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Rochelle M. Edge

(Federal Reserve Board)

J. Nellie Liang

(Hutchins Center on Fiscal and Monetary Policy, Brookings Institution)

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Deutsche Bundesbank, Wilhelm-Epstein-Straße 14, 60431 Frankfurt am Main,  
Postfach 10 06 02, 60006 Frankfurt am Main

Tel +49 69 9566-0

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## **Financial Stability Committees and the Countercyclical Capital Buffer<sup>1</sup>**

Rochelle M. Edge and J. Nellie Liang

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### **Abstract**

Multi-agency financial stability committees (FSCs) have grown dramatically since the global financial crisis. However, most cannot direct actions or recommend to other agencies that they take actions, and most would influence policy actions only through convening and discussing risks. We evaluate whether the significant variation in FSCs and other financial regulatory structures across countries affect decisions to use the countercyclical capital buffer (CCyB). After controlling for credit growth and the severity of the financial crisis, we find that countries with stronger FSCs are more likely to use the CCyB, especially relative to countries where a bank regulator or the central bank has the authority to set the CCyB. While the experience with the CCyB is still limited, these results are consistent with some countries creating FSCs with strong governance to take actions, but most countries instead creating weak FSCs without mechanisms to promote actions, consistent more with a symbolic political delegation motive and raising questions about accountability for financial stability.

**Keywords:** Financial stability committees, Bank regulators, Delegation, Macroprudential policy, Countercyclical capital buffer, Credit growth

**JEL classification:** H11, G21, G28, P16

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<sup>1</sup> Rochelle M. Edge, Federal Reserve Board, [rochelle.edge@frb.gov](mailto:rochelle.edge@frb.gov); J. Nellie Liang, Hutchins Center on Fiscal and Monetary Policy, Brookings Institution, [jnliang@brookings.edu](mailto:jnliang@brookings.edu). We are grateful for helpful comments from Luca Guerrieri, Michael Kiley, Don Kohn, Andreas Lehnert, Erland Nier, Jean-Charles Rochet, Martin Taylor, David Wessel, and participants at the 5<sup>th</sup> Annual Macroprudential Conference organized by the Bundesbank, Riksbank, De Nederlandsche Bank. We thank Sage Belz, Gerardo Sanz-Maldonado, and especially Jeffrey Cheng for excellent research assistance. The views expressed are our own and do not represent the views of the Federal Reserve Board, Brookings Institution.

# 1. Introduction

In March 2009 the Group of 20 called on regulators to establish new bank capital standards to mitigate procyclicality and to develop macroprudential regimes to curb systemic risks. In particular, the G-20 stated that ...

*the FSB, BCBS, and CGFS, working with accounting standard setters, should take forward, with a deadline of end 2009, implementation of the recommendations published today to mitigate procyclicality, including a requirement for banks to build buffers of resources in good times that they can draw down when conditions deteriorate.*

In addition,

*we will amend our regulatory systems to ensure authorities are able to identify and take account of macro-prudential risks across the financial system including in the case of regulated banks, shadow banks, and private pools of capital to limit the buildup of systemic risk. We call on the FSB to work with the BIS and international standard setters to develop macroprudential tools and provide a report by autumn 2009.*

In response to this call, as well as their experiences over the crisis, countries have been building out their macroprudential policy frameworks, specifically: (1) to measure and monitor systemic risk; (2) to implement policies to mitigate identified systemic risks; and, (3) to establish institutional and governance structures for implementing policy.

In this paper, we test whether the governance structures of new macroprudential regimes empirically affect the use of new bank-capital macroprudential tools that are part of Basel III. We extend our work on financial stability governance institutions in 58 countries that evaluated whether such structures had basic features for accountability and ability to take actions.<sup>2</sup>

The dramatic growth of multi-agency financial stability committees (FSCs), from 17 in 2010 to 47 in 2017, is a fundamental change in governance for macroprudential policies (figure 1). FSCs typically include the central bank (CB), prudential bank regulators (PR), and the ministry of finance (MoF), among other financial agencies. FSCs are viewed as a new entity that on its own or with some of its members is accountable for financial stability, with responsibilities to identify and monitor systemic risks, and to reduce systemic risks, though they are not necessarily the entity that is responsible for implementing policies.

There is great variation across countries in the abilities of FSCs to take or mobilize actions of other agencies. We used cluster analysis to identify the FSCs with relatively strong governance

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<sup>2</sup> As discussed more fully in Edge and Liang (2019), we focus on 58 of 64 countries that have been identified in other papers as countries that have used macroprudential policies in a time-varying way (see Cerutti, et al., 2016) and for which we were able to collect information about their governance structures.

mechanisms for taking policy actions based on whether it was created formally by legislation, has a chair, has a voting process, or has powers to direct or to recommend policy actions with a comply-or-explain mechanism. We found only one-quarter of the FSCs were relatively strong, whereas most do not have any powers, and many are missing at least one other basic governance feature. These results raise questions about whether these FSCs serve only to convene and discuss risks rather than to take or initiate actions by others to reduce risks, and whether accountability for financial stability has improved or become obscured.

Extending this work to look at actual implementation of bank-capital macroprudential policies adds an important dimension to understanding the effectiveness of institutional structures: Do FSCs with stronger governance features actually influence bank capital policy actions? Do countries with FSCs that have weaker governance features nonetheless still take actions given the same systemic-risk circumstances, or instead rely on the traditional authorities for banking supervision that an independent prudential regulator or central bank may have?

This new analysis to evaluate implementation of well-defined macroprudential actions for banks can also help to shed light on alternative hypotheses for the creation of post-crisis FSCs. One hypothesis is that FSCs are created by elected officials as a delegation of functional responsibilities for complex and technical issues, consistent with Alesina and Tabellini (2007). Lombardi and Moschella (2017), however, argue that functional delegation cannot be a sufficient explanation given the severity of the financial crisis had to have called into question the competence of the expert financial agencies. Instead, they propose an alternative symbolic political delegation hypothesis, in which FSCs reflect a response by elected officials to show voters that they are taking actions to fix past mistakes; that is, the creation of FSCs is motivated less by delegating to experts and more by political accountability. Functional delegation would predict that FSCs would be given strong powers and should improve policy outcomes, while symbolic political delegation would not have a clear prediction for whether FSCs would be given powers and thus would have less or no influence on policy.

This paper focuses specifically on the use of the countercyclical capital buffer (CCyB), a new, purely macroprudential feature of Basel III. The CCyB can be turned on to build buffers in anticipation of future downturns based on cyclical analysis of the economic and financial cycles. The BCBS identifies the credit-to-GDP gap for countries to monitor as an indicator for using the CCyB. There is variation across countries in the agency that has the authority to set the CCyB. We document that the central bank is the most frequent authority, followed by the prudential regulator, and then the FSC or government. We also document a formal advisory role for setting the CCyB by the FSC and the central bank. This review of 58 countries reveals a range of governance structures for setting the CCyB, which allows us to test for the effects of different institutional governance arrangements on CCyB decisions.

In our dataset, 13 countries made decisions during 2015 to 2018 to raise from zero or to maintain or increase further the CCyB. By 2019, the CCyB setting was decided to be 2.5 percent common equity to risk-weighted assets in three countries, between 1 percent and 2 percent in three countries, and less than 1 percent in seven countries. While the use of CCyB has been increasing across a range of countries, it is still in the early stages of implementation.

Our approach to assess the effects of governance is to evaluate empirically whether FSC governance has an effect on the policy actions to date. While we include variables, such as credit growth that would make raising the CCyB a predictable action, we are silent on whether the actions are ultimately the right ones to take. FSCs exerting an influence on policies would be consistent with a functional delegation motive for FSCs. We also look at the effect of central banks or bank regulators having the authority to set the CCyB, which also sheds light on the functional or symbolic delegation of authorities to FSCs. If a central bank or bank regulator with authority to set the CCyB were to have stronger effects on CCyB actions, that would provide less support for a functional delegation motive for FSCs and more support for symbolic delegation. We estimate the use of CCyB using a logit model for the pooled cross-section data, and control for financial and economic conditions that vary over time and across countries.

Overall, we find that countries with stronger FSCs are more likely to use the CCyB and that countries where existing regulators have authority for the CCyB are less likely to use the CCyB, conditional on financial and economic conditions, and are supportive of a functional delegation motive for FSCs with strong governance features. However, most FSCs are not strong in terms of governance and overall have no effect on a countries' use of the CCyB. Thus, most FSCs appear to be more consistent with a symbolic political delegation motive.

In particular, our empirical analysis shows that countries that have FSCs with the strongest governance, as identified using our cluster analysis, are twice as likely to activate the CCyB relative to countries with less strong FSCs. In addition, FSCs that have direct authority to set the CCyB are even more likely to use the CCyB. The marginal effects of higher credit growth on the probability of activating the CCyB are substantial for the FSCs with the strongest governance, increasing the probability from 19 percent to 42 percent. These findings suggest a functional delegation motive for the formation of this cluster of FSCs.

In addition, an independent prudential regulator with direct authority for the CCyB is significantly less likely to use the CCyB relative to a strong FSC or government, consistent with a prudential regulator's greater focus on microprudential risks. Central banks that have the power to set the CCyB also are less likely to use the CCyB than a strong FSC, a result that might be surprising given a central bank's experience with macroeconomic analysis for monetary policy. However, a central bank that is a sole authority is more likely to use the CCyB than if the central bank is part of a FSC, suggesting that when macroprudential responsibilities and tools are more diffuse across institutions, the structure may reduce effective decision-making.

The empirical results also show that the mere existence of FSCs is not an important determinant for using the CCyB, but FSCs with more member agencies significantly reduce the likelihood of using the CCyB. The negative effect for a higher number of agencies is consistent with greater coordination problems across many member agencies when FSC governance is not strong, although it could also reflect a more complex financial system with a larger nonbank sector. We included an index of the financial development of markets to control to test this alternative.

We recognize that countries that may be most willing to adopt macroprudential bank capital policies like the CCyB may also be more likely to set up governance structures that can be effective, and the significant effects on the use of the CCyB for the strongest FSCs may reflect a joint desire to reduce a repeat of the financial crisis. To control for such an underlying factor, we include the severity of bank losses during the global financial crisis in each country with either the fiscal costs related to bank restructurings relative to GDP or the peak ratio of non-performing loans if the country had a banking crisis that started in 2007 or 2008, as defined by Laeven and Valencia (2018). While these variables are significant, we still find distinctions in the propensity to use the CCyB across different institutional arrangements.

This paper adds to only one other we are aware of that evaluates the effects of governance on macroprudential policy implementation. Lim, Krznar, Lipinsky, Otani, and Wu (2013) provide some evidence that a stronger central bank role, either as a sole authority or as the chair of a FSC, reduces response time of adjusting macroprudential tools to restrain an upturn in credit growth. Their analysis is based on institutional structures in 2011, before many of the FSCs in our dataset were created, and their sample of 39 countries was weighted to emerging market economies. Our analysis, which uses data to 2018, represents a more up-to-date consideration of this question for a broader set of countries, especially advanced economies, and looks specifically at whether the FSC itself influences policy actions and the sensitivity of actions to credit growth.

Our study is also related to and complements studies of effectiveness of macroprudential tools with the distinction being that our study examines the implications of financial stability governance variables on policy actions whereas these studies focus on the effects of policy actions on financial stability outcomes. In general, studies on the effectiveness of macroprudential policies find that these policies reduce credit growth, with stronger effects in emerging and developing countries than advanced economies. Cerutti, Claessens, and Laeven (2015) look at an index of twelve tools in 119 countries from 2001 to 2013 and document a significant upward trend in the series as tools are introduced and remain in place until they are discontinued, though many are structural so they build up over time. The most common tools are concentration limits (used in 75 percent of country-year observations), limits on interbank exposures (29 percent), reserve requirements (21 percent), and LTV-caps (21 percent). Cerutti et al. (2016) document that a LTV cap is the tool (other than reserve requirements that is more akin to a monetary policy tool) that is more likely to be adjusted over time in a way to respond to



financial cycle conditions. Akinci and Olmstead-Rumsey (2018) look more specifically at mortgage-related macroprudential policies and find they are effective at reducing mortgage credit growth and house prices. Boar, Gambacorta, Lombardo, and da Silva (2018) look at the effects on long-run economic performance and find that an index of cumulative macroprudential policies support stronger and less volatile GDP growth.

The remainder of the paper is organized as follows. Section 2 discusses how FSCs could influence policy. Section 3 provides some details on the CCyB. Section 4 explains how we characterize the strength of the governance of FSCs and summarizes various governance variables relating to the setting of the CCyB. Section 5 describes our empirical approach and reports our findings and section 6 concludes.

## **2. How would governance affect macroprudential policy decisions?**

The macroprudential agenda is to bolster the resilience of the financial system as a whole to avoid costly economic downturns or financial crises and offset negative externalities of fire sales and contagion dynamics. Specific goals of macroprudential policies can be described as (1) to control structural vulnerabilities in the financial system that arise from critical financial intermediaries or important interconnections; (2) to maintain the resilience of the financial system in expansionary times to aggregate shocks or even increase resilience by pre-emptively building buffers; and (3) to constrain financial booms and reduce downward spirals from asset prices, financial leverage, and credit.

Institutional design is especially important for macroprudential policies, in contrast to microprudential policies for two reasons. Macroprudential policies consider financial risks that can span many types of financial intermediaries and investors, as well as interactions between the financial system and the real economy. Authorities need extensive knowledge of financial firms and markets and need to be able to analyze how financial risks would affect other financial firms and the economy, and how policy tools could be used to reduce risks. In addition, time-varying macroprudential policies are expected to build resilience in anticipation of possible future shocks, not to wait until negative shocks occur, and so they need to be preemptive as well as guided by tail risks. This means macroprudential policies could be very unpopular. When credit is expanding rapidly, many parties are benefiting from the short-term effects, making it difficult to take actions to limit increases in leverage of financial firms or prevent credit growth from becoming a future unsustainable burden on borrowers (see Elliot, Feldberg, and Lehnert, 2013, for experiences in the U.S.).

As a result, effective governance for effective macroprudential policymaking should involve mechanisms to (1) coordinate regulators across the broad financial system, (2) establish accountability when there are many different regulators with separate mandates, and (3) mobilize

actions, either directly taking actions or recommending actions. Because macroprudential policies need to be forward looking and pre-emptive, governance structures need to include mechanisms to avoid policy inertia and inaction. We define policy inertia as less willingness to take pre-emptive actions given uncertainty about future risks.

In addition to the technical practicalities, governance needs to recognize important political economy considerations between technocrat regulators and the public. Macroprudential policies are new and not well understood, and goals and measures of success are not easily quantified. Moreover, some macroprudential tools may be targeted to certain asset classes, which can be viewed as credit allocation decisions since they could have distributional consequences. These characteristics distinguish macroprudential policy from monetary policy which is viewed as neutral for credit allocation and distribution. This raises questions about the political acceptability of delegating macroprudential authorities to a technocrat regulatory agency, in the same way that monetary policy is delegated to central banks.

### **Financial Stability Committees**

In our dataset of 58 countries, 47 countries now report having a FSC, whereas only 12 countries had FSCs before the crisis (figure 1). Many countries have established FSCs to serve as the face of macroprudential policies, but they vary greatly in terms of responsibility for monitoring and identifying systemic risks and initiating or taking actions to reduce them. The other 11 countries in our dataset have designated a single entity to be the macroprudential authority, almost always the central bank that is also a prudential regulator for banks, and often for other financial firms as well. These countries with a sole authority tend to be smaller, suggesting fewer resources, as well as lower coordination problems across financial agencies.<sup>3</sup>

At a minimum, FSCs can improve communication and coordination across multiple regulatory agencies. Most of the 47 FSCs have between three and five agencies represented, including the bank prudential regulator, the central bank, the ministry of finance, and, in the case that they are separate from the bank prudential regulator, securities regulators and other financial regulators, indicating all the relevant stakeholders are sitting at the table. Prudential bank regulators are on all of the committees, and while reducing system-wide risks may not be part of their traditional mandate, most macroprudential policies would involve the entities that they regulate. Central banks are on all but one of the FSCs. Central banks bring expertise in macroeconomic forecasting and in setting countercyclical monetary policy. Many (specifically, 34) central banks also are prudential regulators and are well-positioned to assess risks in the financial system and how they would affect the macro economy. The ministry of finance is on 40 FSCs and the chair of 25 FSCs, indicating much higher representation in financial regulatory and stability issues

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<sup>3</sup> We would note that countries need not have only one macroprudential authority. In response to the first IMF's Annual Macroprudential Survey (see IMF, 2018), some countries reported that they have more than one authority. The empirical analysis in this paper allows for more than one authority.

than before the financial crisis. The ministry of finance as part of the elected government is considered to have a legitimate role to coordinate across multiple regulatory agencies and, indeed, they are often the chair of the FSC when they are a member.

While multi-agency FSCs as newly-established structures have the potential for improving accountability for financial stability, we found that only about one-quarter of them had basic features that we view would be important for strong governance. These basic characteristics include whether the committee is formally established in legislation (rather than through an inter-agency MOU), has a voting process, has a designated a chair, or has any tools on its own to take actions, including a semi-hard tool of “comply or explain” to a regulatory financial agency. (We provide more detail below in Section 4 on variables used to cluster FSCs into groups based on ability to affect policies.) For example, in two countries, the FSC sets the CCyB and in eleven countries it could make a formal recommendation or issue a comply or explain on the CCyB. But that means that while many FSCs have been established, most do not have authorities to do much. That is, responsibilities remain dispersed across various regulators and the central bank.

### **Alternative hypotheses for the rise in FSCs**

These characteristics raise the question of what is the purpose of establishing a FSC. Can they be responsible for monitoring and identifying systemic risks and initiating actions to reduce them if they lack basic governance features? To explain the rise in the number and the variety of FSCs across countries, we adopt a political economy perspective of why elected officials choose to delegate functions they could themselves control. A primary reason is for functional reasons, and that delegation to expert agencies with a high degree of technical expertise that is required. Alesina and Tabellini (2007) model delegation of authorities to technical agencies and cite complex regulations and monetary policy as examples of functions where this type of delegation would likely occur. A model by Groll, O’Halloran, and McAllister (2019) focuses on financial agencies with technical expertise on bank risk and systemic risk, and who have longer planning horizons than elected officials. In addition, in this model, financial (technical expert) agencies have a greater aversion to bailouts than elected officials because they will be blamed if there is a crisis and will impose stricter regulations. If elected officials assign little political cost to bailouts, there is little to gain from delegating. They are more likely to delegate when bank and systemic risks are more uncertain and bailout costs are more salient to them, as the case in the years after the financial crisis. If functional delegation is the reason for the establishment of FSCs, we would expect FSCs to be also given tools to curb systemic risks and would expect them to influence actual policy actions.

An alternative hypothesis, proposed by Lombardi and Moschella (2017), builds on the observation that functional delegation is unlikely to be the entire story since the expertise of financial agencies came into question during the financial crisis. Instead, symbolic political delegation posits that elected officials create FSCs as a new entity to demonstrate to their angry

constituents that they are responding to problems and working to prevent another crisis. While symbolic political delegation attempts to create accountability and transparency to fill a political gap, it may not lead to an agency or coordinating body with its own independent set of tools. In this case, we would expect many FSCs to facilitate coordination, but as a group they do not decide and take separate actions distinct from existing regulators.

In Lombardi and Moschella, 2017, they provide several quotes for the creation of the Financial Stability Oversight Council in the U.S. that support a motive to improve accountability, but is vague on what authorities the new committee will have:

Harry Reid, Senate majority leader, *“we are moving to this financial reform bill because we need transparency, we need accountability...”*

Timothy Geithner *“the intent of the FSOC was to take authority that is diffused around a bunch of people ... and move it to a central place. It is not fair to characterize it – although I understand the risk – that some new bureaucracy we are imposing on top of the system. It is more like more accountability and clarity ...”*

From a technical functional delegation perspective, there are other political economy issues as well because macroprudential policies are pre-emptive, meaning costs are immediate and benefits are down the road and uncertain. Central banks are designed to have longer time horizons than politicians (and are therefore more willing to bear the near-term costs of policies when gains may not be realized within an election cycle), and also have the technical expertise for these policies (Nordhaus, 1975). For example, the IMF recommends that central banks be given a prominent role and argues central banks foster policy coordination between macroprudential and monetary policy and can “help shield macroprudential policy from political interference that can slow the deployment of tools” (2014, p. 34).

But a political economy perspective might warn against granting the central bank strong powers for macroprudential policy. Baker (2015) argues that while central bankers were behind the macroprudential agenda that emerged after the financial crisis, central banks that engage too much in macroprudential would end up being politicized because there is a less-agreed-upon mandate and it could have distributional effects. This would increase the risk of losing their independence for monetary policy (Baker, 2015). A prominent role for central banks also raises concerns of excess power in a non-elected body (Goodhart, 2010). Additionally, it raises concerns around central bankers enacting policies that affect credit cycles that may have important distributional consequences and be more appropriate for elected officials (Tucker, 2014, 2016). In these circumstance a stronger role by government could help garner political support for policy actions.

Our cluster analysis of FSCs indicate that few FSCs appear to reflect functional delegation, and most appear to reflect symbolic political delegation or are even weaker. Moreover, political

economy considerations are very important, given the widespread participation of ministries of finance in FSCs for macroprudential policies, a new development. Below we test whether stronger FSCs influence policy actions in a different way than all FSCs.

### **Tests for the delegation motivations underlying the formation of FSCs**

The analysis of whether FSCs affect the actual implementation of policies provides an additional important assessment to the cluster analysis of FSCs. We do not take a stand on whether policy actions are appropriate, though we can assess if they are consistent with economic and financial conditions. And while most FSCs do not have direct authorities over bank capital requirements, it is possible that their presence as a coordinator could affect an individual agency's action. Thus we assess given current conditions (and other institutional features in the country), whether governance characteristics have an independent effect on actions. Under our alternative hypotheses, if the governance arrangement reflects symbolic political delegation, we would not expect an influence and might even consider it possible that the FSC has a negative influence since policies that might otherwise have been implemented by a single agency now need to be deliberated by a committee that, moreover, may not have a clear mandate. If the governance arrangement reflects functional delegation to expert agencies, we would expect governance to have a positive influence on actions.<sup>4</sup> We also consider the effects of other authorities for setting bank capital, such as the role of prudential regulators or central banks, given that FSCs generally were added to arrangements already in place.

This analysis of whether FSCs affect the implementation of macroprudential policies is confined to bank capital policies, specifically CCyB, and does not consider policies that are targeted to borrowers, such as loan-to-value ratios (LTV) or debt service-to-income ratios (DSTI) for residential mortgages. Such tools are viewed by some as differing in nature and more interventionist in financial markets than policies aimed at providers of credit, and would require even stronger governance mechanisms than those required to implement bank capital rules. Difficulties with assessing expected risks to financial stability – risks to the economy from excess credit growth – might generate even more policy inertia for these demand side tools. Additionally, policies directed at LTV and DSTI ratios are not always used for macroprudential purposes and are put in place at times for consumer protection or other reasons. In contrast, the Basel III CCyB that we consider has a pure macroprudential motivation.

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<sup>4</sup> A related question is whether a FSC being led by a CB or being led by the MF is likely to affect decision, where being led by a MF could suggest greater accountability and political support, but also greater incentive to delay. We plan to analyze this question in a future draft of this paper.

### 3. The Basel III Countercyclical Capital Buffer

Basel III regulations aim to improve the quantity, quality, and risk coverage of bank capital from a bank safety and soundness perspective. A key addition to Basel III is its more systemic risk-oriented approach to setting capital levels than had been the case with previous capital regimes. Basel III includes a static minimum capital requirement; a capital conservation buffer (CCoB) that can be drawn down when the economy weakens and bank capital levels decline to prevent a firm from having to immediately raise capital during a downturn, thereby contributing further to the downturn; a capital surcharge for systemically important financial institutions (G-SIB) based on its characteristics that impose losses on the broader system if it were to fail; and a countercyclical capital buffer (CCyB). While the CCoB, G-SIB, and CCyB all have macroprudential features, only the CCyB is designed to be evaluated at regular intervals by authorities to decide whether to increase, decrease, or maintain its level.

Countries have established frameworks for using the CCyB that generally call for an increase in the CCyB when system-wide risks appear elevated and a decrease after risks have materialized or decreased. The intent of a higher CCyB is to increase the resilience of banks to future losses, as well as to reduce credit growth pre-emptively by raising a bank's cost of funds, although many countries view this latter intent to be secondary. Banks are generally given a year to raise their capital ratios to meet a new higher requirement. The release of the CCyB, however, is immediate, and is expected to provide banks an incentive to continue to lend by lowering its cost of funds or absorb losses from loans that default.

Most countries expect that the CCyB would be zero in normal times and have established their own criteria for describing when the CCyB would be raised to above zero. An exception is the U.K., where the FPC expects that it will require banks to hold a CCyB of greater than zero in normal times, which provides more scope for lowering it more frequently than in other countries. As noted above, this tool is new and while it is expected to yield important benefits from the way it moderates downturns in the credit cycle, to date there has yet to have been any experiences of this process occurring.

Figure 2 summarizes the CCyB activation decisions of the countries in our dataset.<sup>5</sup> It reports how many countries in any year have activated – and thereby have non-zero – CCyBs. Three countries used the CCyB in 2015 (Hong Kong, Norway, and Sweden). By 2019, this number increased to 13 countries, just under one-quarter of the 55 countries in our dataset that to date have operationalized a CCyB framework. The figure also shows that levels to which the CCyB has been activated, which has increased as the economic and financial cycle has continued to

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<sup>5</sup> Data are from BCBS, ESRB, and countries' websites. We cross-checked with the IMF Macprudential Policy Survey when we collected the information from countries' websites.

expand in most countries. In 2019, six countries have the CCyB above 1 percent, of which three countries are at 2.5 percent, the maximum level eligible for reciprocity treatment.

## 4. Macroprudential governance variables

We consider a wide range of variables to include in our regression analysis, recognizing the constraints of empirical work with 58 countries and still-limited use of the CCyB. These variables can be broadly grouped into those related to macroprudential governance structures, economic- or financial-cycle characteristics, and country cross-sectional characteristics. This section described the macroprudential governance variables that we use in our regressions as well as the cluster analysis that we used to identify *FSC strongest* and *FSC weakest*, the group of FSCs that have stronger and weaker governance features, respectively.

### FSC governance variables

Macroprudential governance variables include *FSC exists*, which is whether or not a FSC exists in a country, and *No. of FSC agencies*, which is the number of agencies on the FSC with a 1 for when there is no FSC but a sole authority. With respect to CCyB specifically, the FSC can set it directly in two countries and can make recommendations in eight countries, mostly to a PR. Characteristics of these variables are reported in Table 1, as well as panels A and B of Table 2.

FSCs can be grouped in terms of being able to take action in response to building vulnerabilities based on similarities in their governance characteristics using a technique known as cluster analysis. Our analysis here to form these clusters of FSCs extends our analysis in a previous paper (Edge and Liang, 2019).

The FSC clusters are based on whether the FSC is established formally in legislation (as opposed to informally via a MOU); takes votes; has a specified chair (or co-chairs); and has good tools, where good tools are that the FSC has authority for hard macroprudential policy tools (*e.g.*, the CCyB or LTV ratios), semi-hard tools (*e.g.*, comply or explain authority), or an advisory role for the CCyB. These variables are the same as those that we considered in our previous paper.

We add to this list if the FSC makes a formal recommendation on the CCyB. For example, in Germany, the prudential regulator has the authority to set the CCyB, but the central bank provides analysis and makes a recommendation to the FSC, which in turn can choose to recommend to the prudential regulator a setting for the CCyB (See Appendix A for a description of these roles.) There is considerable but not complete overlap between the general comply or explain authority and the advisory role for the CCyB. We include this FSC advisory role in our *FSC has good tools* variable because we view this formal role for CCyB to be very close to the FSC having “comply or explain” authority.

Figure 3 reports the results of this updated FSC cluster analysis, where the clusters in the dendrogram are ordered from the weakest FSCs, on the left, to the strongest FSCs, on the right

(note that there is no implied ordering of governance strength within each of the clusters). The variable *FSC strongest* is equal to 1 for the 13 countries with FSCs in the right-most (blue) cluster, and equal to 0 otherwise. This cluster can take actions, since the FSCs in this cluster all are formal, all have a single chair, all have a voting process, and all have hard or semi-hard tools. The FSCs in the next group of eight – the teal cluster – are mostly all formal, all have a single chair, all have a voting process, but none have good tools, and so are not as able to take actions as FSCs in the blue cluster. We consider the next two groups – the red and olive clusters – as even less able to act. Of these two groups the FSCs in the left-most (olive) cluster are mostly defacto FSCs, few vote, and none have tools. The variable *FSC weakest* is equal to 1 for the 13 countries with FSCs in this cluster

Of note – and as seen in the table that follows Figure 3 – the *FSC strongest* cluster is equally likely to be chaired by the MF or the CB, and they are significantly more likely to have independent members than other FSCs. In addition, this group of FSCs are in countries with stronger rule of law and higher per capita income, and with higher fiscal costs-to-GDP related to the financial crisis. In addition, relative to the next most similar set of FSCs (those with the same attributes but without tools), it has a higher credit-to-GDP ratio and more developed financial sector, for both institutions and markets, suggesting these countries may view that stronger FSCs would provide more benefits.

At the same time, however, the countries with the weakest FSCs share similar traits with the strongest – relatively strong rule of law, high per capita income, high credit-to-GDP, and more developed financial sector – and both differ from the two clusters in the middle. That is, the relationship between country variables and strength of FSC strong governance is not monotonic.

### **CCyB governance variables**

FSCs are new and have been mainly appended to existing financial regulatory structures. To measure the strength of other governance for setting the CCyB, we look specifically at if the authority is with the prudential regulator (PR), denoted by an indicator variable *PR sets CCyB*, or with the central bank (CB), denoted *CB sets CCyB*. The CB sets it in 34 countries and makes formal recommendations in five countries, and the PR sets it in 15 countries and does not recommend in any country (see Table 1). In four other countries the ministry of finance or government (MF) sets the CCyB, and in all four cases the CB or the FSC makes a formal recommendation. In addition, we can proxy for the influence of the CB more generally, whether the CB is the authority for bank prudential regulation, *CB is a PR*, or whether the authority for prudential regulation extends beyond just the banking sector, *CB is a wide PR*.

For the 13 countries that raised CCyB in 2018 or earlier, details on the governance and the role of the central bank are shown in Table 3. There is wide variation in authorities for setting the CCyB and includes countries with and without FSCs, with *FSC strongest* and *FSC weakest*, and countries that did and did not have banking crises starting in 2007 or 2008. In terms of the role



of the CB, it ranges from setting the CCyB on its own, making a formal recommendation, consulting, to having no role.

## 5. Empirical Specifications and Results

### Decision to use the countercyclical capital buffer

To evaluate the decision to use the CCyB, we use a pooled cross-section dataset for 55 of the countries in our data set. (Three countries – Chile, Colombia, and Israel – had not set up an implementation framework as of 2018). A country-year observation is 1 if the CCyB is greater than zero.

*Decision CCyB<sub>i,t</sub>* = 1 if CCyB<sub>i,t</sub> > 0 for country *i* in any year *t* from 2015 to 2018  
*Decision CCyB<sub>i,t</sub>* = 0 if CCyB<sub>i,t</sub> = 0 in any year and country has a framework to implement

We model the decision with a random effects logit model:

$$Prob(Decision\ CCyB_{i,t}) = \frac{1}{1 + \exp[-(a_i + b \cdot X_{i,t-1} + c \cdot G_i + d \cdot Z_i)]}$$

where  $X_{i,t-1}$  are financial and economic variables that vary over the credit or business cycle for country *i* in year *t-1*,  $G_i$  are macroprudential and financial regulatory governance variables for country *i*, and  $Z_i$  are other country *i* characteristics.

The CCyB is expected to increase the resilience of banks to future losses, and we expect that it would be positively related to indicators of building financial vulnerabilities, as measured by variables such as rising credit growth or equity or house prices. These variables are defined in Table 2, panel C. We control for the strength of the economy with GDP growth and inflation. All variables are included in the regressions for the year preceding the decision to activate the CCyB to reflect the information authorities would have in hand when they make the decision. (If a decision is made in December of a given year, we use data for that year, assuming that authorities have a good amount of data for that year in hand, and it would be more pertinent than data for the previous year.)

Most countries to date have raised the level of the CCyB each year once initiated, but we have looked so far only at whether it is above zero in any given year. For example, countries that have CCyBs of greater than 2 percent, previously had activated CCyBs but at lower levels. No country during this time period has lowered the CCyB, with the exception of the U.K. discussed below, given countries have been still in an expansionary phase of the business cycle. In the case of the U.K., the FPC had raised the CCyB in March 2016 despite risks that were “in the standard range” in a step toward a capital regime in which the CCyB would be 1 percent in normal ranges of the financial cycle, but it then lowered it after the Brexit vote to help prevent

some heightened volatility in a few financial markets from getting amplified. For our estimations, we drop the initial increase and decrease in the CCyB, since it was related to Brexit and not related to more typical financial cycle indicators, but include the decision to activate in mid-2017.

For governance variables  $G_i$ , we include characteristics of the FSCs and existing regulatory structures. Any FSC, represented by *FSC exists*, even without tools could be influential if just having a FSC body encourages discussions of systemic risk and raises awareness. Positive coefficients on *FSC exists* or *FSC strongest* (those with tools and processes) would be consistent with functional delegation. The effect of any FSC without its own tools and processes, however, could be zero if discussions do not encourage actions by the CB or PR with the tools. It could also be negative if FSCs were to discourage actions because the CB or PR might need to consult with the FSC and other regulators before taking actions, or if FSCs were to make it more challenging to use the CCyB if its use was not endorsed explicitly by the FSC. A zero or negative coefficient would be consistent with delegation for symbolic political reasons.

Another aspect of FSCs that could affect effective decision-making is the number of agencies on the FSC. Because FSCs are designed at a minimum to improve communication and coordination, they will often include multiple financial regulators and the MF. As noted above, most FSCs have three or four member agencies, and the number of agencies ranges from two to nine in our dataset. More agencies would increase coordination problems and reduce efficient decision-making, although countries may want to create large FSCs to be more inclusive. Thus, *No. of agencies on FSC* offers an additional perspective on delegation motives, where a negative coefficient would be more consistent with symbolic political than functional delegation.

In addition, we include the direct authority to set the CCyB – *CB sets CCyB*, *PR sets CCyB*, and *FSC sets CCyB* – where the excluded category is other (MF or government). The authority to set the CCyB most frequently rests with the central bank as a prudential regulator and then with an independent prudential regulator.

Predictions under alternative hypotheses for formation of FSCs are:

- Functional delegation would be supported by:
  - Coefficient on *FSC exists*  $> 0$
  - Coefficient on *FSC strongest*  $> 0$
  - Coefficient on *FSC sets CCyB*  $> 0$  and  $>$  coefficients on *CB sets CCyB* and *PR sets CCyB*
- Symbolic political delegation would be supported by:
  - Coefficient on *FSC exists*  $\leq 0$
  - Coefficient on *No. of agencies on FSC*  $< 0$

In terms of country characteristics  $Z_i$ , described in panel D of Table 2, we include a measure of the severity of the global financial crisis. According to criteria in Laeven and Valencia (2018),

38 percent of the countries in our dataset had a banking crisis that started in 2007 or 2008. The severity of the crisis can be measured by the fiscal costs-to-GDP ratio (*Fiscal costs*) related to bank restructuring or the peak bank nonperforming loan ratio (*Peak NPL*). Countries that had a banking crisis and higher costs may be more determined in their implementation of macroprudential bank capital policies.

We also include in some specifications two indicators of financial development, an index for financial markets and an index for financial institutions, to represent the differences across countries in terms of significance of nonbank market-intermediated finance (as measured by Svirydzienka, 2016). Countries with more developed financial markets may rely less on bank capital tools to reduce systemic risks because intermediation can more easily migrate to other sources when capital requirements on banks are raised. Other governance variables include CB political independence and CB operational independence (see Grilli, et al., 1991, and Amone and Romelli, 2013), and measures of rule of law and checks and balances, both from the World Bank.

Regression results for decisions to use the CCyB are shown in Table 4 and marginal effects for key regressions and variables are shown in Table 5. The coefficient on growth in credit for the past year is always positive and significant and often also for credit growth in the prior year. We would note that we tried the credit-to-GDP gap measure, as recommended by the BCBS for setting the CCyB (see BCBS, 2010), but it was not significant (not shown). Many countries have pointed out that they have activated the CCyB although the gap was less than 2 percent, the threshold suggested by the BCBS, or indeed was often negative. Specifically, the average credit-to-GDP gap for countries with *Decision CCyB* = 1 was -7.9 percent, lower than the average of -6.3 percent for countries with *Decision CCyB* = 0. Gap measures do not appear to be as helpful in identifying episodes of credit excess in the post-crisis period since trends are highly uncertain, and the inclusion of the credit boom in the late 2000s has pushed up the underlying trend in many countries, making it appear as if they have substantial negative credit gaps despite strong increases in credit-to-GDP or real credit growth.

In addition to more rapid credit growth, countries with higher GDP growth and inflation are more likely to raise the CCyB, consistent with stronger economies being better able to absorb costs of higher capital requirements. Countries that had a banking crisis during the global financial crisis and had higher fiscal costs-to-GDP are also more likely to use the CCyB. Using *Peak NPL* rather than *Fiscal costs* in the regressions leads to results that are very similar; we do not include both variables since they are highly correlated.

Equity returns in the previous year also are significant, but when they are included, coefficients on GDP growth and inflation become insignificant (column 2). The rest of results reported in Table 4 include GDP and inflation since we lose three countries when we use equity returns. Notably we also tried change in house prices, although we have house price data for only 38 of the 55 countries, and house price changes were not significant.

Turning to governance variables, the coefficient on *FSC sets CCyB* is large and significant (column 3 of Table 4) and – when all other regression variables are at their means – implies a 50 percent probability of the CCyB being activated (Table 5). The effect of *FSC is CCyB advisor* is also positive but not significant.

We can also capture the strength of governance of FSCs more broadly with *FSC strongest* rather than specific to the CCyB. The coefficient on *FSC strongest* is positive and significant (column 4 of Table 4). These results suggest that the strongest FSCs – those with authorities and good governance – increase the likelihood of activating the CCyB, consistent with the strongest FSCs reflecting functional delegation. Indeed, our estimated coefficients for this equation imply that – when all other regression variables are at their means – countries with the strongest FSCs have a 19 percent probability of their CCyBs being activated (Table 5). In contrast, a country with a FSC that is not in the strongest cluster has a 9 percent probability of their CCyBs being activated.

In contrast to measures that capture strong governance of FSCs in equations 3 and 4, we include an indicator variable for the cluster of FSCs that are the weakest. The coefficient on *FSC weakest* is negative and significant (column 5), or has a much smaller positive but insignificant coefficient than for *FSC strongest* when both are included in the regression (not shown). These results suggest the clusters are able to capture differences in FSC governance that affect the CCyB decision, with clusters with no tools and weak mechanisms to facilitate decision-making significantly reducing the likelihood of using the CCyB.

The variables *FSC exist* and *No. of agencies on FSC* are included in each of these specifications. In general, the coefficients on *FSC exists* are positive but not significant and the coefficients on *No. of agencies on FSC* are negative and significant. The coefficient estimates from equation 3 imply a 13 percent probability of the CCyB being activated when there is a FSC with an average number of members, but it is higher, 18 percent probability, when there is an FSC with only two members. This probability falls steeply with progressively larger FSCs, specifically to 4 percent for a five-member FSC. The declining probabilities for FSCs with more members is consistent with greater coordination problems among more regulators.

We examine whether more agencies may mainly reflect that these countries have more-complex financial systems such that a higher CCyB applicable to banks might not reduce systemic risks given that activities could move to nonbanks. We test this by including indexes for the financial development of markets and institutions and find that a negative but insignificant coefficient on the market development index, a positive and significant coefficient on the financial institution development index, while the coefficient on *No. of agencies on FSC* remains negative (not shown).

Turning next to the role of the existing regulators, we look specifically at whether the independent PR or the central bank with authority to set the CCyB influence the likelihood of using the CCyB. The coefficient on *PR sets CCyB* is negative and significant (column 6 of Table 4) and – when all other regression variables are at their means – implies a low probability,

only 3 percent, of the CCyB being activated (Table 5). The coefficient for *CB sets CCyB* is also negative but less sizable and implies a 12 percent probability of the CCyB being activated. In addition, the coefficient on *CB is CCyB advisor* is not significant.<sup>6</sup> These coefficients suggest that existing regulators are much less likely to activate the CCyB relative to a strong FSC or other government authority. When neither the PR nor CB set the CCyB, the probability of the CCyB being activated is 35 percent.

The negative coefficient on *CB sets CCyB* might be surprising given that CBs are generally expected to be more likely to use the CCyB based on their expertise with time-varying analysis for setting monetary policy and that there are synergies for macroprudential policies for a central bank that is also a prudential regulator.<sup>7</sup> We look further at *CB sets CCyB* and split *CB sets CCyB* into whether a FSC exists or whether a FSC does not exist and the CB is the country's single authority for financial stability. Negative and significant coefficients on each variable indicate that a CB with the authority to set the CCyB will be more likely to activate the CCyB when it is a single authority rather than when it is a member of a FSC. Specifically the coefficients imply a 18 percent probability of the CCyB being activated when the CB sets the CCyB and the CB is a single authority, and only a 5 percent probability of the CCyB being activated when the CB sets the CCyB and a FSC exists. These results suggest that CB decisions are affected by FSCs, and that the separation of authorities to set CCyB from government roles for financial stability may hinder decision-making.

Table 5 also reports for different governance set-ups the probability to activate the CCyB for an increase in the rate of credit growth of one standard deviation from its mean. The marginal effect is substantial and sizable for strong FSCs. In particular, a one standard deviation in credit growth substantially boosts the probability of the CCyB being activated from 19 percent to 42 percent for *FSC strongest*, and from 50 percent to 68 percent for *FSC sets CCyB*, though this reflects the experience of only two countries. It is also substantial for FSCs with fewer than the average number of agencies (an increase from 18 percent to 29 percent), consistent with lower coordination problems at smaller FSCs. For FSCs not among the strongest, the probability increases from 9 percent to 18 percent, but 18 percent is only the average probability. For CBs and PRs with direct authorities to set the CCyB, the additional increase in the probability from higher credit growth is more modest; specifically, from 12 to 18 percent when the CB sets the CCyB and from 3 to 6 percent when the PR sets the CCyB.

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<sup>6</sup> The CB is a formal advisor for the CCyB in five countries. Additionally, as shown in Table 3 for the countries that have activated the CCyB, the CB can consult with or provide analysis for other agencies when it does not have the authority to set it. We interpret consulting with or providing analysis as having less authority than when the CB makes a formal recommendation. For example, the CBs in Iceland, Luxembourg, Sweden, and the U.K. provide analysis or consult with the authority for setting the CCyB and thus can have an influence even if it does not have the authority itself to set the CCyB.

<sup>7</sup> See Nier, Osinski, Jacome, and Madrid (2011), Goodhart and Schoenmaker (1995), and Merrouche and Nier (2010) as examples of papers that find that the CB being the PR leads to better banking-sector outcomes and Koetter, Roszbach, and Spagnolo (2014) as an example of a paper that does not find this result.

## Robustness

We evaluate robustness of the empirical results for various governance measures in a number of ways. First, we re-estimate the logit specification that we report in Table 4 as probit specifications (not shown). As is to be expected (and as discussed by Amemiya, 1981, and cited by Hsaio, 1992), the estimated coefficients in our probit models are different from those of our logit models – specifically, approximately 0.6 times – but our resulting probabilities and marginal effects are similar across specifications.

Second, we estimate our regressions based on only the last year of the sample period, which should alleviate possible concerns that standard errors are underestimated in the logit model with random effects. As shown in Table 6, coefficients on key governance variables – *FSC strongest*, *CB sets CCyB*, and *PR sets CCyB* – are significant in the cross-section specifications, indicating that the estimated effects for these governance variables are significant and suggesting the significance of these variables in the estimations using the panel data are not misleading. In addition, the average probability of using the CCyB derived from the cross-section equations are similar, though a bit higher, than those from the estimations using the panel dataset, reflecting the greater use of the CCyB in 2018 than in 2015. In particular, the average probability of *FSC strongest* is 40 percent, *CB sets CCyB* is 15 percent, and *PR sets CCyB* is 11 percent, retaining the same ordinal pattern of likelihood as obtained under the panel specification.

Third, we try an additional way to control for the possibility that there is a common underlying factor determining the decision to use the CCyB and to have a FSC with strong governance. Recall, that we already tried, in variants of our Table 4 regressions, to control for this potential effect by including *Fiscal costs* or *Peak NPL* during the financial crisis on the basis that a country having experienced in the recent past a more severe crisis might be more likely to have a strong FSC and to also activate its CCyB sooner. The additional modeling specification that we try to address this concern is a bivariate recursive probit model as described by Maddala (1983) and Greene (1998, 2018). Specifically, in a bivariate recursive probit specifically we model the decision to use the CCyB as depending on *FSC strongest* and other variables and model *FSC strongest* as depending on various country characteristics but not on the decision to use the CCyB. To explain FSC governance, we include variables such as *Fiscal costs*, rule of law, per capita GDP, log (GDP), whether the *CB is a PR*, and *CB political independence*. While coefficients on these variables generally have the expected signs, none of the variables are significant. But the bivariate recursive probit estimations indicate that the FSC strongest remains significant in the decision to use the CCyB.

## 6. Conclusion

This paper is to our knowledge the first to document the effects of new macroprudential governance structures on macroprudential features of the Basel III capital regime. In particular, this paper finds empirical evidence that governance characteristics of FSCs significantly affect the use of the CCyB. We showed in an earlier paper that FSCs differ significantly in terms of governance mechanisms, and we demonstrate in this paper that stronger FSCs – that is, those with tools and good governance – have significant effects on a country’s use of the CCyB. Both *FSC sets CCyB* and *FSC strongest* as defined by cluster analysis of governance characteristics have substantially higher probabilities of activating the CCyB, and the effect of *FSC strongest* is highly sensitive to credit growth. However, most FSCs are not strong, and *FSC weakest* and *FSC exists* if the FSC have more member agencies than average, have lower probabilities of activating the CCyB. In addition, a country is significantly less likely to use the CCyB when an independent PR sets the CCyB, consistent with its relative focus on microprudential risks, and also when the CB sets the CCyB relative to the FSC or government.

We interpret these results as suggesting that a minority of countries have created FSCs consistent with a functional delegation motive. Most countries, however, appear to have created FSCs for reasons that are more consistent with a symbolic political delegation motive.

Given that both FSCs and the CCyB are recent developments it is not surprising that questions remain open. While we have taken a number of different approaches to examine whether a common underlying factor is determining both the decision to use the CCyB and to have a FSC with strong governance and so far have not found this to be the case, the question deserves further consideration. More broadly, the finding that countries with the strongest FSCs are more likely to set the CCyB in ways consistent with reducing systemic risk, even when they do not have the authority to directly set the policy themselves, while prudential regulators are less likely raises interesting questions about the significance of processes for collective decision making. A related question is whether distributing macroprudential policy responsibilities across multiple agencies – such as, an FSC and a central bank – improves decision-making and accountability, or obscures and hinders it. Another issue is the significance of the extensive presence of elected government (such as the ministry of finance) in a FSC with the central bank and independent prudential regulators, and how that influences macroprudential policies. We plan to follow up on these questions as the use of CCyB expands over time across differing economic and financial cycles.

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**Table 1. Financial Stability Committees: Membership, leadership, and authorities**

	No. of countries
<b>A. Microprudential Authorities</b>	
CB is the PR	34
CB is a wide PR	18
Independent PR	24
<b>B. FSC characteristics</b>	
FSC exists	47
Formal	36
De facto	11
Number of FSC agencies	
2	4
3	14
4	18
5	7
6	2
7	0
8	1
9	1
FSC chair or co-chair	
MoF	25
CB	19
PR	1
Other	6
<b>C. Authorities and advisory roles for the CCyB</b>	
CB sets	34
FSC makes recommendation	1
PR sets	15
FSC makes recommendation	5
CB makes recommendation	2
Both make recommendations	0
MF or government sets	4
FSC makes recommendation	2
CB makes recommendation	2
Both make recommendations	0
FSC sets	2
CB makes recommendation	1
Country does not have CCyB	3

**Table 2. Regression and cluster analysis variables**

		Mean	Std. dev.	10 <sup>th</sup> pctl.	90 <sup>th</sup> pctl.
<b>A. FSC macroprudential governance variables</b>					
FSC exists	Collected in our dataset and equal to 1 if a FSC exists and 0 if not.	0.81	0.4	0	1
No. of agencies on FSC	Collected in our dataset and equal to the number of agencies on the FSC or 1 if no FSC.	3.41	1.7	1	5
FSC strongest	Derived from cluster analysis equal to 1 if FSC is in cluster 2 (the blue cluster) in Figure 3.	0.22	0.42	0	1
FSC weakest	Derived from cluster analysis equal to 1 if FSC is in cluster 3 (the olive cluster) in Figure 3.	0.22	0.42	0	1
CB is chair	Collected in our dataset and equal to 1 if the CB is chair of the FSC and 0 if not.	0.33	0.47	0	1
MF is chair	Collected in our dataset and equal to 1 if the MF is chair of the FSC and 0 if not.	0.41	0.5	0	1
<b>B. CB and PR microprudential governance variables</b>					
CB is a PR	Collected in our dataset and equal to 1 if the CB is the PR and 0 if not.	0.60	0.49	0	1
CB is a wide PR	Collected in our dataset and equal to 1 if the CB is the PR of more than banks and 0 if not.	0.31	0.47	0	1
CB sets CCyB	Collected in our dataset and equal to 1 if the CB sets the CCyB and 0 if not.	0.57	0.5	0	1
PR sets CCyB	Collected in our dataset and equal to 1 if the PR sets the CCyB and 0 if not.	0.26	0.44	0	1
<b>C. Macroeconomic and financial variables</b>					
Real GDP growth	An indicator of the macroeconomic cycle and equal to the year-on-year growth rate of real GDP. Reported by the World Bank	2.67	3.7	-0.5	5.9
CPI inflation	An indicator of the macroeconomic cycle and equal to the year-on-year growth rate of the CPI. Reported by the World Bank	1.92	3.3	-0.5	5.9
Credit growth	An indicator of the financial cycle and equal to the year-on-year growth rate of nominal private-sector credit growth. Reported by the World Bank.	1.27	7.5	-6.6	10.3
Private credit-to-GDP ratio	An indicator of an economy's credit intensity. Reported by the World Bank.	3.01	1.1	1.9	4.3
Equity returns	An indicator of the financial cycle and equal to the year-on-year growth rate of equity prices. Reported by the World Bank.	-0.91	24.3	-26.6	24.2

**Table 2 Regression and cluster analysis variables, continued**

		Mean	Std. dev.	10 <sup>th</sup> pctl.	90 <sup>th</sup> pctl.
<b>D. Other financial-sector and country governance variables</b>					
Fiscal cost-to-GDP	As measured by Laeven and Valencia (2018) and is fiscal outlays directly related to the restructuring of the financial sector if the country had a banking crisis that started in 2007 or 2008. Measured as a percent of GDP.	3.6	8.1	0	9.9
Peak NPL	As measured by Laeven and Valencia (2018) and bank peak non-performing loans as a percent of to total loans if the country had a banking crisis that started in 2007 or 2008.	4.8	10.6	0	17.3
Financial development index	Measured by Svirydzhenka (2016) in IMF WP 16/5 and based on the depth, access, and efficiency of countries financial institutions and markets.	0.60	0.21	0.33	0.85
Fin. market development index	Measured by Svirydzhenka (2016) in IMF WP 16/5. See above.	0.55	0.26	0.19	0.86
Fin. institution development index	Measured by Svirydzhenka (2016) in IMF WP 16/5. See above.	0.65	0.20	0.35	0.90
CB political independence	Measured by Grilli, et al. (1991) and updated by Amone and Romelli (2013) and based on the involvement of the government in appointing the CB governor or as a participant for formulating monetary policy.	0.64	0.30	0.13	1
CB operational independence	Measured by Grilli, et al. (1991) and updated by Amone and Romelli (2013) and based on linkages between the CB and government in terms of credit provision by the CB to the government. The CB being a PR is dropped from the measure.	0.78	0.18	0.38	1
Rule of law	Measured by the World Bank and now the IADB to capture the traditions and institutions by which authority in a country is exercised.	0.78	0.91	-0.51	1.84
Checks and balances	Measured originally by the World Bank and now the IADB to capture the institutions by which limits are placed on the actions of one branch of the government by other branches with purview over these actions.	0.66	0.24	0.20	0.85
Log GDP	An indicator of the economy's size. As reported by the World Bank and measured by U.S. dollar denominated GDP.	26.4	1.5	24.4	28.5
GDP per capita	An indicator of a country's wealth. As reported by the World Bank and measured by GDP in U.S. dollars per person.	29.5	16.9	6.7	52.3

**Table 3. Countries that have raised their countercyclical capital buffers and governance**

	Year of first raise	Authority for CCyB	FSC exists	FSC strong -est	FSC weak-est	FSC chair	FSC member	CB role	Banking crisis that started 07 -08
Bulgaria	2018	CB	Y	N	N	MF	Y	Sets CCyB on its own	N
Czechia	2015	CB	N	N	N	-----	-----	Sets CCyB on its own	N
Denmark	2018	Gov	Y	Y	N	CB	Y	-----	Y
France	2018	FSC <sup>(a)</sup>	Y	Y	N	MF	Y	Makes a recommendation to FSC based on CB and PR analysis	Y
Hong Kong	2015	CB	Y	Y	N	MF	Y	Sets CCyB on its own	N
Iceland	2016	PR	Y	Y	N	MF	Y	Prepares analysis for FSC via a committee with CB and PR; FSC recommends CCyB level to PR	Y
Ireland	2018	CB <sup>(a)</sup>	Y	N	Y	No chair	Y	-----	Y
Lithuania	2017	CB <sup>(a)</sup>	N	N	N	-----	-----	Sets CCyB on its own	N
Luxembourg	2018	PR <sup>(a)</sup>	Y	Y	N	MF	Y	Is consulted by PR but does not make a recommendation	Y
Norway	2013	MF	Y	N	Y	MF	Y	Makes a recommendation to MF, which CB publishes in its MPR	N
Slovakia	2016	CB <sup>(a)</sup>	N	N	N	-----	-----	Sets CCyB on its own	N
Sweden	2014	PR	Y	N	N	MF	Y	Is consulted (with other bodies) by PR but does not make a recommendation <sup>1</sup>	Y
United Kingdom	2017 <sup>(b)</sup>	FSC	Y	Y	N	CB	Y	Prepares analysis for the FSC but does not make a recommendation	Y

(a) As a participant in the European single supervisory mechanism (SSM), the ECB can mandate a higher CCyB

(b) We exclude the first raise in 2016 because it was reduced shortly after being raised to avoid amplifying volatility related to Brexit.

**Table 4. Decision to use CCyB**

	<i>Dependent variable: Decision CCyB=1</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Credit growth(t-1)	43.06*** (3.36)	32.73*** (2.71)	67.75*** (4.65)	57.41*** (4.04)	58.72*** (4.87)	55.88*** (3.90)	64.77*** (3.09)	61.48*** (3.88)
Credit growth(t-2)	26.44* (1.93)	18.66 (1.53)	34.95** (2.07)	31.51 (1.63)	35.43** (2.34)	37.75** (2.49)	39.43* (1.83)	33.06** (1.99)
GDP growth(t-1)	42.34* (1.69)	7.26 (0.24)	70.70** (2.11)	57.22* (1.82)	62.12** (2.08)	61.38** (2.16)	74.76* (1.96)	64.87** (2.02)
CPI (t-1)	59.98*** (2.79)	15.05 (0.38)	114.76*** (4.08)	98.29*** (3.62)	97.74*** (4.35)	84.71*** (4.10)	107.06*** (3.30)	101.45*** (3.62)
Fiscal cost (crisis)	44.73*** (2.60)	21.67 (1.16)	47.28** (2.27)	37.83 (1.64)	46.44*** (2.76)	66.13*** (3.81)	65.79*** (3.12)	48.45*** (2.67)
Equity returns(t-1)		12.35*** (2.73)						
FSC sets CCyB			20.57** (1.89)					
FSC is CCyB advisor			5.58 (1.38)					
FSC strongest				8.32** (2.48)				7.34* (1.91)
FSC weakest					-7.51* (-1.93)			
FSC exists			5.41 (0.91)	4.95 (0.78)	11.16** (2.08)			1.15 (0.15)
No of agencies on FSC			-4.53** (-2.62)	-4.19** (-2.20)	-4.75*** (-2.96)			-3.08 (-1.32)
PR sets CCyB						-18.94*** (-4.59)	-18.63*** (-3.19)	-11.48** (-2.34)
CB sets CCyB						-13.29*** (-3.36)		-7.38* (-1.68)
CB is CCyB advisor						1.49 (0.31)	-1.78 (-0.24)	2.54 (0.46)
CB sets CCyB x FSC = 1							-19.01*** (-3.31)	
CB sets CCyB x FSC = 0							-8.40 (-1.56)	
Constant	-19.43*** (-6.22)	-15.75*** (-6.89)	-16.42*** (-4.08)	-14.03*** (-2.75)	-15.27*** (-4.34)	-14.26*** (-4.03)	-12.98*** (-2.96)	-7.42 (-1.43)
Observations	216	204	216	216	216	216	216	216
Country groups	54	51	54	54	54	54	54	54
Log likelihood	-46.87	-41.24	-44.13	-44.38	-45.28	-43.98	-43.11	-42.30

Notes: This table presents panel results of financial and economic, and governance variables on the decision to activate CCyB. The panel range is from 2015 to 2018. The dependent variable is a dummy on whether CCyB is active for a specific year. The independent variables are presented in Table 2. The t-values are in parentheses, and the statistical significance are \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 5. Probability of using CCyB by governance structure and marginal effects of credit growth**

	<b>Pr (CCyB) = 1 (with all variables at their means)</b>	<b>Pr (CCyB) = 1 (with credit growth at its mean + 1 s.d. and all other variables at their means)</b>
Eqn. (3)		
FSC exists and sets the CCyB	0.50	0.68
FSC exists but does not set the CCyB	0.13	0.17
No. of agencies on FSC = 2	0.18	0.29
No. of agencies on FSC = 5	0.04	0.08
Eqn. (4)		
FSC exists and is one of the strongest FSCs	0.19	0.42
FSC exists but is not one of the strongest FSCs	0.09	0.18
Eqn. (5)		
FSC exists and is one of the weakest FSCs	0.05	0.16
FSC exists but is not one of the weakest FSCs	0.18	0.20
Eqn. (6)		
PR sets the CCyB	0.03	0.06
CB sets the CCyB	0.12	0.18
Neither PR or CB set the CCyB	0.35	0.50

Note: Marginal effects for equation (3) assume that the FSC does not advise on the CCyB (*FSC advise CCyB* = 0) and for equation (6) assume that the CB does not advise on the CCyB (*CB advise CCyB* = 0)

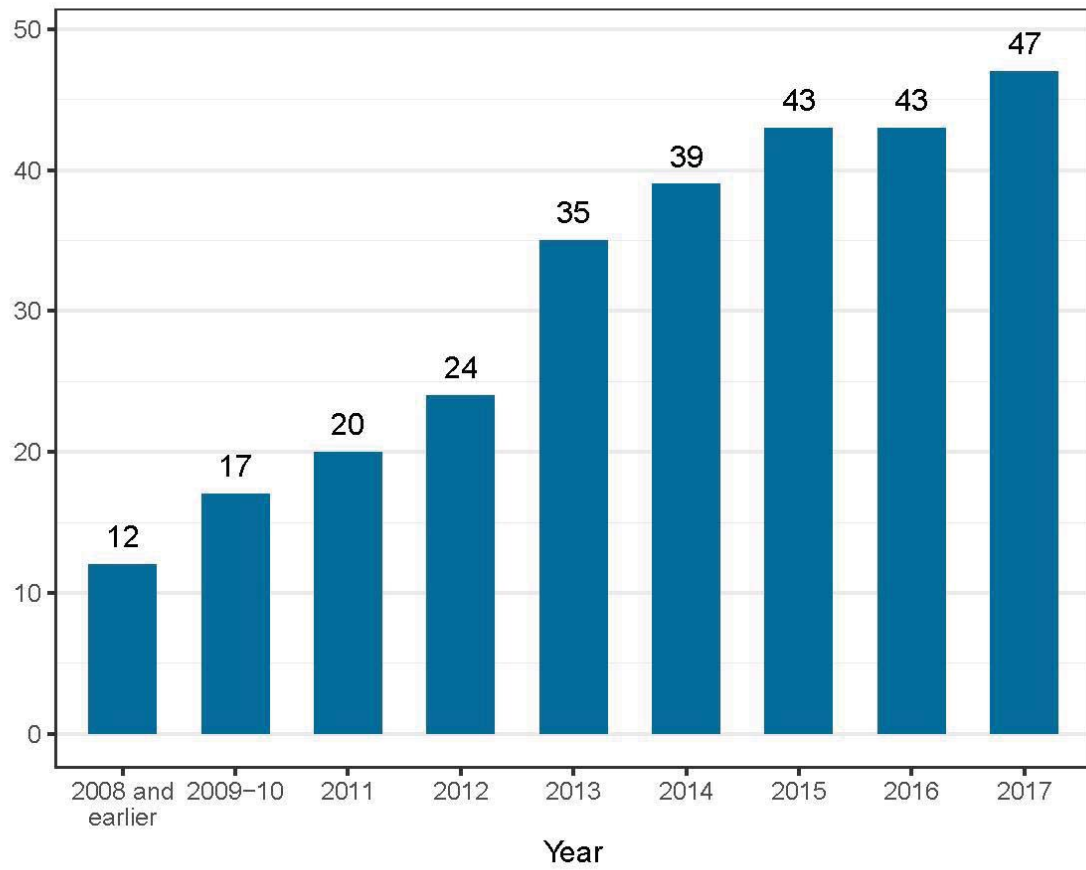
**Table 6. Robustness: Decision to use CCyB in 2018 only**

	<i>Dependent variable:</i> <i>Decision CCyB=1 in 2018</i>	
	(1)	(2)
Credit growth(t-1)	14.28* (1.86)	16.12** (2.12)
Credit growth(t-2)	6.34 (1.17)	7.47 (1.09)
Fiscal cost	8.19* (1.72)	10.72** (2.19)
FSC sets CCyB		
FSC is CCyB advisor		
FSC strongest	1.49* (1.69)	
FSC exists	0.33 (0.25)	
No of agencies on FSC	-0.38 (-1.11)	
PR sets CCyB		-2.68** (-2.08)
CB sets CCyB		-2.29** (-2.01)
CB is CCyB advisor		-0.60 (-0.43)
Constant	-1.65* (-1.82)	-0.34 (-0.34)
Observations	55	55
Pseudo $R^2$	0.210	0.239
Log likelihood	-23.77	-22.88

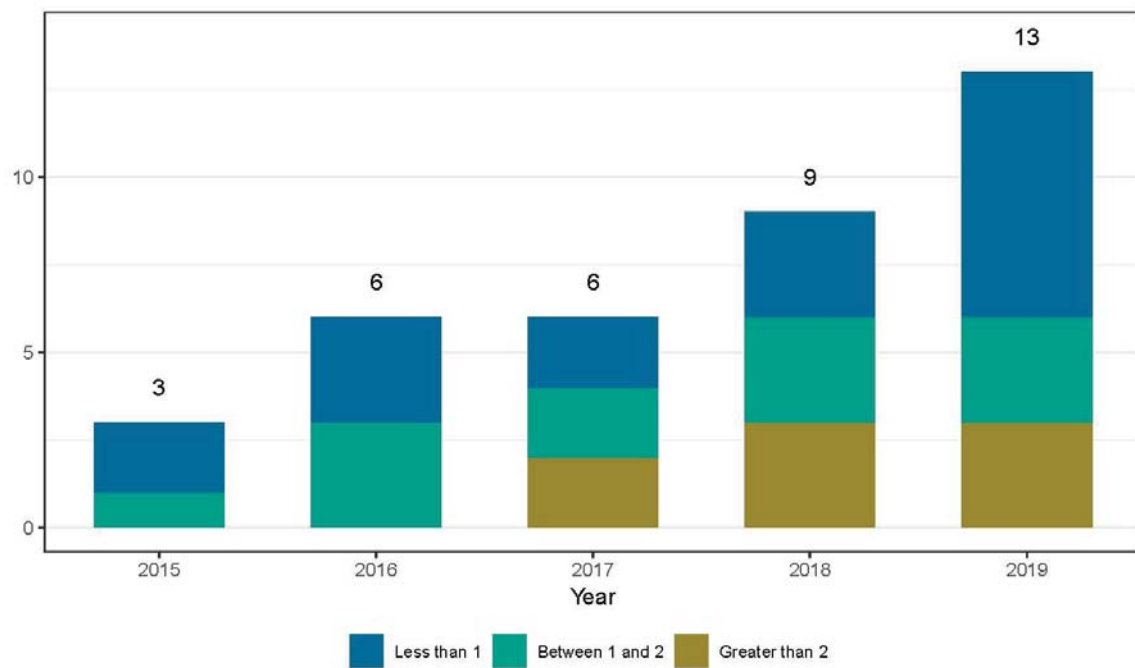
Notes: This table presents cross sectional results of financial and governance variables on whether a country activated its CCyB. The data year is 2018. The dependent variable is a dummy on whether CCyB is active. The independent variables are presented in Table 2. The t-values are in parentheses, and the statistical significance are \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Figure 1. Number of Financial Stability Committees, by year of formation**



**Figure 2 – Number of Countries that have Activated the Countercyclical Capital Buffer and Size of the Buffer, by year of activation decision**



Note: Three countries in our dataset have not operationalized the CCyB in their bank capital regimes. CCyB settings of 1 are included in the “Less than 1” portion of the bars and CCyB settings of 2 are included in the “Greater than 2” portion of the bars.



### Characteristics of Clusters in the FSC Ability to Act Dendrogram

	<i>Weakest</i>			<i>Strongest</i>
	Olive (3)	Red (1)	Teal (4)	Blue (2)
<b>A. Dendrogram info. &amp; avg. values of variables</b>				
No. of countries	13	13	8	13
Within (cluster) sum of squares (WSS)	8.2	0.9	0.0	0.0
Between (cluster) sum of squares (BSS)	8.1	5.1	3.3	10.1
Formal FSC	0.15***	1***	1***	1***
Single chair	0.54***	1***	1***	1***
FSC votes	0.23***	0***	1***	1***
Good tools	0.08***	0.08***	0***	1***
<b>B. Average values of other FSC variables</b>				
CB is chair	0.15**	0.31**	0.75**	0.54**
MF is chair	0.38	0.62	0.50	0.54
CB and MF are members	0.77	1.00	0.62	0.85
Indep. members on FSC	0**	0.08**	0.12**	0.38**
No. agencies on FSC	3.46	4.31	4.12	4.08
<b>C. Avg. values of other pru.. gov. variables</b>				
CB is PR	0.54	0.54	0.38	0.62
CB is wide PR	0.31	0.23	0.12	0.23
CB has CCyB	0.54	0.54	0.75	0.31
CB has LTVs	0.54	0.38	0.38	0.15
PR has CCyB	0.23	0.38	0.12	0.31
PR has LTVs	0.08	0.23	0.00	0.15
MoF or other has CCyB	0.15	0.00	0.00	0.15
MoF or other has LTV's	0.15	0.23	0.12	0.15
Early FSR	0.77	0.69	0.88	0.92
<b>D. Avg. values of other governance variables</b>				
CB political independence	0.51	0.58	0.66	0.74
CB operational independence (excl. CB is PR)	0.88	0.82	0.87	0.93
Rule of law	0.95*	0.35*	0.46*	1.21*
Checks and balances	0.66	0.58	0.59	0.78
<b>E. Avg. values of economy variables</b>				
Log GDP (2007)	26.72	26.60	26.11	26.63
Per-capita GDP (2007)	36.2**	22.3**	20.8**	39.1**
Private credit-to-GDP (2007)	106.14	82.63	89.36	114.24
Number of crises	0.92	1.31	1.12	1.15
Financial development index	0.70	0.56	0.54	0.69
Financial institutions development index	0.71	0.57	0.61	0.75
Financial markets development index	0.67	0.53	0.46	0.61
Peak non-performing loans in crisis	0.03	0.03	0.04	0.08
Fiscal cost-to-GDP of crisis	0.03*	0.01*	0.04*	0.06*

## Appendix A. Formal advisory roles for the FSC and CB for setting the CCyB

	Sets the CCyB	FSC role in the CCyB	CB role in the CCyB
Austria	PR	FSC makes a recommendation to PR	-----
Denmark	Gov	FSC makes a recommendation to Gov.	-----
Finland	PR	-----	CB, MF and Ministry of Social Affairs are consulted prior to PR's decision but they do not make any recommendations
France	FSC	NA	CB makes a recommendation to FSC based on CB and PR analysis
Germany	PR	FSC would make a recommendation to PR for a non-zero CCyB	CB prepares the analysis but does not make a recommendation
Iceland	PR	FSC makes a recommendation to PR	CB prepares the analysis for FSC via a committee with CB and PR but does not make a recommendation to PR
Japan	PR	FSC is designated as the venue for discussing the level to set the CCyB.	-----
Latvia	PR	-----	PR's decision is made in cooperation with CB and MF (which we view as being the same as making a recommendations)
Luxembourg	PR	FSC makes a recommendation to PR	CB is consulted by PR but does not make a recommendation
Mexico	PR	-----	Since Basel III regulations discuss only the "relevant national authority" for setting the CCyB and do not specify an agency, PR or CB could both be the relevant authority
Norway	MF	-----	CB makes a recommendation to MF, which CB publishes in its MPR
Poland	MF	FSC makes a recommendation to MF	-----
Romania	CB	FSC makes a recommendation to CB	-----
Sweden	PR	-----	CB is consulted (with other bodies) by PR but it does not make a recommendation
Switzerland	MF	-----	CB makes a recommendation to MF on both overall CCyB and on sectoral CCyBs
U.K.	FSC	NA	CB prepares analysis for FSC but does not make a recommendation