with a value of 1 if a country chooses *centralization in the central bank* and 0 if it adopts *coordination by the government*. The second robustness check is based on the fact that actual institutional arrangements for macroprudential policy are divided broadly between

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<sup>32</sup> This paper focuses on the difference between the roles the central bank and the government play in macroprudential policy. However, the simple dichotomy between the central bank and the government might not be applied to the countries where the independence of the central bank is not fully ensured. From this perspective, this paper uses the data of the countries with relatively high level of central bank independence to conduct another robustness check. Concretely, we exclude the countries whose scores of the central bank independence, that are measured by Fry *et al.* (2000), fall below the bottom 20 percent from the sample countries. The result confirms that the result of the ordered probit analysis is robust.

*centralization in the central bank and coordination by the government.*

The additional exercises confirm that the result of the ordered probit analysis is robust. Tables 7 and 8 show that the results of the first robustness check do not differ significantly from the result of the ordered probit analysis. Table 9 shows that in the second robustness check, the statistically significant variables are all the explanatory variables in the baseline specification as well as international capital transactions, which are statistically significant both in the estimation of the CB index and the Gov index.

## **5. Concluding Remarks**

This paper examines recent developments in, and characteristics of, institutional arrangements for macroprudential policy and conducts empirical analyses of drivers behind the choice of institutional arrangements, especially the roles of the central bank and the government. We use a number of sources to collect information on the current institutional arrangements for macroprudential policy of 66 countries (32 advanced economies and 34 emerging market economies).

The findings of this paper are summarized as follows. First, many countries have recently developed their institutional arrangements for macroprudential policy in the sense that they have set up a mandate for macroprudential policy and established a multi-agency communication/coordination framework. Second, the current institutional arrangements are largely divided into two types: (1) *centralization in the central bank*, in which the central bank or a committee of the central bank is the sole owner of the macroprudential mandate; and (2) *coordination by the government*, in which the government coordinates views or policies among multiple agencies with the macroprudential mandate as the sole chairperson of the financial stability committee. While the most prevalent type of institutional arrangements is *coordination by the government* in the advanced economies, *centralization in the central bank* is adopted by the largest number of emerging market economies. Third, our empirical analyses

suggest that diverse features such as economic and financial characteristics, the exchange rate regime, and the degree of democracy influence the choice of roles played by the central bank and the government in macroprudential policy.

This paper is the first attempt to analyze the determinants of institutional arrangements for macroprudential policy as far as we know, and more work is needed in several areas. The first would be to extend the range of potential determinants behind the choice of institutional arrangements. This paper focuses mainly on economic and financial characteristics as well as institutional and political factors, based on a comparison with microprudential regulation/supervision. Nier *et al.* (2011), however, point to other factors including the history of existing institutional structures and legal traditions, which are likely to influence the choice of institutional arrangements for macroprudential policy. In addition, the choice of institutional arrangements might be affected by political economy<sup>33</sup> as well as the experience of financial crises. Additional empirical work with these factors is needed to corroborate the paper's findings on the determinants behind the choice of institutional arrangements for macroprudential policy. The second area where work is needed is a consideration of chronological change in the choice of institutional arrangements. This paper uses information available through the end of August 2014 to construct indices on the roles of the central bank and the government, and does not analyze changes in their roles over time. In the wake of the recent global financial crisis, however, international financial circles have recognized the importance of central banks' participation in macroprudential decision making. Along with this recognition, some advanced economies have changed their institutional arrangements to enhance the central bank's role. This observation indicates that it is necessary to investigate the factors that cause such changes in institutional arrangements.

In addition, some important issues remain to be answered about institutional

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<sup>33</sup> Many studies analyze economic policy making and implementation from the political economy perspective. On this regard, for example, see Persson and Tabellini (2000).



arrangements for macroprudential policy. These include which arrangement is the most desirable to ensure that macroprudential policy works effectively. This paper is silent about what the desirable arrangement would be, because the concept of macroprudential policy has a relatively short history, making it difficult to evaluate institutional arrangements for macroprudential policy in relation to the impact of the past financial crisis and the effectiveness of the macroprudential policy<sup>34</sup>. This paper, however, provides important suggestions in shaping the desirable arrangements suitable for individual countries. That is, this paper shows that the current arrangements are influenced by a number of factors including the economic and financial structure, institutional and political factors. These findings imply that a desirable arrangement will be also shaped by country-specific circumstances as the IMF (2011a) suggests. This suggests that the arrangement should be adjusted flexibly to changes in circumstances.

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<sup>34</sup> One of few studies on the effectiveness of institutional arrangements for macroprudential policy is Lim *et al.* (2013b), which evaluated “response time”, elapsed time between the emergence of a risk and the subsequent use of a policy instrument, under different institutional arrangements.

## Appendix I: Description of the Data

Variable	Definition	Source
<b>Complexity of the financial system</b>	Stock market capitalization / bank assets	World Bank, <i>Global Financial Development</i> ( <a href="http://data.worldbank.org/data-catalog/global-financial-development">http://data.worldbank.org/data-catalog/global-financial-development</a> )
<b>Size of the financial system</b>	Bank assets	World Bank, <i>Global Financial Development</i> ( <a href="http://data.worldbank.org/data-catalog/global-financial-development">http://data.worldbank.org/data-catalog/global-financial-development</a> )
<b>Size of the economy</b>	Total population	World Bank, <i>World Development Indicators</i> ( <a href="http://data.worldbank.org/indicator">http://data.worldbank.org/indicator</a> )
<b>Size of the economy</b>	Real GDP in U.S. dollars	World Bank, <i>World Development Indicators</i> ( <a href="http://data.worldbank.org/indicator">http://data.worldbank.org/indicator</a> )
<b>Development stage</b>	Real GDP per capita in U.S. dollars	World Bank, <i>World Development Indicators</i> ( <a href="http://data.worldbank.org/indicator">http://data.worldbank.org/indicator</a> )
<b>Fixed exchange rate regime</b>	Dummy = 1 if a hard peg or soft peg	IMF, <i>Annual Report on Exchange Arrangements and Restrictions</i>
<b>Gross foreign assets</b>	Gross foreign assets / real GDP	IMF, <i>International Financial Statistics</i> ( <a href="http://www.imf.org/external/data.htm">http://www.imf.org/external/data.htm</a> ) World Bank, <i>World Development Indicators</i> ( <a href="http://data.worldbank.org/indicator">http://data.worldbank.org/indicator</a> )
<b>Gross capital flows</b>	Gross capital flows / real GDP	IMF, <i>Balance of Payments Statistics</i> ( <a href="http://www.imf.org/external/data.htm">http://www.imf.org/external/data.htm</a> ) World Bank, <i>World Development Indicators</i> ( <a href="http://data.worldbank.org/indicator">http://data.worldbank.org/indicator</a> )
<b>Central bank's objective</b>	Dummy = 1 if the financial stability objective is explicitly secondary to another objective	Jeanneau (2014) ( <a href="http://www.bis.org/publ/bppdf/bispap76e_rh.pdf">http://www.bis.org/publ/bppdf/bispap76e_rh.pdf</a> ) and national legislations
<b>Size of central bank</b>	Number of central bank staff / total population	Central Bank Directory 2014 World Bank, <i>World Development Indicators</i> ( <a href="http://data.worldbank.org/indicator">http://data.worldbank.org/indicator</a> )
<b>Degree of price stability inflation, consumer prices</b>	Consumer price index (yearly change, percent)	World Bank, <i>World Development Indicators</i> ( <a href="http://data.worldbank.org/indicator">http://data.worldbank.org/indicator</a> )
<b>Degree of democracy</b>	Democracy Index, i.e., a measure of the state of democracy, ranging from 0 to 10 (full democracy)	Center for Systemic Peace, <i>Polity IV Project</i> ( <a href="http://www.systemicpeace.org/p4creports.html">http://www.systemicpeace.org/p4creports.html</a> )

## **Appendix II: Analyses of the Degree of Central Bank Engagement in Microprudential Regulation/Supervision**

Appendix II uses ordered probit techniques to analyze which factors influence the role of the central bank in terms of microprudential regulation/supervision. Before formulating the analyses, we refer to Lim *et al.* (2013b) to construct an index indicating the degree to which the central bank is engaged in microprudential regulation/supervision. Then we use the latest available information up through the end of August 2014 to compile the actual data for the index on 66 countries. The index assigns a score of 1 to 3, with a higher value indicating a more important role:

- The microprudential policy (MiPP) index:
  - 1 = The central bank has no regulatory/supervisory functions.
  - 2 = The central bank has regulatory/supervisory functions only over the banking sector.
  - 3 = The central bank has regulatory/supervisory functions over not only the banking sector but also (a part of) the nonbank financial sector.

In the empirical analyses, we follow the same strategy in the estimation of the CB index and the Gov index. That is, first we use ordered probit techniques to execute single variate analyses for all the data on potential determinants as preparatory analyses. Second, we take account of the explanatory power of each datum obtained from the first step, data availability, and potential multicollineality to construct the baseline specification for estimation of the MiPP index. Finally, we add other potential determinants to the baseline specification. For the baseline specification, we employ financial system complexity and the degree of democracy.

Appendix Table 1 shows that financial system complexity and the degree of democracy are statistically significant, while the other variables are not statistically significant. In addition, comparison of the results with Table 5 on the CB index reveals that the central

bank's role in macroprudential policy is influenced by a wider range of factors than its role in regulation/supervision of financial institutions.

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**Table 1 Institutional Arrangements for the 66 Sample Countries**

	Ownership of a macroprudential mandate: single (S) or multiple (M)	Ownership of a financial stability mandate: single (S) or multiple (M)	Interagency cooperation arrangements				
			Year of establishment	Number of agencies concerned	Role of the central bank	Role of the governmental agencies	
Advanced economies							
1	Australia		M	1998	4	Chair	Member
2	Austria	M (including CB, FSC)	M	2014	4	Member	Chair
3	Belgium	S (CB)	S (CB)	2013	2	Member	Member
4	Canada		M	1997	5	Member	Chair
5	Cyprus	S (CB)	S (CB)	2007	5	Chair	Member
6	Czech Republic	S (CB)	S (CB)	Not established	1		
7	Denmark	S (FSC)	M	2013	5	Chair	Member
8	Estonia	S (CB)	S (CB)	2007	3	Member	Chair
9	Finland	S (IR)	M	2009	3	Chair (if appointed)	Chair (if appointed)
10	France	S (FSC)	M	2013	4	Member	Chair
11	Germany	S (FSC)	M	2013	4	Member	Chair
12	Greece	M (including CB, FSC)	M	2010	3	Member	Chair
13	Hong Kong	M (including CB)	M	2000	5	Member	Chair
14	Ireland	S (CB)	S (CB)	2007	2	Member	Member
15	Israel		M	2011	3	Member	Member
16	Italy		M	2008	4	Member	Chair
17	Japan		M	2014	2	Member	Member
18	Korea		M	2012	4	Member	Chair
19	Luxembourg	S (FSC)	M	2014	4	Member	Chair
20	Malta	S (CB)	S (CB)	2013	2	Chair	Member
21	Netherlands	S (FSC)	M	2012	3	Chair	Member
22	New Zealand	S (CB)	S (CB)	2013	2	Member	Member
23	Norway	S (MOF)	M	2006	3	Member	Chair
24	Portugal	S (CB)	S (CB)	2007	4	Member	Member
25	Singapore		S (CB)	Not established	1		
26	Slovakia	S (CB)	M	2007	2	Co-chair	Co-chair
27	Slovenia	S (FSC)	M	2013	4	Chair	Member
28	Spain	M (including CB, FSC)	M	2006	3	Member	Chair
29	Sweden	S (IR)	M	2013	4	Member	Chair
30	Switzerland		M	2011	3	Member	Member
31	United Kingdom	S (CB)	S (CB)	2013	3	Chair	Member (observer)
32	United States	M (including CB, FSC)	M	2011	9	Member	Chair

	Ownership of a macroprudential mandate: single (S) or multiple (M)	Ownership of a financial stability mandate: single (S) or multiple (M)	Interagency cooperation arrangements				
			Year of establishment	Number of agencies concerned	Role of the central bank	Role of the governmental agencies	
<b>Emerging market economies</b>							
1	Albania	S (CB)	S (CB)	2006	4	Member	Chair
2	Argentina		M	2010	2	Member	Chair
3	Armenia	S (CB)	S (CB)	2011	3	Chair	Member
4	Bahrain		S (CB)	Not established	1		
5	Brazil	M (including CB)	M	2006	4	Chair (in rotation)	Chair (in rotation)
6	Bulgaria	M (including CB, FSC)	M	2003	3	Member	Chair
7	Chile		M	2011	5	Member (observer)	Chair
8	China		M	2008	7	Member	Chair
9	Colombia		M	2003	4	Member	Chair
10	Croatia	S (FSC)	M	2013	4	Chair	Member
11	Hungary	S (CB)	M	2013	2	Chair	Member (advisor)
12	India	M (including CB, FSC)	M	2010	5	Member	Chair
13	Indonesia	S (CB)	M	2012	4	Member	Member
14	Kuwait		S (CB)	2011	2	Member	Member
15	Lebanon		M	2011	2	Chair	Member
16	Lithuania	S (CB)	S (CB)	Not established	1		
17	Malaysia		S (CB)	2010	2	Chair	Member
18	Mexico		M	2010	6	Member	Chair
19	Mongolia	S (CB)	M	2007	3	Chair (in rotation)	Chair (in rotation)
20	Nigeria	S (CB)	S (CB)	1994	10	Chair	Member
21	Oman	S (CB)	S (CB)	2014	4	Chair	Member
22	Paraguay		S (CB)	Not established	1		
23	Peru		M	2008	3	Member	Member
24	Philippines		M	2014	5	Chair	Member
25	Poland		M	2008	4	Member	Chair
26	Qatar		M	2012	3	Chair	Member
27	Romania	S (FSC)	M	Not yet in force	3	Chair	Member
28	Russia	M (including CB, FSC)	M	2013	3	Member	Chair
29	Saudi Arabia		S (CB)	2012	2	Member	Member
30	Serbia		S (CB)	2013	4	Chair	Member
31	South Africa	M (including CB, FSC)	M	Not yet in force	3	Chair	Member
32	Thailand	S (CB)	S (CB)	2011	4	Chair	Member
33	Turkey	S (FSC)	M	2011	5	Member	Chair
34	Uruguay	S (FSC)	M	2011	3	Member	Chair

Notes: 1. CB = central bank, FSC = financial stability committee or other policy coordination bodies, MOF = ministry of finance, and IR = integrated financial regulator.

2. As for countries without a financial stability committee, we put the number of agencies that have ownership of the macroprudential/financial stability mandate as the number of agencies concerned.

3. The classification of advanced economies and emerging market economies is based on IMF, World Economic Outlook (April 2014).

4. While the IMF survey in 2010 covers around 50 countries in many areas including Asia, the Americas, and Europe, we take account of the regional balance to add 17 countries mainly in the Middle East and Central and Eastern Europe to the country list of the IMF survey. The countries comprise Albania, Armenia, Bahrain, Croatia, Cyprus, Denmark, Estonia, Israel, Korea, Kuwait, Lithuania, Luxembourg, Malta, Oman, Qatar, Saudi Arabia, and Slovenia. Jordan is excluded from the country list due to information restrictions. The ECB is also excluded, because we do not consider any international arrangement.

Sources: Mainly legal sources such as agency settlement laws and memoranda of understanding (MOUs), and various, including reports on institutional arrangements by national authorities and international organizations, all of which were available up through the end of August 2014.



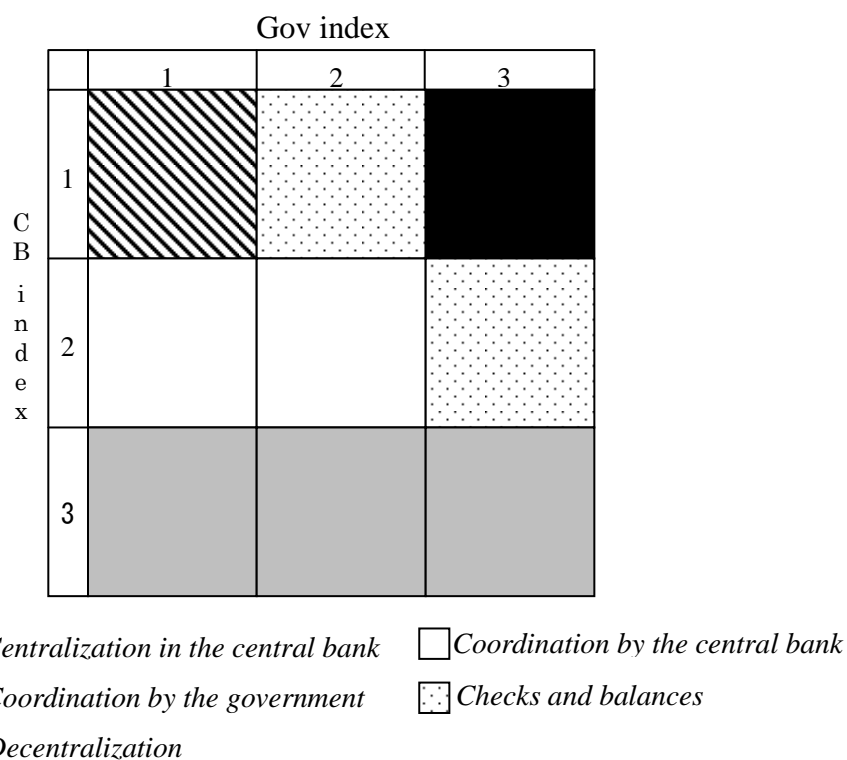
**Table 2 Values of the CB Index and the Gov Index for the 66 Sample Countries**

	CB index	Gov index
Advanced economies		
1 Australia	2	2
2 Austria	1	3
3 Belgium	3	2
4 Canada	1	3
5 Cyprus	3	2
6 Czech Republic	3	1
7 Denmark	2	2
8 Estonia	3	3
9 Finland	1	3
10 France	1	3
11 Germany	1	3
12 Greece	1	3
13 Hong Kong	1	3
14 Ireland	3	2
15 Israel	1	2
16 Italy	1	3
17 Japan	1	2
18 Korea	1	3
19 Luxembourg	1	3
20 Malta	3	2
21 Netherlands	2	2
22 New Zealand	3	2
23 Norway	1	3
24 Portugal	3	2
25 Singapore	3	1
26 Slovakia	3	3
27 Slovenia	2	2
28 Spain	1	3
29 Sweden	1	3
30 Switzerland	1	2
31 United Kingdom	3	2
32 United States	1	3
Average in advanced economies	1.8	2.4

	CB index	Gov index
Emerging market economies		
1 Albania	3	3
2 Argentina	1	3
3 Armenia	3	2
4 Bahrain	3	1
5 Brazil	2	3
6 Bulgaria	1	3
7 Chile	1	3
8 China	1	3
9 Colombia	1	3
10 Croatia	2	2
11 Hungary	3	2
12 India	1	3
13 Indonesia	3	2
14 Kuwait	3	2
15 Lebanon	2	2
16 Lithuania	3	1
17 Malaysia	3	2
18 Mexico	1	3
19 Mongolia	3	3
20 Nigeria	3	2
21 Oman	3	2
22 Paraguay	3	1
23 Peru	1	2
24 Philippines	2	2
25 Poland	1	3
26 Qatar	2	2
27 Romania	2	2
28 Russia	1	3
29 Saudi Arabia	3	2
30 Serbia	3	2
31 South Africa	2	2
32 Thailand	3	2
33 Turkey	1	3
34 Uruguay	1	3
Average in emerging market economies	2.1	2.3
Rank correlation (including both advanced and emerging market economies)	-0.68	

Note: The classification of advanced economies and emerging market economies is based on IMF, World Economic Outlook (April 2014).

**Table 3 Types of Institutional Arrangements for Macroprudential Policy**



**Table 4 Expected Effect of Potential Determinants**

	CB index	Gov index
Domestic economic and financial factors		
Complexity of the financial system	–	+
Size of the economy and financial system	–	+
Development stage	–	+
Exchange rate regime and international capital transactions		
Fixed exchange rate regime	+	–
International capital transactions	+ or –	– or +
Central bank characteristics		
Priority of the financial stability objective	+	–
Size of the central bank	+	–
Degree of price stability	+ or –	– or +
Political factor		
Degree of democracy	+ or –	– or +

**Table 5 Ordered Probit Analysis (CB Index)**

<b>Size of the economy system</b> (Population)	-0.411 <sup>***</sup> (0.110)	-0.344 <sup>***</sup> (0.116)	-0.526 <sup>***</sup> (0.147)	-0.447 <sup>***</sup> (0.143)	-0.474 <sup>***</sup> (0.136)
<b>Development stage</b> (Real GDP per capita)	-0.028 <sup>***</sup> (0.010)	-0.027 <sup>***</sup> (0.010)	-0.061 <sup>***</sup> (0.020)	-0.023 <sup>**</sup> (0.011)	-0.028 <sup>***</sup> (0.010)
<b>Degree of democracy</b> (Democracy)	-0.136 <sup>**</sup> (0.059)	-0.186 <sup>***</sup> (0.064)	-0.259 <sup>***</sup> (0.100)	-0.292 <sup>**</sup> (0.139)	-0.153 <sup>**</sup> (0.063)
<b>Complexity of the financial system</b> (Stock market capitalization / bank assets)		-0.483 <sup>*</sup> (0.261)			
<b>International capital transactions</b> (Gross foreign assets / real GDP)			0.340 <sup>**</sup> (0.132)		
<b>Exchange rate regime</b> (Fixed exchange rate regime)				-0.151 (0.477)	
<b>Size of the central bank</b> (Central bank staff / population)					-17.07 (20.60)
Pseudo-R <sup>2</sup>	0.454	0.492	0.768	0.554	0.469
Count R <sup>2</sup>	0.661	0.694	0.719	0.679	0.645
Number of observations	62	62	57	53	62

- Notes: 1. Standard errors are in parentheses.  
2. \*\*\*, \*\*, and \* denote significance at the 0.01, 0.05, and 0.10 level.  
3. Pseudo-R<sup>2</sup> is the McKelvey and Zavoina R<sup>2</sup>.

**Table 6 Ordered Probit Analysis (Gov Index)**

<b>Size of the economy system</b> (Population)	0.254 <sup>**</sup> (0.099)	0.278 <sup>***</sup> (0.108)	0.246 <sup>**</sup> (0.109)	0.239 <sup>**</sup> (0.122)	0.359 <sup>***</sup> (0.128)
<b>Development stage</b> (Real GDP per capita)	0.009 (0.009)	0.010 (0.009)	0.011 (0.012)	0.012 (0.010)	0.008 (0.009)
<b>Degree of democracy</b> (Democracy)	0.114 <sup>**</sup> (0.051)	0.100 <sup>*</sup> (0.057)	0.157 <sup>**</sup> (0.063)	0.135 <sup>*</sup> (0.079)	0.141 <sup>***</sup> (0.054)
<b>Complexity of the financial system</b> (Stock market capitalization / bank assets)		-0.148 (0.249)			
<b>International capital transactions</b> (Gross foreign assets / real GDP)			-0.081 <sup>*</sup> (0.047)		
<b>Exchange rate regime</b> (Fixed exchange rate regime)				-0.901 <sup>**</sup> (0.458)	
<b>Size of the central bank</b> (Central bank staff / population)					28.64 (20.77)
Pseudo-R <sup>2</sup>	0.247	0.253	0.327	0.373	0.288
Count R <sup>2</sup>	0.581	0.613	0.596	0.604	0.581
Number of observations	62	62	57	53	62

- Notes: 1. Standard errors are in parentheses.  
2. \*\*\*, \*\*, and \* denote significance at the 0.01, 0.05, and 0.10 level.  
3. Pseudo-R<sup>2</sup> is the McKelvey and Zavoina R<sup>2</sup>.

**Table 7 Binary Probit Analysis (CB Index)**

<b>Size of the economy system</b> (Population)	-0.388*** (0.123)	-0.287** (0.135)	-0.650*** (0.201)	-0.453*** (0.168)	-0.406*** (0.145)
<b>Development stage</b> (Real GDP per capita)	-0.029** (0.011)	-0.024** (0.012)	-0.095*** (0.035)	-0.024* (0.013)	-0.028** (0.011)
<b>Degree of democracy</b> (Democracy)	-0.131** (0.062)	-0.224*** (0.079)	-0.346*** (0.120)	-0.323** (0.145)	-0.135** (0.066)
<b>Complexity of the financial system</b> (Stock market capitalization / bank assets)		-0.855** (0.393)			
<b>International capital transactions</b> (Gross foreign assets / real GDP)			0.539*** (0.198)		
<b>Exchange rate regime</b> (Fixed exchange rate regime)				-0.316 (0.569)	
<b>Size of the central bank</b> (Central bank staff / population)					-5.206 (21.52)
Pseudo-R <sup>2</sup>	0.436	0.533	0.875	0.575	0.438
Count R <sup>2</sup>	0.770	0.787	0.839	0.750	0.787
Number of observations	61	61	56	52	61

- Notes: 1. Standard errors are in parentheses.  
2. \*\*\*, \*\*, and \* denote significance at the 0.01, 0.05, and 0.10 level.  
3. Pseudo-R<sup>2</sup> is the McKelvey and Zavoina R<sup>2</sup>.

**Table 8 Binary Probit Analysis (Gov Index)**

<b>Size of the economy system</b> (Population)	0.235** (0.109)	0.275** (0.122)	0.210* (0.123)	0.235* (0.137)	0.387*** (0.162)
<b>Development stage</b> (Real GDP per capita)	0.004 (0.010)	0.005 (0.010)	0.018 (0.016)	0.007 (0.012)	0.000 (0.012)
<b>Degree of democracy</b> (Democracy)	0.158** (0.075)	0.147** (0.081)	0.165* (0.089)	0.248 (0.154)	0.223** (0.111)
<b>Complexity of the financial system</b> (Stock market capitalization / bank assets)		-0.230 (0.283)			
<b>International capital transactions</b> (Gross foreign assets / real GDP)			-0.213* (0.124)		
<b>Exchange rate regime</b> (Fixed exchange rate regime)				-1.104* (0.615)	
<b>Size of the central bank</b> (Central bank staff / population)					39.33 (33.02)
Pseudo-R <sup>2</sup>	0.291	0.321	0.516	0.506	0.394
Count R <sup>2</sup>	0.689	0.656	0.643	0.654	0.656
Number of observations	61	59	56	52	61

- Notes: 1. Standard errors are in parentheses.  
2. \*\*\*, \*\*, and \* denote significance at the 0.01, 0.05, and 0.10 level.  
3. Pseudo-R<sup>2</sup> is the McKelvey and Zavoina R<sup>2</sup>.

**Table 9 Binary Probit Analysis**

<b>Size of the economy system</b> (Population)	-0.539*** (0.166)	-0.466*** (0.173)	-0.652*** (0.222)	-0.480*** (0.177)	-0.628*** (0.200)
<b>Development stage</b> (Real GDP per capita)	-0.029** (0.013)	-0.026* (0.014)	-0.089** (0.036)	-0.028* (0.014)	-0.025* (0.014)
<b>Degree of democracy</b> (Democracy)	-0.207** (0.103)	-0.261** (0.106)	-0.302** (0.127)	-0.265* (0.157)	-0.249** (0.123)
<b>Complexity of the financial system</b> (Stock market capitalization / bank assets)		-0.702 (0.477)			
<b>International capital transactions</b> (Gross foreign assets / real GDP)			0.547** (0.225)		
<b>Exchange rate regime</b> (Fixed exchange rate regime)				0.249 (0.831)	
<b>Size of the central bank</b> (Central bank staff / population)					-21.49 (23.76)
Pseudo-R <sup>2</sup>	0.605	0.632	0.889	0.627	0.635
Count R <sup>2</sup>	0.826	0.848	0.907	0.805	0.804
Number of observations	46	46	43	41	46

Notes: 1. Standard errors are in parentheses.

2. \*\*\*, \*\*, and \* denote significance at the 0.01, 0.05, and 0.10 level.

3. Pseudo-R<sup>2</sup> is the McKelvey and Zavoina R<sup>2</sup>.

**Appendix Table 1 Ordered Probit Analysis (MiPP Index)**

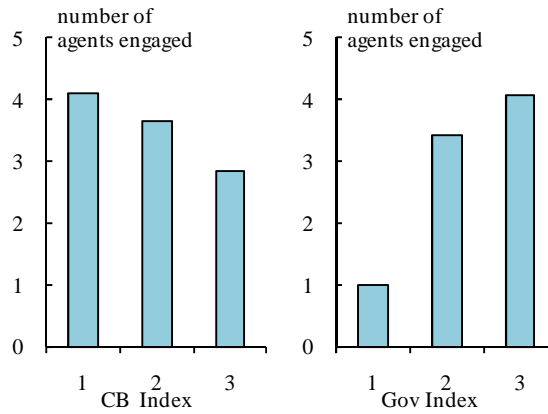
<b>Complexity of the financial system</b> (Stock market capitalization / bank assets)	-0.433* (0.247)	-0.445* (0.229)	-0.390* (0.231)	-0.693*** (0.255)	-0.369* (0.239)
<b>Degree of democracy</b> (Democracy)	-0.169*** (0.061)	-0.150** (0.060)	-0.149** (0.066)	-0.297*** (0.103)	-0.152** (0.063)
<b>Size of the economy system</b> (Population)	-0.020 (0.097)				
<b>Development stage</b> (Real GDP per capita)		-0.012 (0.009)			
<b>International capital transactions</b> (Gross foreign assets / real GDP)			0.045 (0.049)		
<b>Exchange rate regime</b> (Fixed exchange rate regime)				-0.389 (0.436)	
<b>Size of the central bank</b> (Central bank staff / population)					18.62 (15.62)
Pseudo-R <sup>2</sup>	0.202	0.220	0.174	0.353	0.230
Count R <sup>2</sup>	0.571	0.677	0.534	0.630	0.619
Number of observations	63	62	58	54	63

Notes: 1. Standard errors are in parentheses.

2. \*\*\*, \*\*, and \* denote significance at the 0.01, 0.05, and 0.10 level.

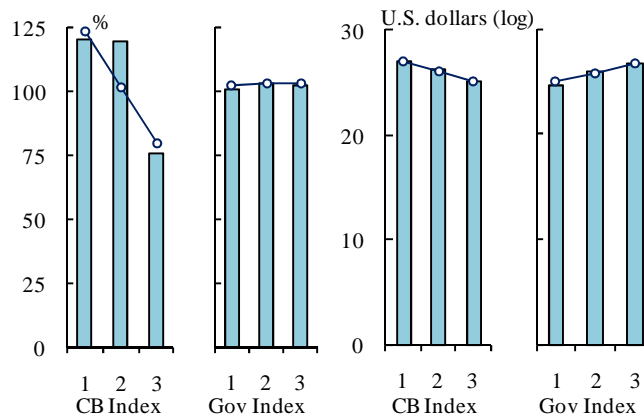
3. Pseudo-R<sup>2</sup> is the McKelvey and Zavoina R<sup>2</sup>.

**Figure 1 Relation between Number of Agencies Engaged and Indices**

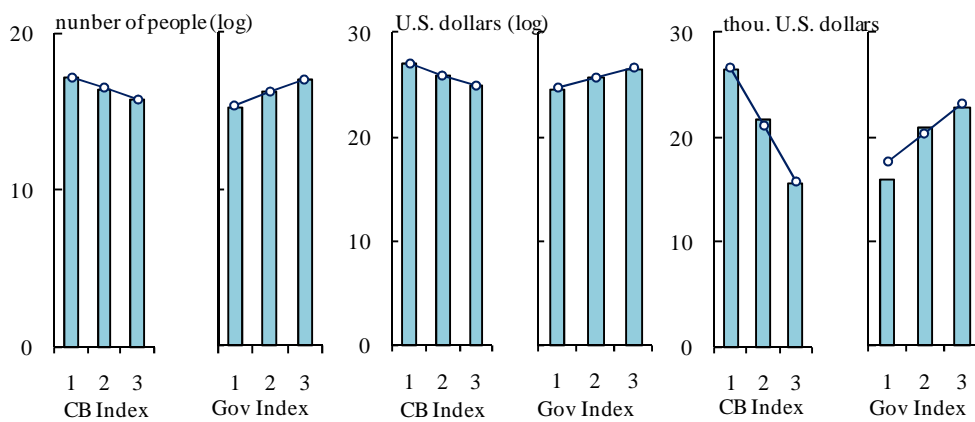


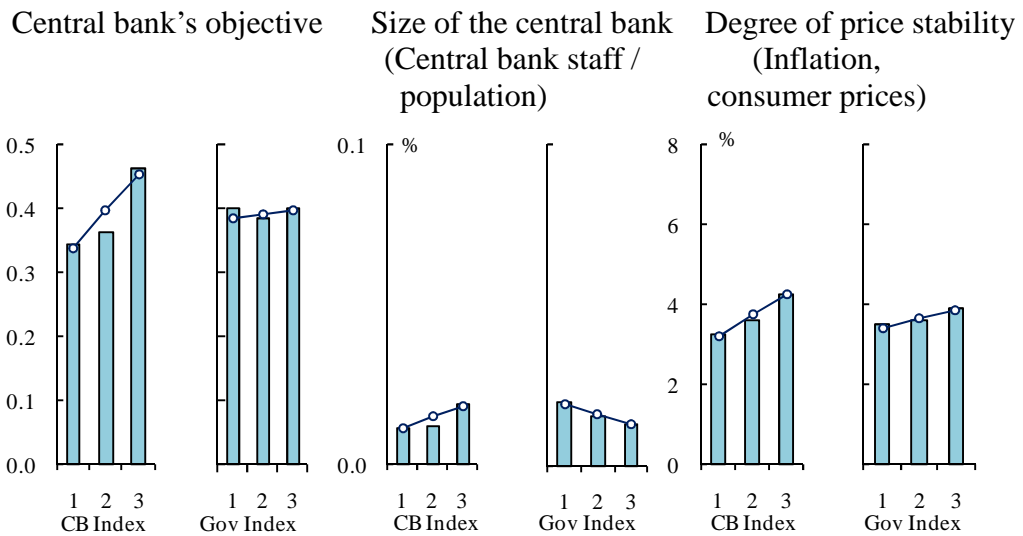
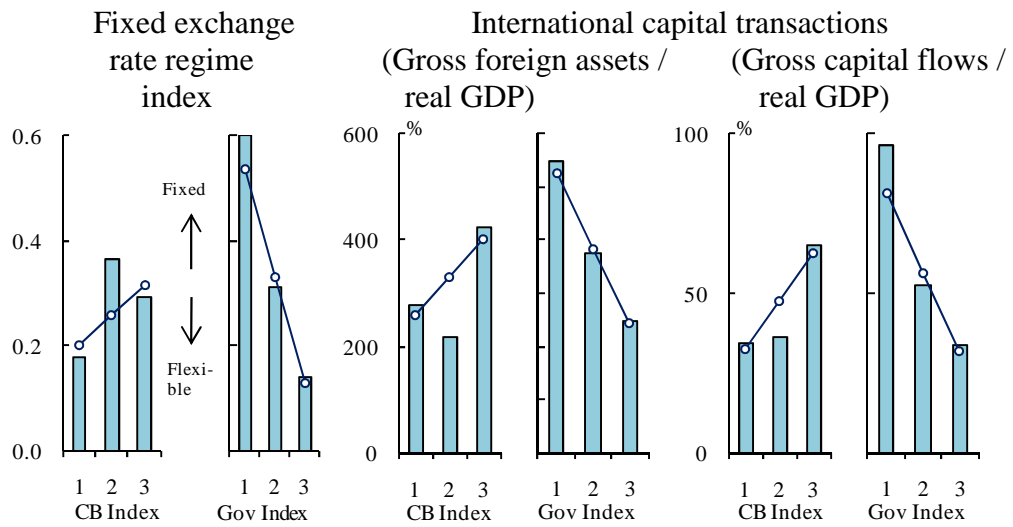
**Figure 2 Relation between Determinants and Indices**

Complexity of the financial system (Stock market capitalization / bank assets)      Size of the financial system (Bank assets)

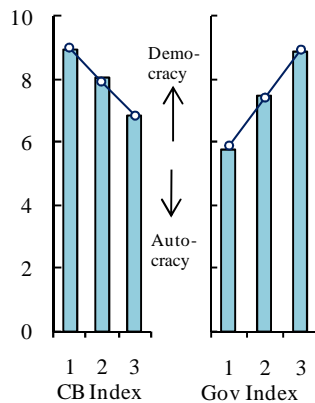


Size of the economy (Population)      Development stage (Real GDP per capita)





**Degree of democracy (Democracy)**



Notes: 1. The trend line is calculated in linear regression.  
 2. Central bank's objective is a dummy variable with a value 1 if financial stability objective is explicitly secondary to another objective.