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**Financial Stability Committees and Basel III Macroprudential  
Capital Buffers**

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# Financial Stability Committees and Basel III Macroprudential Capital Buffers<sup>1</sup>

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## Abstract

We evaluate how a country's governance structure for macroprudential policy affects its implementation of Basel III macroprudential capital buffers. We find that the probabilities of using the countercyclical capital buffer (CCyB) are higher in countries that have financial stability committees (FSCs) with stronger governance mechanisms and fewer agencies, which reduces coordination problems. These higher probabilities are more sensitive to credit growth, consistent with the CCyB being used to mitigate systemic risk. A country's probability of using the CCyB is even higher when the FSC or ministry of finance has direct authority to set the CCyB, perhaps because setting the CCyB involves establishing a new macro-financial analytical process to regularly assess systemic risks and allows these new entities to influence the process. These results are consistent with elected officials creating the FSCs with the strongest governance and fewer agencies for functional delegation reasons, but most FSCs are created for symbolic political reasons.

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# 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 policy regimes to curb systemic risks. In particular, the G20 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 governance structures for macroprudential policies affect decisions to implement Basel III macroprudential capital buffers. We consider in depth the effects of existing financial regulators and multi-agency financial stability committees (FSCs), which have increased dramatically since the crisis from 12 before the crisis to 47 in 2017 in our sample of 58 countries (figure 1).<sup>2</sup> This increase in FSCs represents a fundamental change in the governance for macroprudential policies to reduce financial stability risks. FSCs typically include the central bank, bank prudential regulators, and the ministry of finance, among other financial agencies, and are viewed as a new entity that either on its own or with some of its members is accountable for financial stability. This accountability translates into responsibilities for measuring and monitoring systemic risks, and for reducing systemic risks, although the FSC is not necessarily the entity that is responsible for implementing macroprudential policies.

In earlier work on financial stability governance, we found that the probability of creating an FSC was increasing with country size and with the central bank being a prudential regulator, suggesting that the need for multi-agency coordination and resource constraints are primary determinants of FSC formation (Edge and Liang, 2019). But among the FSCs that have been created, we documented significant distinctions in characteristics that would affect their ability to take actions or mobilize the actions of other

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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.

agencies. We used cluster analysis – which we extend further in this paper – to identify the FSCs with relatively strong governance mechanisms for taking policy actions based on whether they were formally established in legislation, have a designated chair, have a voting process, and have tools to take actions either on its own or via a comply-or-explain mechanism. In this paper we find that only 13 FSCs (one-quarter of FSCs in our sample) are 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 become more clear or more obscure.

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 macroprudential bank capital policy actions? Or, do FSCs with weaker governance features nonetheless still take actions given the same systemic-risk circumstances, and what effect do bank prudential regulators have, given their traditional role in capital regulation? To investigate these questions, we test the effect of governance on the implementation of the two main macroprudential capital features of Basel III – the countercyclical capital buffer (CCyB) and the capital surcharge for global or domestic systemically important banks (SIBs).<sup>3</sup>

The CCyB is a new, purely macroprudential feature of Basel III that can be raised to build a buffer in anticipation of future downturns and released after a downturn commences in order to support the provision of credit. In our sample, 14 countries have used the CCyB, having made multiple decisions to activate and use the CCyB from 2015 to May 2019 (figure 2 and table 2), although the tool is still in the early stages of its implementation. Using the CCyB requires countries to establish an analytical process to regularly evaluate economic and financial cycles for systemic risks and to assess and adjust the setting of the CCyB. This macro-financial analytical process likely would be a new one and would provide an opportunity for an FSC, central bank, or ministry of finance to influence the use of this new tool because it would differ from what a microprudential bank regulator would usually do.

In contrast, the capital surcharges for global or domestic SIBs are one-time decisions with less discretion in implementation. They are not calibrated to vary with economic and financial cycles. Instead, the capital surcharge for global SIBs is based on a fixed weighting scheme for 11 specific indicators, while the surcharge for domestic SIBs is based on similar principles. FSCs could influence this process for setting the surcharge for global and domestic SIBs, although implementing these capital requirements are highly likely to be part of an established rule-writing process for bank capital and, thus, to be undertaken by the existing bank prudential regulator.

Evaluating the effects of governance on the implementation of Basel III macroprudential capital buffers sheds light on alternative hypotheses for the creation of FSCs discussed in the political economy literature. One hypothesis is that FSCs are created by elected officials as a delegation of functional

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<sup>3</sup> The Basel III capital conservation buffer (CCoB) can also be viewed as a macroprudential tool, given that it can be drawn down (subject to the bank then facing restrictions on dividend payments, share buybacks, and staff bonus payments) so allowing capital requirements to vary somewhat to offset some pro-cyclicality. However, the CCoB is not set in the same way that the CCyB and SIB surcharges are to address cyclical or cross-sectional systemic risks and, as such, we do not view the CCoB as being among the main macroprudential capital features of Basel III. That said, we report on some analysis relating to governance structures and the CCoB at the end of section 5.

responsibilities for complex and technical issues, consistent with Alesina and Tabellini (2007) and considered by Groll, O'Hallaran, and McAllister (2019). Lombardi and Moschella (2017), however, argue that functional delegation cannot be a sufficient explanation given that 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 would suggest less or no influence on policy.

In testing whether institutional arrangements for macroprudential policy affect the CCyB actions to date, we first evaluate the effects of FSC clusters based on the strength of governance mechanisms. In general, if FSCs exert an influence and FSCs in the strongest cluster have more influence, that would be more consistent with a functional delegation motive than with a symbolic delegation motive for FSCs. Second, we evaluate the effects of different agencies having direct authority to set the CCyB, where these authorities can be the FSC or ministry of finance (or government agency more broadly), the central bank, (the most frequent authority), or the bank prudential regulator (the second most frequent authority). We also take into account the fact that the FSC and the central bank can have formal advisory roles for the CCyB even if another agency sets it.

We define the use of CCyB by an indicator variable equal to 1 if a country sets it to be greater than zero and equal to 0 if not, and examine it based on these governance variables using a logit model for the pooled cross-section data. We control for financial and economic conditions that vary over time and across countries. 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.

Overall, we find that countries with the strongest cluster of FSCs are more likely to use the CCyB than countries with the weakest cluster. Indeed, our empirical analysis shows that countries that have FSCs with the strongest governance are three times more likely to activate the CCyB relative to countries with the weakest FSCs. We also find that the probability that a country uses the CCyB is more sensitive to credit growth when the FSC has stronger governance, consistent with using the CCyB to reduce systemic risks. These results suggest that governance matters for decisions and also suggest a functional delegation motive for the formation of at least the strongest FSCs.

Our empirical analysis also indicates that countries with smaller FSCs are much more likely than countries with larger FSCs to use the CCyB. This probably is because smaller FSCs with fewer member agencies confront fewer coordination problems than larger FSCs with more agencies. Relatedly, we also find that countries with FSCs with four or more agencies, 29 of 47 FSCs in our sample, have a lower probability of using the CCyB than when a single agency has authority for macroprudential policy. Our results based on FSC size alone suggest that smaller FSCs are more consistent with functional than symbolic political delegation motivations.

We also find that a country's probability of using the CCyB is substantially higher, around 45 percent to 50 percent, when an FSC or ministry of finance has the direct authority to set the CCyB or an FSC has a

formal advisory role for the CCyB. These probabilities are three times higher than when the existing bank regulator, either as part of the central bank or as an independent agency, sets the CCyB. These differences could reflect that an existing bank regulator has a more traditional focus on microprudential risks while an FSC or ministry of finance with new responsibilities to set the CCyB would have to set up a new decision-making process since they likely would not previously have had a role to set bank capital requirements.

Countries that may be most willing to adopt macroprudential bank capital policies like the CCyB also may – perhaps due to a severe past financial crisis – be more likely to set up governance structures that can be effective. This raises the possibility that the significant effects we find on the use of the CCyB by the strongest FSCs may not reflect governance considerations but rather a joint desire to reduce a repeat of the financial crisis. To control for this alternative explanation, we include variables in our regressions to control for the severity of bank losses during the global financial crisis in each country. Specifically, we include either the fiscal-to-GDP costs related to bank restructurings or the peak bank nonperforming loan ratio 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.

In contrast to the results for the CCyB, we find no evidence that stronger FSC governance affects the implementation of the capital surcharge for global or domestic SIBs. We look at the variation in the minimum level of the overall SIB surcharge as a measure of the size of macroprudential capital buffers. Countries with more effective governance structures could be more attuned to systemic externalities posed to the macroeconomy and would want to specify higher surcharges. We choose to look at the minimum rather than average level because it more likely reflects a country's underlying approach to managing systemic risk than variation in the market structure of the banking system.

We conjecture that the differences found for the effects of stronger FSC governance reflects important differences in the amount of discretion countries have to set the various buffers and the related decision-making processes. Decisions for the SIB surcharge are one-time decisions based on determinants tightly prescribed by Basel, and the prudential regulator retains the authority to implement these as part of their established rule-writing process. In contrast, decisions for the CCyB require a macro-based analytical framework to regularly assess system-wide risks in order to adjust the CCyB setting and discretion in interpreting measures of systemic risk and mapping them into the CCyB. A new tool with a different analytical approach provides a greater opportunity for a new FSC or other institutional arrangement with strong governance to influence actions.

This paper adds to only one other of which we are aware 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 the single macroprudential authority or as the chair of an 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 2019, 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 also is 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 (2017) look at an index of 12 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. Most of these tools are structural so they build up over time and are not adjusted countercyclically, the most common being concentration limits (used in 75 percent of country-year observations) followed by limits on interbank exposures (29 percent). Cerutti et al. (2016) document that caps on loan-to-value ratios, used in 21 percent of country-year observations, is the tool (other than a change in reserve requirements that is more akin to a monetary policy tool) that is more likely to be adjusted over time 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 supports stronger and less volatile GDP growth.

The remainder of the paper is organized as follows. Section 2 provides some details on the CCyB as well as global and domestic SIB surcharges. Section 3 discusses how FSCs could influence policy. 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. Implementation of Basel III macroprudential capital buffers**

The new Basel III capital regulations aim to improve the quantity, quality, and risk coverage of bank capital from a safety and soundness perspective. Basel III also takes a more systemic risk-oriented approach to setting capital levels than previous capital regimes and includes several features in addition to improved static minimum capital requirements.

Basel III includes a capital conservation buffer (CCoB). This is a static buffer but it can be drawn down when bank losses increase in a downturn, thus averting the need for the bank to quickly build back up its capital ratios, which could lead to a contraction in lending and worsen the downturn. A bank not satisfying the CCoB faces an automatic trigger of capital conservation rules that limit dividend payments, share repurchases, and staff bonus payments.

Basel III also includes a capital surcharge for global systemically important banks (SIBs) that is based on the characteristics of SIBs that would lead them to impose outsized losses on the broader financial system and macroeconomy if they were to fail. Additionally, Basel III allows for a domestic counterpart to the global SIB surcharge – called the domestic SIB surcharge – that is based on principles similar to those underlying the global SIB surcharge. If a bank were to face both a global and domestic SIB surcharge, Basel III specifies that a bank’s overall SIB surcharge should be the maximum of these two surcharges and not the sum. Finally, Basel III also includes a countercyclical capital buffer (CCyB). The CCyB would be deployed when system-wide risks were building so to ensure that the banking system would

have a buffer for future potential losses, which could be released after stresses materialize and losses are incurred. Both SIB surcharges and the CCyB expand the CCoB and not satisfying the expanded CCoB results in the same (albeit recalibrated) capital conservation rules as the CCoB. (Appendix A describes these components of Basel III in detail.)

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 CCyB is designed to be evaluated at regular intervals by authorities to decide whether to increase, decrease, or maintain its level. Banks are generally given a year to raise their capital ratios to meet a new higher requirement. The release, 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 above zero. An exception is the U.K., where the Financial Policy Committee (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 by moderating downturns in the credit cycle, to date it has yet to be used in this manner.

Figure 2 summarizes the CCyB activation decisions of the countries in our dataset.<sup>4</sup> It reports how many countries in any year have set the CCyB to be above zero. Three economies used the CCyB in 2015 (Hong Kong, Norway, and Sweden). By 2019, this number increased to 14, one-quarter of the 55 countries in our dataset that have operationalized a CCyB framework.<sup>5</sup> The figure also shows the levels to which the CCyB has been raised, which has increased as the economic and financial cycle has continued to expand in most countries. In 2019, six countries have the CCyB above 1 percent, and three of them at 2.5 percent, the maximum level eligible for reciprocity treatment. In our empirical analysis, we focus on whether countries have used the CCyB or not.

In contrast to how the CCyB is set, global and domestic SIB surcharges are not adjusted in a countercyclical fashion. Annual adjustments of surcharges are made but these are in response to changes in bank characteristics that according to a fixed methodology define a bank's systemic importance. SIB surcharges and annual adjustments made to them are bank-specific. In studying the effect of governance mechanisms on the capital surcharges required for global and domestic SIBs, we focus on the size of these surcharges. For most countries, SIB surcharges have a range, since surcharges are bank-specific and banks differ in their systemic importance, and we define the minimum SIB surcharge across banks in a country as the minimum of the maximum of either the global or domestic SIB surcharge since only the higher of the two would apply to any individual bank. We use this minimum because it is less influenced by the structure of a country's banking sector. In our empirical analysis, we test the effect of governance on whether the minimum SIB capital surcharge is less than 1 percent of risk weighted assets (RWA) or is greater than or equal to 1 percent. We choose a threshold of 1 percent because it is the minimum amount for the Basel III GSIB surcharge. For the sample of 52 countries that we ultimately use in our regression

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<sup>4</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.

<sup>5</sup> Three countries – Chile, Colombia, and Israel – had not set up an implementation framework for CCyB as of year-end 2018. Chile subsequently adopted Basel III reforms in early 2019 but did not activate the CCyB in the first half of 2019, so we continue to exclude it from the estimations in this paper.



analysis, 22 have minimum surcharges of less than 1 percent of RWA and 30 have minimums of 1 percent or higher. Of these 30 countries, the vast majority (specifically, 25) have a minimum of 1 percent.

### **3. Governance, FSCs, and the macroprudential policy agenda**

The macroprudential policy 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 countercyclical goals of macroprudential policies can be described as (1) to maintain the structural resilience of the financial system in expansionary times to aggregate shocks; (2) to increase resilience by pre-emptively building buffers; and (3) to constrain financial booms and reduce downward spirals from deleveraging and fire sales.

Institutional design is especially important for the macroprudential policy agenda – and likely more important than for microprudential policy – for two reasons. First, macroprudential policies consider financial risks that span many types of financial intermediaries and investors, as well as interactions between the financial system and the macroeconomy. 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 macroeconomy, and how policy tools could be used to reduce risks. Second, time-varying macroprudential policies are expected to build resilience in anticipation of possible future shocks, rather than to wait until negative shocks occur, and so they need to be forward looking and pre-emptive as well as to be 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 for authorities 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 macroprudential policymaking should involve mechanisms to coordinate regulators across the broad financial system, to establish accountability when there are many different regulators with separate mandates, and to mobilize actions, either directly taking actions or recommending actions. Additionally, 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 for macroprudential policy are not easily quantified. Moreover, some macroprudential tools may be targeted at certain asset classes, which can be viewed as credit allocation decisions with possible distributional consequences. These characteristics distinguish macroprudential policy from monetary policy which is viewed as neutral for credit allocation. 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.

## The rise and general characteristics of FSCs

In our dataset of 58 countries, 47 countries now report having an FSC, whereas before the crisis only 12 countries did (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 these risks. The other 11 countries have designated a single agency to be the macroprudential authority, which is almost always the central bank that also serves as a prudential regulator for banks, and often for other financial firms as well. Countries that have a single agency with authority for macroprudential policy tend to be smaller, suggesting fewer resources, as well as fewer existing coordination problems because the central bank is the regulator for banks and other financial firms.<sup>6</sup>

At a minimum, FSCs can improve communication and coordination across multiple regulatory agencies. Most of the 47 FSCs have three or four member agencies, including the bank prudential regulator, the central bank, the ministry of finance, and, when they are separate from the bank prudential regulator, securities regulators and other financial regulators, indicating that relevant stakeholders are sitting at the table. Bank prudential regulators are on all FSCs, while reducing system-wide risks may not be part of their traditional mandate, most macroprudential policies would involve the entities that these agencies regulate. Central banks are on all but one of the FSCs. Central banks bring expertise in macroeconomic forecasting and countercyclical monetary policy. The majority of central banks also are bank prudential regulators and are well-positioned to assess risks in the financial system and how they may affect the macro economy.<sup>7</sup> The ministry of finance is on 40 FSCs and the chair of 25 FSCs, indicating much higher representation in financial regulatory and stability issues than before the financial crisis. The ministry of finance, since it is part of the elected government, is considered to have a legitimate role to coordinate across multiple regulatory agencies.

FSCs also have the potential to improve accountability for financial stability, although, both in earlier work (Edge and Liang, 2019) and in extensions made in this paper, we find that only about one-quarter of FSCs had basic features that we view would be important for strong governance. These features include whether the FSC is formally established in legislation (as opposed to informally via an inter-agency, memorandum of understanding, MOU), has a designated chair, has a voting process, or can take actions on its own, including a semi-hard tool of “comply or explain” to a regulatory financial agency. For example, in two countries, the FSC sets the CCyB and in 11 countries it can 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. Rather, responsibilities remain dispersed across various existing regulators and the central bank. (We provide more detail in Section 4 on variables used to cluster FSCs into groups based on their ability to affect policies.)

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<sup>6</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.

<sup>7</sup> Of the 47 countries with FSCs in our dataset, the central bank is the bank prudential regulator in 25 countries. For the 58 countries in our dataset, this number is 34.

## Political economy explanations for the rise and general characteristics of FSCs

The above-described characteristics of FSCs raise the question of the purpose of establishing FSCs. Can they monitor and identify systemic risks and initiate actions to reduce them if they lack basic governance features? To interpret the role of FSCs for bank macroprudential capital decisions, we adopt a political economy perspective of why elected officials choose to delegate functions they could themselves control.

One key motivation for delegation is for functional reasons, where elected officials delegate authority to expert agencies that possess a high degree of technical expertise required to formulate good policy. 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. Groll, O'Halloran, and McAllister (2019) model delegation focusing on financial agencies that have greater technical expertise on bank risk and systemic risk, and longer planning horizons than elected officials. This translates into financial agencies imposing stricter regulations because they have a greater aversion to bailouts than elected officials, where this aversion results from financial agencies being more likely to be blamed if there were a crisis. Elected officials' gains from delegating increase with the salience to voters of the cost of bailouts, and when bank and systemic risks are more uncertain. If functional delegation is an important reason for FSCs, we would expect FSCs to be also given tools to curb systemic risks and would expect them to be able 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 crisis. Instead, they posit that symbolic political delegation underlies the motivation for elected officials creating 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 not to decide or take actions distinct from existing regulators. Lombardi and Moschella provide several quotes from around the time of the creation of the Financial Stability Oversight Council (FSOC) 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, “[W]e are moving to this financial reform bill because we need transparency, we need accountability...”

Timothy Geithner, U.S. Treasury Secretary, “[T]he 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 ...”

Functional delegation of macroprudential authority would also likely imply other governance features given other political economy considerations related to macroprudential policy. In particular, macroprudential policies are pre-emptive, meaning that their costs are borne immediately while their benefits occur later and arise from the economy avoiding adverse outcomes, which is difficult to verify. 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. Additionally, central banks 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 policymaking from political interference that can slow the deployment of tools” (IMF, 2014, p. 34).

But a political economy perspective might warn against granting the central bank strong powers for macroprudential policy. Although central bankers supported the macroprudential agenda that emerged after the financial crisis, central banks that engage too much in macroprudential policy could end up being politicized because countries have less of an agreed-upon mandate for macroprudential policy and because macroprudential policy can have distributional effects. This involvement increases the risk of central banks’ losing their independence for monetary policy (Baker, 2015). A prominent role for central banks in macroprudential policy also raises concerns of excess power in a non-elected body (Goodhart, 2010). Additionally, it raises concerns that central bankers may enact policies that affect credit cycles with important distributional consequences and, thus, are more appropriately made by elected officials (Tucker, 2014, 2016). In these circumstances, a stronger role for the government through the ministry of finance – the main government agency for economic policy – could help garner political support for policy actions.

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

Under our alternative hypotheses, if the governance arrangement reflects symbolic political delegation, we would not expect the FSC to have an influence on policy actions and might even consider a negative influence, since policies that might have been implemented by a single agency now need to be deliberated by the FSC that 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. 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.<sup>8</sup>

## **4. Macroprudential governance variables**

This section describes 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 groups of FSCs that have stronger and weaker governance features, respectively. We constructed the macroprudential governance variables in this section based on an extensive data collection described in Edge and Liang (2019).

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<sup>8</sup> We do not consider whether FSCs affect the implementation of borrower-based policies, such as LTV or debt service-to-income (DSTI) ratios for residential mortgages. Such policies are viewed by some as being more interventionist than bank-capital based policies aimed at lenders, and would require even stronger governance mechanisms. Additionally, LTV- and DSTI-ratio policies are used for both macroprudential and consumer protection reasons, in contrast to the capital buffers that we study only have macroprudential motivations.

## FSC governance variables

Macroprudential governance variables include *FSC exists*, which is whether or not an FSC exists in a country, and *No. of FSC agencies*, which is the number of agencies on the FSC, and is set to 1 when there is not an FSC but, rather, a single agency is the macroprudential authority. These variables are reported in panel A of table 1.

FSCs can be grouped in terms of their ability to take action in response to building vulnerabilities based on similar 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). We look at whether the FSC is established formally in legislation, has a voting process, has a designated chair, and has good tools, where good tools are either hard macroprudential policy tools (*e.g.*, the CCyB or LTV ratios), semi-hard tools (*e.g.*, “comply or explain” authority), or makes a formal recommendation on the CCyB.

These variables are the same as those that we considered in our previous paper, although for this paper we expand our definition of “good tools” to include whether the FSC makes a formal recommendation on the CCyB. FSCs make formal recommendations on the CCyB in eight countries. In Germany, for example, which is one of these countries, the prudential regulator has the authority to set the CCyB, but the central bank provides analysis to the FSC that, in turn, can choose to recommend to the prudential regulator a setting for the CCyB. We include this formal recommendation role in the *FSC has good tools* variable because we view this formal role for CCyB as being very close to the FSC having “comply or explain” authority. There is considerable but not complete overlap between FSCs having general comply or explain authority and the authority to make formal CCyB recommendations.

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 with no implied ordering of governance strength within each of the four 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. The FSCs in this cluster can take actions, since *all* FSCs in this cluster are formal, have a single chair, have a voting process, and all have hard or semi-hard tools. Only two of these 13 can set the CCyB directly and the others have only semi-hard “comply or explain” tools. The eight FSCs in the next (teal) cluster have the same characteristics except that none have hard or semi-hard tools, and so are not as able to take actions as FSCs in the blue cluster can. We consider the FSCs in the next two clusters (shown in red and olive) as even less able to act. Of these two groups the FSCs in the left-most (olive) cluster are mostly de facto FSCs, few vote, and only two 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 ministry of finance or the central bank, and is significantly more likely to have independent members than other FSCs. In addition, this group of FSCs is 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), they have a higher credit-to-GDP ratio and more developed financial sector, for both institutions and markets, suggesting these countries may see more benefits from stronger FSCs.

At the same time, however, the countries in the *FSC weakest* cluster 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-specific governance variables**

With respect to governance specifically for the CCyB, we look at whether the authority is with the bank prudential regulator, either the central bank if it is also a regulator or an independent regulator, or is a different arrangement, either the FSC or ministry of finance (or government more generally). This information is reported in panel B of table 1.

The FSC sets the CCyB directly in two countries and the ministry of finance (or government) sets it in four. In our empirical analysis we group together the FSC and ministry of finance (or government) setting the CCyB – denoted by the indicator variable *FSC or MF set CCyB*. We group these agencies because they are not traditional bank prudential regulators and setting capital requirements would be a new role for them and would require new processes to assess systemic risk and make decisions on the setting of the CCyB. The central bank sets the CCyB in 34 countries, denoted by *CB sets CCyB* in our regressions, and the independent prudential regulator PR sets it in 15 countries, denoted by *PR sets CCyB*. In addition, the FSC makes formal recommendations on the CCyB in eight countries (mostly to a PR), denoted by the indicator variable *FSC advises on CCyB*, and the central bank makes formal recommendations in five countries, denoted by *CB advises on CCyB*.<sup>9</sup>

Details of the governance structures for the 14 countries shown in figure 2 that raised the CCyB between 2016 through the first half of 2019 are reported in Table 2. Table 2 shows wide variation in authorities of the FSC or the central bank in the group of countries that have turned on the CCyB. The group includes countries with and without FSCs and with *FSC strongest* and *FSC weakest*. In terms of the role of the central bank, the group ranges from setting the CCyB on its own, making a formal recommendation, consulting, to having no role. In addition, the group includes both countries that had or did not have a banking crisis in 2007-08.

### **Microprudential authority variables**

In addition, we can test whether the central bank as a prudential regulator acts differently than an independent bank regulator in setting the SIB capital surcharge. In particular, we include in some specifications whether the central bank is the authority for bank prudential regulation, *CB is a PR*; where it is not, then an independent PR is the bank regulator. We can also test whether the central bank's authority for prudential regulation extends beyond just the banking sector, *CB is a wide PR*. This information is reported in panel C of table 1.

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<sup>9</sup> Appendix B presents details on the countries for which the FSC or the central bank advises. Note that in six countries the central bank can consult with or provide analysis on the CCyB for other agencies. We interpret consulting with or providing analysis as representing less authority than in the five countries where the central bank makes a formal recommendation.

## 5. Empirical specifications and results

### Decision to use the CCyB: Empirical specification

To evaluate the decision to use the CCyB, we use a pooled cross-section dataset for 54 of the countries in our full dataset.<sup>10</sup> 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 2019

*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:

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

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* and  $Z_i$  are other country *i* characteristics. We consider a wide range of economic- and financial-cycle, and country cross-sectional variables in our regression analysis, recognizing the constraints of empirical work with 58 countries. These variables are defined in table 3, panels C and D.  $G_i$  are macroprudential and financial regulatory governance variables for country *i* (that is, the variables discussed in section 4).

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 prices. We control for the strength of the economy with real GDP growth and inflation. All variables are included in the regressions for the year preceding the decision to set the CCyB to above zero 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.)

Many countries have further raised the level of the CCyB once initiated, but we have looked so far only at whether it is above zero in any given year given the limited number of observations. For example, countries that have CCyBs of greater than 2 percent, previously had activated CCyBs but at lower levels. With the exception of the U.K., no country during this time period has lowered the CCyB, reflecting the fact that in the years in our sample countries have been still in the expansionary phase of the business cycle. In the case of the U.K., the FPC 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 the amplification of heightened volatility in a few financial markets. For our estimations, we drop the U.K.’s initial increase and decrease in the CCyB, since it was related to Brexit and not to more typical financial cycle indicators, but include its decision to activate it in mid-2017.

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<sup>10</sup> Chile, Colombia, and Israel had not set up an implementation framework as of 2018, and Argentina did not have sufficient data for CPI and GDP growth for our analysis.

For governance variables  $G_i$ , we include characteristics of the FSCs and existing regulatory structures to evaluate if governance arrangements have an effect on using the CCyB and if they shed light on alternative hypotheses, either symbolic political or functional delegation, for the formation of FSCs. Drawing on our cluster analysis of FSCs, we look specifically at the strength of FSC governance characteristics and tools. A positive coefficient on *FSC strongest* and a negative coefficient on *FSC weakest* would be consistent with functional delegation. In contrast, a zero or negative coefficient on *FSC strongest* and a positive coefficient on *FSC weakest* would be consistent with delegation for symbolic political reasons.

Any FSC relative to a sole authority, measured by *FSC exists*, could be influential if it encourages communication and coordination across agencies about systemic risk and raises awareness. A positive coefficient on *FSC exists* would generally be consistent with functional delegation. However, the number of agencies on the FSC, denoted by *No. of FSC agencies*, could also affect effective decision-making. Most FSCs have three or four member agencies, and the number of agencies ranges from two to nine. While more agencies could improve communication, it could also hinder coordination and reduce efficient decision-making.

Thus, to interpret the effect of FSCs, we want to consider the joint effect of *FSC exists* and *No. of FSC agencies*.<sup>11</sup> Specifically, FSCs consistent with functional delegation would be a positive coefficient on *FSC exists* but also a net positive effect of the sum of the positive coefficient on *FSC exists* and the product of the coefficient on *No. of FSC agencies* and the value of *No. of FSC agencies*. Conversely, a net negative effect of the sum of the coefficient on *FSC exists* and the product of the coefficient on *No. of FSC agencies* and the value of *No. of FSC agencies* would be consistent with delegation for symbolic political reasons for FSCs.

In summary, predictions under these two alternative hypotheses for formation of FSCs are:

- Functional delegation would be supported by Coefficient on *FSC exists*  $> 0$  and one or more of the following:
  - Coefficient on *FSC strongest*  $> 0$ ,
  - Coefficient on *FSC weakest*  $< 0$ ,
  - Coefficient on *FSC exists* plus the product of the coefficient on *No. of FSC agencies* and the value of *No. of FSC agencies*  $> 0$ .
- Symbolic political delegation would be supported by
  - Coefficient on *FSC exists*  $\leq 0$  or:
  - Coefficient on *FSC strongest*  $\leq 0$ , or
  - Coefficient on *FSC weakest*  $\geq 0$ , or
  - Coefficient on *FSC exists* plus the product of the coefficient on *No. of FSC agencies* and the value of *No. of FSC agencies*  $< 0$ .

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<sup>11</sup> In the case of a sole authority, the value of *FSC exists* is 0 and the value of *No. of FSC agencies* is 1, whereas when there is an FSC, *FSC exists* is 1 and the value of *No. of FSC agencies* is some integer between 2 and 9.



Of course, there is a spectrum between these two clear-cut extremes and our results will not allow us to characterize FSCs as a collective group as being created for one reason than the other. We keep this possibility in mind when interpreting our regression results for FSCs as a collective group or for different groups of FSCs.

We also examine the effects of the direct authority to set the CCyB – *FSC or MF sets CCyB*, *CB sets CCyB*, and *PR sets CCyB*. These regressions differ from testing the effects of FSC governance since, as reported in the table following figure 3, the central bank or prudential regulator has the authority to set the CCyB more often than the FSC in the *FSC strongest* cluster.

In terms of country characteristics  $Z_i$ , we include a measure of the severity of the global financial crisis. According to the 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 a crisis can be measured by the crisis' fiscal costs-to-GDP ratio related to bank restructuring or by its peak bank nonperforming loan ratio. 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. Both variables reflect differences across countries in terms of significance of nonbank market-intermediated finance (as measured by Svirydzenka, 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 central bank political independence and central bank 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.

### **Decision to use the CCyB: Results**

Regression results for decisions to use the CCyB based on FSC clusters are shown in table 4A, and decisions based on direct authorities in table 4B, and marginal effects for key regressions and variables are shown in table 5. The coefficients on credit growth for the past year and in the prior year are almost always positive and significant (all columns of tables 4A and 4B). We would note that we tried the credit-to-GDP gap measure, the measure 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 for activation, 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, estimated coefficients show that countries with higher real GDP growth and inflation in the past year are more likely to raise the CCyB. Although not always significant, the positive coefficients are 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 for bank restructuring are also more likely to use the CCyB. Note that using the peak bank nonperforming loan ratio instead of fiscal costs in the regressions leads to results that are very similar; we do not include both variables in the same regressions since they are highly correlated.

For asset prices, we tried equity returns in each of the past two years, but generally they are not significant (column 2 of table 4A). We also tried house price changes, although we have house price data for only 38 of the 55 countries, and it was not significant (not shown). The rest of results reported in tables 4A and 4B do not include asset prices.

Turning to governance variables, we consider first the strength of governance of FSCs with the variable *FSC strongest*. The coefficient on *FSC strongest* is positive and significant (column 3 of table 4A). These results suggest that the strongest FSCs – those with better governance and general authorities – increase the likelihood of using the CCyB, consistent with the strongest FSCs reflecting functional delegation more than symbolic delegation.

Next we include an indicator variable for the weakest cluster of FSCs, those with no tools and only weak mechanisms to facilitate decision-making. The coefficient on *FSC weakest* is negative and significant (column 4 of table 4A), in contrast to the positive coefficient on *FSC strongest*, (column 3), and thus is consistent with at least some stronger FSCs being created for functional delegation reasons. These results also suggest the clusters are able to capture differences in FSC governance that affect the CCyB decision. When both cluster indicators are included (column 5), the coefficient on *FSC weakest* becomes insignificant but the coefficient on *FSC strongest* remains positive and significant.

We also test whether our results for *FSC strongest* mainly reflects that two FSCs can directly set the CCyB rather than an exercise of general authorities. We create *FSC strongest excluding the UK and France*, the two countries where the FSC has the direct authority to implement the CCyB, and use this more narrow variable instead of *FSC strongest*. The coefficient on this variable (column 6) is smaller and barely significant ( $t=1.63$ ), but remains positive, suggesting that stronger governance plays a role separate from a direct authority for using the CCyB.

The variables *FSC exists* and *No. of FSC agencies* are included in all of the regressions shown in columns 3 to 6. The coefficients on *FSC exists* are positive and significant and the coefficients on *No. of FSC agencies* are negative and significant. As described above, interpreting whether FSCs are more consistent with functional delegation rather than symbolic political delegation requires that we consider the net effect of the two variables. The coefficient combinations of *FSC exists* and *No. of FSC agencies* imply that countries with FSCs with more than three agencies have a lower probability of using the CCyB than a single agency. Leaving aside the characterization of FSC clusters, results based on FSC size alone suggest the establishment of FSCs with three agencies or less is consistent with functional delegation. These results suggest greater coordination problems when there are many agencies on the FSC.

More agencies on a country's FSC could reflect a country having a more-complex financial systems and a preference to not use the CCyB because it might not reduce systemic risks if higher capital leads to more activities moving from banks to nonbanks. To test this alternative explanation, we include indexes for the

financial development of markets but find that an insignificant coefficient on this variable, while the coefficient on *No. of FSC agencies* remains negative (not shown).

To gauge the economic significance of FSCs on decisions, we present in table 5 the implied probabilities of using the CCyB for the various clusters of FSCs based on the equation in column 5. The coefficient on *FSC strongest* implies that the probability of the CCyB being greater than zero is 21 percent when all other variables are at their means (including the number of FSC agencies), (table 5). In contrast, based on the same type of calculation, the coefficient on *FSC weakest* implies only a 7 percent probability of the CCyB being above zero and when the FSC is neither the strongest nor the weakest, the probability is 15 percent.<sup>12</sup>

These probabilities are in line with FSCs being formed to play more than merely a symbolic role for macroprudential policies. In addition, while the probability of using the CCyB is notably higher for countries with FSCs in the *FSC strongest* cluster, the difference is much more substantial for countries with smaller FSCs, consistent with fewer coordination problems. In particular, the probability for *FSC strongest* when there are only two agencies is 50 percent, which is significantly higher than the probability of 18 percent for countries with FSCs in the *FSC weakest* cluster. For *FSC strongest* when there are five agencies, the probability of a country using the CCyB is 12 percent, whereas it is only 3 percent for *FSC weakest*.

An additional important distinction between *FSC strongest* and other FSCs is evident when we look at the sensitivity of the probability to an increase in credit growth. Table 5 also shows for the various governance set-ups how the probability of using the CCyB changes with an increase in the rate of credit growth of one standard deviation from its mean in both the last year (that is,  $t-1$ ) and the year before ( $t-2$ ). The marginal effect is sizable for *FSC strongest*. In particular, a one standard deviation increase in credit growth substantially boosts the probability of the CCyB being activated from 21 percent to 50 percent, and when the strong FSC has two member agencies the boost in probability goes from 50 to 75 percent. The marginal effects are considerably smaller for *FSC weakest*, from 7 percent to 18 percent. However, similar to the results for strong FSCs, the increase in probabilities for weak FSCs is also larger when the *No. of FSC agencies* is two rather than five.

Returning to table 4B, we consider specific authorities to set the CCyB. The coefficient on *FSC or MF sets CCyB* is positive and significant (column 7), indicating a higher probability relative to the omitted categories of when either the *CB sets CCyB* or *PR sets CCyB*. The coefficient on *FSC or MF sets CCyB* remains significant after *CB sets CCyB* is added to the regression, where the latter coefficients are small and positive but insignificant (columns 8 and 9). Excluding *FSC or MF sets CCyB* and including both *CB sets CCyB* and *PR sets CCyB* (columns 10 and 11), results in negative and significant coefficients on both of these variables, consistent with a lower probability of the central bank and prudential regulator using the CCyB relative to the FSC or ministry of finance. In these regressions, we also include *FSC advises on CCyB* and *CB advises on CCyB*. The coefficients on these variables are positive but not significant.

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<sup>12</sup> These probability estimates are almost identical to those implied by other equations in table 4A (not shown), of 18 percent for *FSC strongest* in equation 3 and 7 percent for *FSC weakest* in equation 4. In addition, estimated coefficients for *FSC strongest excluding UK and FR* from equation 6, suggest that even excluding the two countries with the direct authorities, the probability of using the CCyB remains at 18 percent in countries with stronger FSCs.

As we did for FSC cluster variables, we report in table 5 the probability of using the CCyB based on direct authorities. When all other regression variables are at their means, the estimates from equation 7 suggest that when the *FSC or MF sets CCyB* or when the *FSC advises on CCyB*, there is a high probability, 50 percent, of the CCyB being activated. This probability is notably higher than it is for *FSC strongest*, a cluster which also includes FSCs that have only comply or explain authorities. When *CB sets CCyB* and *CB advises on CCyB* are also included in the regression (equation 8), the probability that the CCyB is used when the *FSC or MF sets CCyB* or when *FSC advises on CCyB* is 45 percent, similar to the previous estimate. In addition, the probability that the CCyB is used when the *CB sets CCyB* or *CB advises on CCyB* is lower, 18 percent. These probability estimates are similar to those derived from equation 9 (not shown), which drops *FSC exists and No. of FSC agencies*.

Probability estimates based on coefficients from equation 10 for when the prudential regulator sets the CCyB are shown in table 5. The probability that the CCyB is used when *PR sets CCyB* is 13 percent. When instead *CB sets CCyB* or *CB advises on CCyB* the probability is 14 percent. Both probabilities are significantly lower than the probability when neither the prudential regulator nor central bank sets and when the central bank does not advise. In this case, the probability of the CCyB being activated is 41 percent.

The probability estimates implied by equation 11 (not shown) indicate that the effect of *CB sets CCyB* differs only slightly based on whether it is a single authority or part of an FSC. That is, the probability of using the CCyB in countries where *CB sets CCyB* and the central banks is a single authority is 17 percent, a bit higher than 13 percent when the central bank is part of an FSC.

With respect to how an increase in the rate of credit growth affects CCyB activation for different agencies with direct CCyB authority, table 5 reports that for *FSC or MF sets CCyB* the additional increase in the probability of activation is quite sizable. Specifically, the increase is from 50 percent to 73 percent (equation 7), or 45 percent to 59 percent (equation 8), depending on the specification. For *CB sets CCyB* and *PR sets CCyB* (considered by equations 7 to 11), the additional increases in probabilities are not as large.

Overall, the probability of the CCyB being activated is much higher when an FSC or ministry of finance (or government more generally) sets it than when the strongest FSC cluster does, reflecting the distinction in hard and semi-hard tools. It is also higher than when either the central bank or prudential regulator sets it. This difference may reflect the fact that when an FSC or government agency is given the authority for setting the CCyB, new processes likely were created to assess systemic risk, make decisions, and provide accountability. In contrast, when a central bank or prudential regulator sets the CCyB, the authority for doing so probably arises from existing authorities such that processes to provide accountability for regularly occurring CCyB decisions and for systemic risk may not be as clear.

### **Robustness of CCyB analysis**

The regression results reported in tables 4A and 4B already reflect some robustness analysis, since we included only specifications and results in these tables that we found to be robust across other slightly modified specifications. In this section, we further evaluate the robustness of our empirical results 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, the coefficient *FSC strongest* remains positive (column 1). The coefficients on the governance variables related to direct authorities to set the CCyB – *FSC or Gov sets CCyB*, *CB sets CCyB*, and *PR sets CCyB* – also remain significant (columns 2 and 3), indicating that the significance of these variables in the panel data model are not misleading. The average probability of using the CCyB derived from the cross-section equations are similar, though higher, than those from the estimations using the panel dataset, reflecting greater use of the CCyB in 2019 than in 2015. In particular, the average probability of using the CCyB is 48 percent for *FSC strongest* and 74 percent for *FSC or MF sets CCyB*, 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 an FSC with strong governance. Recall, that we tried, in variants of our regressions reported in table 4, to control for this potential effect by including crisis fiscal cost-to-GDP or crisis peak bank nonperforming loan ratio on the basis that a country having experienced a more severe recent crisis might be more likely to both have a strong FSC and to 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, this probit models 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 crisis fiscal-cost-to-GDP, rule of law, per capita GDP, log (GDP), whether the *CB is a PR*, and central bank 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.

### **Decision to set a higher minimum SIB capital surcharge: Empirical specification**

We next test whether governance affects the other macroprudential capital buffer in Basel III, the SIB surcharge. To measure the SIB surcharge, we use the minimum across banks in each country of their overall global or domestic SIB surcharge, as described in section 2. Since countries with more effective governance structures could be better informed about the externalities posed to the macroeconomy by SIBs, we expect such countries to be more likely to specify higher systemic risk surcharges.

To evaluate the decision to require SIBs to have higher capital surcharges, we use a cross-section of 52 of the countries in our full dataset.<sup>13</sup> A country observation is 1 if (minimum) capital surcharge in a country is 1 percent of RWA or higher. For our sample of 52 countries, 22 (or 42 percent) have a minimum

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<sup>13</sup> Chile and Colombia were dropped from the sample since their Basel III regulations were finalized after 2016. Cyprus and Hong Kong were dropped because their credit-to-GDP ratios are extreme high outliers in the sample, while Iceland and Malta were dropped because of missing values for the bank competition index variable.

surcharge of less than 1 percent of RWA and 30 (or 58 percent) have a minimum surcharge of 1 percent or more.

$$\begin{aligned} \text{Prob}(\text{Minimum\_overall\_SIB\_surcharge} \geq 1) &= 0 \text{ if } \max\_min < 1 \text{ percent of RWA} \\ &= 1 \text{ if } \max\_min \geq 1 \text{ percent of RWA} \end{aligned}$$

Because this rule is not revisited frequently (although banks surcharges can change annually due to changes in their systemic importance characteristics), we estimate this logit model for the cross-section of countries:

$$\text{Prob}(\text{Min\_overall\_SIB\_surcharge}_i) = \frac{1}{1 + \exp[-(a + c \cdot G_i + d \cdot Z_i)]}$$

where  $G_i$  are governance characteristics (described in section 4) and  $Z_i$  are other country characteristics (described in panel D of table 3). The timing of our  $G_i$  indicators is the year before the surcharge was adopted, not later than 2016. We also include the governance variables *FSC exists* and *No. of FSC agencies* or *FSC strongest* if the FSC was formed by 2016, and include *CB as PR*.

For country-level variables,  $Z_i$ , we include variables that reflect the importance of credit in the macroeconomy, specifically, the credit-to-GDP ratio and the financial markets development index, to reflect the potential impact of capital surcharges on banks for making credit available to the macroeconomy. We also include a bank competition index, H-stat, to control for the competitiveness of the banking sector (our focus on a minimum should control for some differences in market structure of banks that may determine a capital surcharge); more competitive banking sectors (high H-stat) also have been associated with a lower probability of a banking crisis (Schaeck, Cihak, and Wolfe, 2009). In addition, we control for the severity of past banking crises with either the fiscal costs-to-GDP ratio or the peak bank nonperforming loan ratio. Higher costs in a crisis would make countries more inclined to require their more SIBs to have higher capital surcharges. Finally, we control for the size of the economy (measured by the natural log of real GDP).

## Decision to set a higher minimum SIB capital surcharge: Results

Regression results for decisions to set a higher minimum overall SIB capital surcharge are reported in table 7. In general, countries that are larger, with higher credit-to-GDP ratios, less competitive banking sectors, and less developed financial markets are more likely to have a minimum SIB surcharge of 1 percent or more. The coefficient on the credit-to-GDP ratio is positive and often significant. The coefficient on the bank competition index, where higher values reflect less ability to earn monopoly rents, is negative, consistent with not setting surcharges as high in countries where systemic risk is lower or when higher capital is more costly to banks.<sup>14</sup> The effect of the financial markets development index on

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<sup>14</sup> We also considered a number of bank structure variables, such as banking sector concentration measured by market share of the largest five banks, to control for the fact that market structure could affect the size of the minimum SIB surcharge. These measures were insignificant and thus are not included in our regressions. Bank concentration was also found to be insignificant in regressions of the probability of a banking crisis in 38 countries from 1980-2003, while bank competition was significant in Straeck, Cihak, and Wolfe (2009).

the size of the overall SIB surcharge is negative – where more developed financial markets, which serve as an alternative source of credit to banks, would lead to lower surcharges – but this effect is not consistently significant. In addition, we find that countries with higher levels of GDP – that is, larger economies – are more likely to require their SIBs to have higher capital surcharges.<sup>15</sup> We also include either fiscal costs-to-GDP ratio and peak bank nonperforming loan ratio, which proxy for the costs of financial crises, but neither are ever significant.

In terms of governance variables,  $G_i$ , we look first at whether the central bank or independent prudential regulator has separate effects on the minimum SIB surcharge. The coefficient on *CB as PR* is positive but not significant, which suggests that, when the prudential regulator is the central bank, the minimum SIB surcharge is not set at a meaningfully higher level than when the prudential regulator is independent (columns 4 to 6). We tested for whether this effect differs by whether the central bank is a single authority or part of an FSC, but did not find any difference (not shown).

With regard to FSCs, the coefficient on *FSC exists* is positive and significant and the coefficient on *No. of FSC agencies* is negative and significant (columns 5 and 6), similar to results for using the CCyB. The coefficient values imply that countries with FSCs with four or fewer agencies have a higher probability of setting a higher SIB surcharge than when a single agency has authority for macroprudential policy. However, the coefficient on *FSC strongest* is not significant (column 6).

We can compare these results for the CCyB and draw implications for the effects of governance. First, the strongest FSC clusters influence CCyB decisions but not SIB surcharge decisions. Second, while FSCs with fewer agencies increase the probability of both actions, the number of agencies at which coordination problems appear to become significant is lower for the CCyB than for the SIB surcharge. Specifically, countries with FSCs with three or fewer agencies are more likely to use the CCyB and countries with FSCs with four or fewer agencies are more likely to have a higher surcharge both relative to when countries have a single agency. These differences are consistent with the differences in the decision processes for each action. The SIB surcharge is likely a one-time policy decision supported by a well-established rule-writing process by the bank regulator, and the costs to a bank regulator to consult or coordinate with an FSC will not be materially higher if the FSC is larger since it is such an infrequent event. In this case, FSCs have less opportunity to influence decisions, and bigger FSCs are less costly because the decisions are non-recurring. In contrast, the CCyB is a regularly occurring policy decision based on frequent assessments of systemic risk. This process would require setting up a new macro-financial assessment process, typically outside of what a traditional bank regulator does. In this situation, new FSCs with strong governance and tools have more of an opening to exert influence on the decision process, and larger FSCs would make the coordination problems more material.

Our above interpretation is supported by additional analysis (not shown) that evaluates the effect of FSC governance on the capital conservation buffer (CCoB). To be sure, the size of the CCoB is not calibrated in the same way that CCyB or SIB surcharges are to address cyclical or cross-sectional systemic risks. However, the CCoB can be viewed as a macroprudential tool because it is a buffer that can be drawn

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<sup>15</sup> We tested whether this result merely reflected countries with higher levels of GDP being more likely to be BCBS countries that would, in turn, be more likely to follow the Basel guidelines regarding their implementation of SIB surcharges. We did not, however, find this to be the case (not shown).

down when a bank's losses increase in a downturn, thus averting the need for a bank to immediately build back up its capital ratios, which could lead to a contraction in lending and further worsen the downturn. In contrast to the CCyB and SIB surcharges, the CCoB is set at a standard 2.5 percent of RWA and does not vary across countries once it is adopted. However, countries could choose to start the phase-in of the CCoB before the standard Basel III 2016 date – which 18 countries in our sample do – where early adoption could occur if financial vulnerabilities were building ahead of 2016. We look at differences in the timing of the adoption of the CCoB and evaluate whether a country adopted the CCoB early or in the standard year of 2016.

In studying the CCoB, we estimate cross-section logit regressions that include the same financial and economic variables, governance variables, and country-level variables as in the SIB surcharge regressions, but also include credit growth and equity returns in the year before the phase in of the CCoB starts because we are estimating the timing of adoption. We find the timing is affected by credit growth and equity returns in the year before adoption, where higher growth increases the probability of early implementation. In terms of governance variables, we find that the coefficients on *CB as PR* and *FSC strongest* are not significant, as we found for the SIB surcharge. The result that FSCs with stronger governance do not affect CCoB timing, which aligns with that from the SIB surcharge analysis, but do affect the use of the CCyB, could reflect differences in the actual decision-making processes for the tools. That is, whereas the CCoB, like the SIB surcharge, is a one-time decision which is part of a PR's rule-writing process, the CCyB is a decision that is reviewed on a regular periodic basis and requires a new analytical process.<sup>16</sup>

## 6. Conclusion

This paper is the first, to our knowledge, to study the effects of new institutional arrangements for macroprudential policy on the implementation of Basel III macroprudential capital buffers. The paper presents empirical evidence that stronger governance for macroprudential policies significantly increases the probability of using the CCyB and increases the sensitivity of this probability to credit growth, consistent with taking actions to mitigate financial stability risks. We do not take a stand on whether policy actions are appropriate, though we do consider if they are consistent with economic and financial conditions.

We document that FSCs differ significantly in terms of governance mechanisms, and we demonstrate that these differences have meaningful effects on using the CCyB. Countries with FSCs in our strongest cluster – which includes FSCs with good governance characteristics and with tools – have a higher probability of using the CCyB than countries with FSCs in the weakest cluster. Moreover, the difference is more substantial when there are fewer member agencies, suggesting weaker FSCs with greater coordination problems are the least likely to use the CCyB. In addition, when the FSC or ministry of finance has the direct authority to set the CCyB, the probability of a country using the CCyB is substantially higher than when the traditional bank regulator, either the central bank or prudential

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<sup>16</sup> In contrast to both the CCyB and the SIB surcharge regression results, we find that neither *FSC exists* nor *No. of FSC agencies* has a significant effect on the timing of implementation of the CCoB. This result may reflect the fact that since the size of the CCoB is fixed and the CCoB will be put into effect anyway, expertise about parts of the financial system beyond banks may not be important, and only financial conditions, which are found to be significant, prompt an earlier phase-in date.



regulator, has the authority. We control for the possibility that countries that are more likely to want to use the CCyB also create stronger FSCs or establish new direct authorities, with variables such as whether the country had a more costly financial crisis in 2008 and with bivariate logit estimations, and find the effects of the governance variables remain significant.

We conjecture that the higher probability of using the CCyB for countries with FSCs in our strongest cluster and for countries where the FSC or ministry of finance has direct authorities is that these situations require countries to establish a new analytical framework for assessing cyclical systemic risks and determining bank capital sufficiency for future downturns. This new process provides an opportunity for an entity other than the bank regulator that traditionally writes rules for structural capital requirements to exert some influence on the decision process. Supporting evidence is provided by our empirical results that FSCs have little to no effect on a country's implementation of the other Basel III macroprudential capital buffer, the capital surcharge for SIBs. This other macroprudential capital buffer is heavily prescribed by BCBS guidelines, is implemented with a one-time or infrequent process, and are implemented with rule-writing embedded in the countries' prudential regulator, in contrast to the more discretionary setting for the CCyB that is based on a regulatory occurring assessment of systemic risks. The well-established rule-writing process would provide less scope for a newly created FSC or the ministry of finance or other government entity to exert a significant influence.

In addition, we do not find that central banks with direct powers are more likely than independent bank regulators to use the CCyB or increase the minimum SIB surcharge, although central banks are involved in multiple ways in these decisions. For the CCyB, they are the direct authority in 34 countries (wherever they are also the prudential regulator) and they make formal recommendations in five more countries. But we do not find a distinct effect for the central bank from the prudential regulator for any of the macroprudential capital buffer decisions.

Our findings have implications for two research areas related to governance for macroprudential policy. First, only some of the new multi-agency FSCs – specifically, those with tools or those with fewer member agencies – are consistent with a functional delegation motive. While countries may prefer to create FSCs mainly for improved communication, large FSCs or those with weak governance mechanisms may actually hinder effective decision-making. Second, institutional arrangements and establishing clear responsibilities for new tools have a measurable effect on decisions. New authorities with tools and accountability can have a significant effect on using the CCyB. The central bank and prudential regulator authorities for setting the CCyB likely arise from pre-existing regulatory responsibilities and, while their accountability for these tools may be well-defined, they will still have their traditional microprudential responsibilities and may have a less clear mandate for new tools when there is also an FSC. Although we do not want to say that the only way to effectively use the CCyB is to give the authority to set it to FSCs or ministries of finance, this paper strongly suggests that establishing accountability matters.

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**Table 1. Macroprudential governance characteristics**

	No. of countries
<b>A. 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	
MF	25
CB	19
PR	1
Other	6
<b>B. CCyB characteristics (authorities and advisory roles)</b>	
FSC sets	2
CB makes recommendation	1
MF or government sets	4
FSC makes recommendation	2
CB makes recommendation	2
Both make recommendations	0
CB sets	34
FSC makes recommendation	1
PR sets	15
FSC makes recommendation	5
CB makes recommendation	2
Both make recommendations	0
Country does not have CCyB	3
<b>C. Microprudential authority characteristics</b>	
CB is the PR	34
CB is a wide PR	18
Independent PR	24

**Table 2. 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	CB is 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
Germany	2019	PR	Y	Y	N	MF	Y	CB provides analysis to FSC	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.

Sources: See appendix C.

**Table 3. 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 an FSC exists and 0 if not.	0.81	0.4	0	1
No. of FSC agencies	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 3 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>					
Crisis fiscal cost-to-GDP	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
Crisis peak NPL	Measured by Laeven and Valencia (2018) and is peak bank nonperforming loans as a percent of 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 Svirydzenka (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 Svirydzenka (2016) in IMF WP 16/5. See above.	0.55	0.26	0.19	0.86
Fin. institution development index	Measured by Svirydzenka (2016) in IMF WP 16/5. See above.	0.65	0.20	0.35	0.90
Bank competition index	Measured by the World Bank and calculated as the elasticity of banks revenues to input prices. Under perfect competition $H=1$ , monopolistic competition $0 < H < 1$ , monopoly $H < 0$ .	.63	.19	.28	.93
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 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 by the World Bank and now IADB to capture the institutions by which limits are placed on the actions of one branch of government by others with purview over these actions.	0.66	0.24	0.20	0.85
Log GDP	Indicator of the economy's size. Reported by the World Bank in U.S. dollars.	26.4	1.5	24.4	28.5
GDP per capita	Indicator of a country's wealth. Reported by the World Bank in U.S. dollars.	29.5	16.9	6.7	52.3

**Table 4A. Decision to use CCyB, based on FSC clusters**

	<i>Dependent variable: Decision to use CCyB</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
Credit growth(t-1)	39.54*** (3.13)	42.11*** (4.13)	56.26*** (4.86)	47.74*** (4.28)	47.40*** (3.11)	50.92*** (4.49)
Credit growth(t-2)	28.62** (2.42)	34.07*** (2.71)	36.96*** (2.89)	33.19*** (2.82)	31.90** (2.56)	33.75*** (2.85)
Real GDP growth(t-1)	31.73 (1.30)	32.36 (1.05)	51.63* (1.72)	41.03 (1.55)	41.12 (1.52)	44.33 (1.61)
CPI inflation (t-1)	61.57*** (3.37)	64.87*** (3.49)	110.88*** (5.62)	82.45*** (4.17)	87.62*** (4.02)	94.13*** (4.52)
Crisis fiscal cost-to-GDP	43.68*** (2.89)	42.38** (2.42)	40.01** (2.00)	40.98*** (2.68)	34.63** (2.11)	40.73** (2.34)
Equity returns(t-1)		0.46 (0.16)				
Equity returns(t-2)		4.59 (1.62)				
FSC exists			10.92** (2.05)	11.22** (2.40)	9.18 (1.63)	8.86* (1.79)
No. of FSC agencies			-6.65*** (-4.05)	-4.35*** (-2.95)	-4.90*** (-2.79)	-4.64*** (-2.88)
FSC strongest			8.05*** (2.78)		6.54** (2.38)	
FSC weakest				-5.66* (-1.74)	-2.45 (-0.63)	
FSC Strongest (excl. UK and France)						4.65 (1.63)
Constant	-16.61*** (-6.86)	- 18.77*** (-7.25)	-13.22*** (-3.71)	- 12.66*** (-4.13)	- 11.51*** (-3.50)	- 13.47*** (-4.27)
Observations	270	255	270	270	270	270
Country groups	54	51	54	54	54	54
Log likelihood	-60.05	-55.68	-57.17	-57.68	-57.16	-57.92

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 2019. The dependent variable is a dummy on whether a country has made the decision to activate its CCyB. The independent variables are presented in table 3. The t-values are in parentheses, and the statistical significance are \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



**Table 4B. Decision to use CCyB, based on direct authorities**

	<i>Dependent variable: Decision to use CCyB</i>				
	(7)	(8)	(9)	(10)	(11)
Credit growth(t-1)	52.34*** (3.42)	44.80*** (4.58)	43.45*** (4.08)	42.65** (2.53)	51.31*** (4.97)
Credit growth(t-2)	34.08** (2.57)	31.28*** (2.90)	30.37*** (2.71)	30.60** (2.32)	33.36*** (2.84)
Real GDP growth(t-1)	48.65* (1.74)	43.72* (1.82)	38.50 (1.56)	36.47 (1.43)	46.45* (1.74)
CPI inflation (t-1)	95.08*** (4.00)	80.48*** (4.52)	68.66*** (3.67)	68.81*** (3.29)	133.08*** (8.07)
Crisis fiscal cost-to-GDP	46.52*** (2.70)	40.25*** (2.90)	43.41** (2.57)	49.45*** (3.07)	56.75*** (3.17)
FSC exists	5.40 (1.15)	3.49 (0.74)			
No. of FSC agencies	-3.88*** (-3.06)	-2.65* (-1.81)			
FSC or MF sets CCyB	11.89** (2.10)	8.47** (2.16)	13.76*** (3.48)		
FSC advises on CCyB	3.85 (0.99)	3.69 (1.07)	5.30 (1.53)		
CB sets CCyB		0.79 (0.32)	2.59 (1.00)	-9.07*** (-2.59)	
CB advises on CCyB		4.09 (0.73)	2.46 (0.52)	0.92 (0.17)	2.94 (0.67)
PR sets CCyB				-8.46** (-2.21)	-11.29*** (-2.66)
CB sets CCyB x FSC = 1					-14.89*** (-3.37)
CB sets CCyB x FSC = 0					-9.74* (-1.91)
Constant	-15.06*** (-4.24)	-14.71*** (-4.22)	-21.76*** (-7.36)	-10.09*** (-2.83)	-16.60*** (-3.87)
Observations	270	270	270	270	270
Country groups	54	54	54	54	54
Log likelihood	-55.43	-55.18	-56.76	-57.89	-57.23

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 2019. The dependent variable is a dummy on whether a country has made the decision to activate its CCyB. The independent variables are presented in table 3. The t-values are in parentheses, and the statistical significance are \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 5. Countries' probabilities of using CCyB by governance structure and marginal effects of credit growth**

	Pr (CCyB) = 1	Pr (CCyB) = 1 (with credit growth(t-1) and credit growth(t-2) at its mean + 1 s.d.)
Eqn. (5)		
FSC exists, Strongest FSC cluster	0.21	0.50
No. of FSC agencies = 2	0.50	0.75
No. of FSC agencies = 5	0.12	0.19
FSC exists, Weakest FSC cluster	0.07	0.18
No. of FSC agencies = 2	0.18	0.47
No. of FSC agencies = 5	0.03	0.05
FSC exists, FSC not strongest or not weakest	0.15	0.21
No. of FSC agencies = 2	0.23	0.50
No. of FSC agencies = 5	0.03	0.12
FSC does not exist	0.18	0.38
Eqn. (7)		
FSC exists and either FSC/MF sets CCyB or FSC advises on CCyB	0.50	0.73
FSC exists, and neither FSC/MF sets CCyB, nor FSC advises on CCyB	0.07	0.18
Eqn. (8)		
FSC exists and either FSC/MF sets CCyB or FSC advises on CCyB	0.45	0.59
FSC exists and either CB sets CCyB or CB advises on CCyB	0.18	0.39
FSC exists and neither FSC/MF nor CB set CCyB nor FSC nor CB advise on CCyB	0.06	0.18
Eqn. (10)		
PR sets the CCyB	0.13	0.20
Either CB sets CCyB or CB advises on CCyB	0.14	0.21
Neither PR nor CB set the CCyB nor CB advises on CCyB	0.41	0.53

Notes: All regression variables, unless otherwise specified, are set at their means

**Table 6. Robustness: Decision to use CCyB in 2019 only**

	<i>Dependent variable:</i>		
	<i>Decision CCyB = 1 in 2019</i>		
	(1)	(2)	(3)
Credit growth(t-1)	-0.61 (-0.06)	-0.09 (-0.01)	2.70 (0.26)
Credit growth(t-2)	24.97* (1.94)	23.88* (1.80)	18.86 (1.56)
Fiscal Cost	7.22 (1.44)	8.70* (1.70)	9.49* (1.82)
FSC exists	0.59 (0.47)	-0.03 (-0.02)	
No. of FSC agencies	-0.50 (-1.47)	-0.33 (-0.90)	
FSC strongest	1.44* (1.66)		
FSC or MF sets CCyB		2.09** (2.02)	
FSC advises on CCyB		0.81 (0.83)	
CB sets CCyB			-1.91* (-1.73)
CB advises on CCyB			-0.31 (-0.23)
PR sets CCyB			-1.85 (-1.60)
Constant	-1.20 (-1.35)	-1.42 (-1.57)	-0.38 (-0.37)
Observations	52	52	52
Pseudo $R^2$	0.214	0.254	0.194
Log likelihood	-23.82	-22.59	-24.40

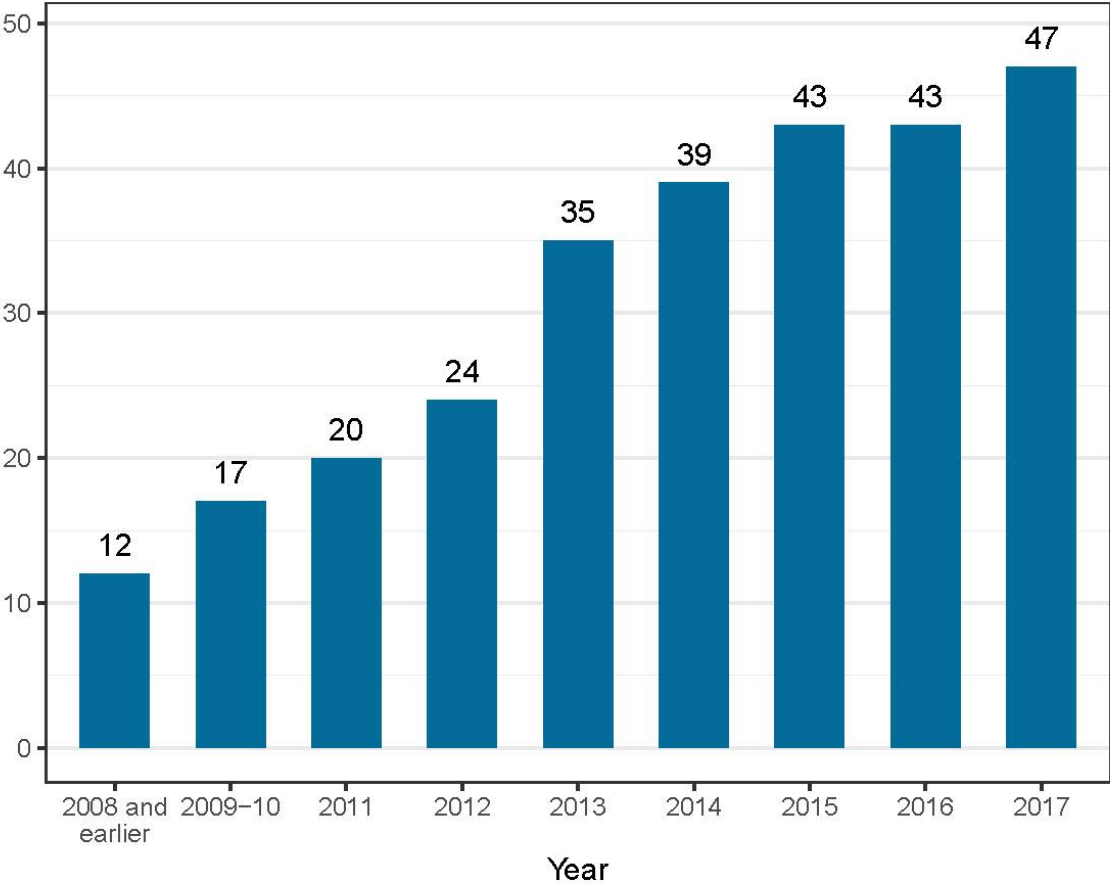
Notes: This table presents cross-sectional results of financial and governance variables on whether a country activated its CCyB in 2019. The dependent variable is a dummy on whether the country's CCyB is above zero or at zero, conditional on a framework for implementing CCyB. The independent variables are presented in table 3. The t-values are in parentheses, and the statistical significance are \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

**Table 7. Decision to require banks with greater systemic importance to hold higher capital buffers**

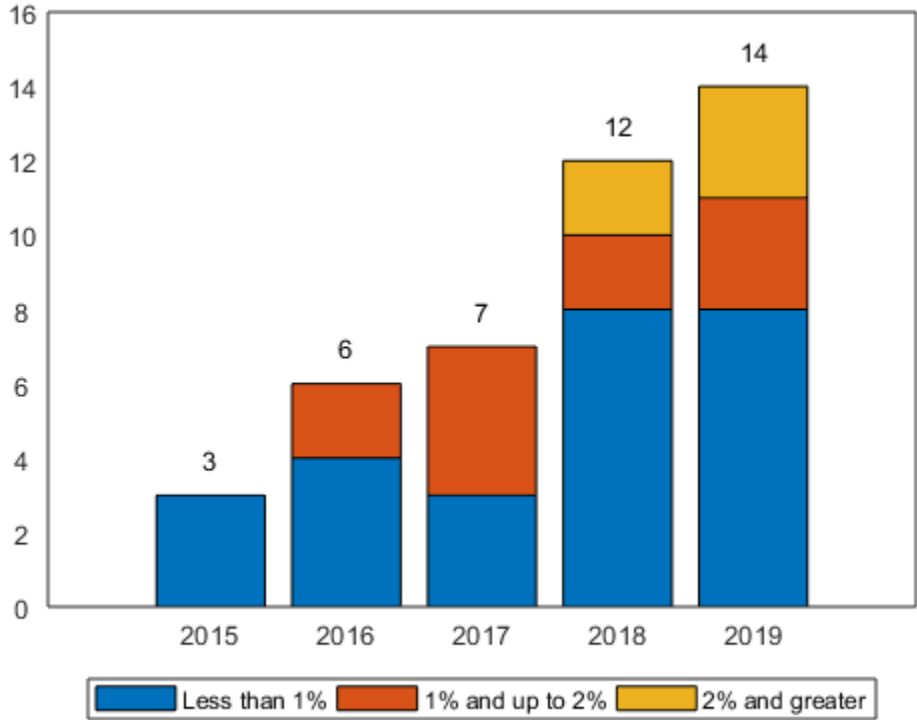
	<i>Dependent variable: Minimum Surcharge <math>\geq 1</math></i>					
	(1)	(2)	(3)	(4)	(5)	(6)
Private credit-to-GDP ratio (2014)	0.02 (1.55)	0.02* (1.65)	0.02 (1.55)	0.02* (1.78)	0.03** (1.98)	0.03** (2.08)
Bank competition index (2014)	-3.03* (-1.66)	-3.20* (-1.72)	-3.02* (-1.65)	-3.36* (-1.79)	-3.51* (-1.68)	-3.53* (-1.65)
Fin. markets development index (2014)	-3.09 (-1.25)	-3.81 (-1.43)	-3.16 (-1.23)	-3.84 (-1.42)	-6.36* (-1.92)	-6.85** (-1.97)
GDP	0.68* (1.90)	0.80** (2.04)	0.69* (1.84)	0.82** (2.03)	1.36** (2.50)	1.41** (2.54)
Crisis peak NPL		4.42 (1.08)		3.57 (0.84)	4.95 (1.12)	5.05 (1.13)
Crisis fiscal cost-to-GDP			0.47 (0.11)			
CB as PR				0.65 (0.88)	0.57 (0.71)	0.64 (0.79)
FSC exists (and formed early)					2.20* (1.95)	2.53** (2.09)
No. of FSC agencies					-0.72** (-2.04)	-0.74** (-2.12)
FSC strongest (and formed early)						-0.74 (-0.84)
Constant	-15.97* (-1.75)	-19.09* (-1.92)	-16.28* (-1.70)	-20.08* (-1.95)	-19.57* (-1.92)	-20.23* (-1.95)
Observations	52	52	52	52	52	52
pseudo $R^2$	0.155	0.173	0.155	0.184	0.197	0.184
Log likelihood	-29.93	-29.31	-29.92	-28.91	-28.43	-28.89

Notes: This table present cross-sectional results of financial and economic and governance variables on the decision to increase the minimum global/domestic SIB surcharge to at least 1. The dependent variable is a dummy on whether the max of the minimum surcharge is greater than or equal to 1. The independent variables are presented in table 3. There full list of 58 countries can be found in figure 3. The countries that are excluded from the sample are Chile, Colombia, Cyprus, Hong Kong, Iceland, and Malta. The t-values are in parentheses, and the statistical significance are \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Figure 1. Cumulative number of FSCs, by year of formation**



**Figure 2. Number of Countries that have set the CCyB above zero and size of the buffer**



Note: Three countries in our dataset have not operationalized the CCyB in their bank capital regimes.



## 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 member agencies	0.77	1.00	0.62	0.85
Indep. members on FSC	0**	0.08**	0.12**	0.38**
No. of FSC agencies	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	0.38
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
MF or other govt. agency has CCyB	0.15	0.00	0.00	0.15
MF or other govt. agency 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 gov. 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 nonperforming 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. Summary of Basel III and other post-crisis capital reforms**

### ***Basel III minimum capital requirements***

- Basel III capital reforms specified common equity tier 1 (CET1) – a subcomponent of tier 1 capital – as a new capital ratio and eliminated tier 3 capital as a category of capital.
- The reforms specified minimum requirements for CET1 of 4.5 percent of risk-weighted assets (RWA), tier 1 capital of 6.0 percent of RWA, and total capital (tier 1 plus tier 2 capital) of 8.0 percent of RWA. Additionally, the reforms entailed stricter definitions of tier 1 capital, thereby improving the quality of loss absorbing capital, as well as stricter definitions of RWA, thereby enhancing the risk coverage of capital requirements.
- The reforms also specified an initial calibration of a minimum tier 1 capital leverage ratio of 3.0 percent, expressed relative to a broad measure of leverage exposure that also included on-balance sheet total assets.
- The transitional arrangements for these requirements were that CET1 and tier 1 capital requirements would be phased-in between January 1, 2013 and January 1, 2015. The 8.0 percent total capital requirement did not need to be phased-in, since it was always in effect.

### ***The Basel III capital conservation buffer (CCoB)***

- Basel III capital reforms introduced the CCoB, which was designed to ensure that banks would build up capital buffers outside of periods of stress that could then be drawn down in the event that stresses materialized and losses were incurred.
- The size of the CCoB would be 2.5 percent, where this buffer would be built above minimum requirements and be met with CET1.
- The reforms specified capital conservation rules – limiting dividend payments, share-backs, and staff bonus payments – that would take effect when capital ratios fell within quartiles of the range of the CCoB and become more stringent as capital ratios fell into progressively lower quartiles of the CCoB range. The purpose of these rules would be to prevent ratios from breaching minimum capital requirements.
- The transitional arrangements for the CCoB were that it would be phased-in in four 0.625 p.p. steps between January 1, 2016 and January 1, 2019.

### ***The Basel III countercyclical capital buffer (CCyB)***

- Basel III capital reforms introduced the CCyB, which was designed to ensure that bank capital requirements accounted for the macro-financial environments in which banks operate. The CCyB would be deployed by national jurisdictions when excess aggregate credit growth were judged to be associated with the build-up of system-risk so to ensure that the banking system had a buffer to protect the jurisdiction against future potential losses. The buffer could then be drawn down in the event that stresses materialized and losses were incurred.
- While jurisdictions would deploy their own CCyBs, a bank's CCyBs would be the weighted sum of the CCyBs set in each jurisdiction in which it had private sector credit exposures, where the weights in this sum would equal the bank's share of private sector credit exposure in each jurisdiction.
- The maximum CCyB that could be activated by a jurisdiction and be reflected – or “reciprocated” – in the CCyBs of other jurisdictions' banks that operated the jurisdiction would be 2.5 percent.
- An activated CCyB would be met with CET1 (like the CCoB) and would expand on the 2.5 percent CCoB. This would mean that the capital conservation rules would apply to quartiles of the CCoB expanded by the level of the CCyB.
- The transitional arrangements for the CCyB were that the maximum CCyB that could be activated by a jurisdiction and reciprocated in the CCyBs of other jurisdictions' banks that operated the country would be phased-in in four 0.625 p.p. steps between January 1, 2016 and January 1, 2019.

### ***The Basel III global systemically important bank (G-SIB) surcharge***

- Basel III capital reforms introduced the G-SIB surcharge, which, was designed to address part of the cross-border negative externalities implied by G-SIBs by increasing G-SIBs' going-concern loss absorbency and thereby reducing the probability of the failure of a G-SIBs. (Improved global recovery and resolution frameworks would complement the G-SIB surcharge by reducing the impact of the failure of a G-SIB.)
- The Basel Committee on Bank Supervision (BCBS) developed an indicator-based methodology for assessing the global systemic importance of an internationally active bank and a methodology for determining the magnitude of additional loss absorbency that a G-SIB should have.
- The BCBS's methodology for determining the G-SIB surcharge considered that additional loss absorbency for internationally active banks with the highest current measures of global systemic importance should be 2.5 percent of RWA, with the possibility of loss absorbency reaching up to 3.5 percent of RWA. The magnitude for the lowest loss absorbency would be 1.0 percent of RWA.
- The G-SIB surcharge for a bank would be met with CET1 (like the CCoB and CCyB) and would expand on the 2.5 percent CCoB plus any activated CCyB. This would mean that the capital conservation rules would apply to quartiles of the CCoB expanded by the G-SIB surcharge and the level of the CCyB.
- The transitional arrangements for the G-SIB surcharge were that it would be phased in in four equal steps between January 1, 2016 and January 1, 2019.

### ***The domestic systemically important bank (D-SIB) surcharge***

- The BCBS developed a set of 12 principles for jurisdictions to follow in developing frameworks for determining higher loss absorbency (HLA) requirements at D-SIBs. Such requirements would address the domestic negative externalities implied by D-SIBs.
- The BCBS's 12 D-SIB principles include 6 for assessing the domestic systemic importance of banks and 6 for calibrating the HLA of D-SIBs. By providing only principles, jurisdictions would be able to determine, given their local financial systems, the most appropriate framework for deciding on their banks' D-SIB surcharges.
- The BCBS's D-SIB principle number 10 emphasizes the importance of jurisdictions ensuring that the G-SIB and D-SIB frameworks are compatible and complementary. The principle argues against making the G-SIB and D-SIB surcharges additive and instead advocates for making the higher surcharge the relevant one.
- The BCBS's D-SIB principle number 12 states that the HLA requirement should be met fully with CET1. The maximum of the G-SIB and D-SIB surcharges would expand on the 2.5 percent CCoB plus any activated CCyB. This would mean that the capital conservation rules would apply to quartiles of the CCoB expanded by the maximum of the G-SIB and D-SIB surcharges and the level of the CCyB.
- Given the complementary nature of the G-SIB and D-SIB surcharges, the BCBS argues for the D-SIB surcharge to have the same transitional arrangements as the G-SIB surcharge.

### ***Sources***

- For minimum capital requirements, the CCoB, and the CCyB: The July 2011 BCBS paper "Basel III: A global regulatory framework for more resilient banks and banking systems."
- For the G-SIB surcharge: The November 2011 BCBS paper "Global systemically important banks assessment methodology and the additional loss absorbency requirement."
- For the D-SIB surcharge: The October 2012 BCBS paper "A framework for dealing with domestic systemically important banks."

## Appendix B. 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 these agencies making 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

Sources: See appendix C.

## Appendix C. Sources for macroprudential bank capital policy implementation dataset

### *Sources for the global systemically important bank (G-SIB) surcharge, and the domestic systemically important bank (D-SIB) surcharge*

- The IMF's Macroprudential Policy Survey database was a key source for collecting detailed information on how countries implemented their G-SIB surcharge and D-SIB surcharges, as well as the sizes to which they set their D-SIB surcharges given the BCBS's principals for this surcharge.
  - This database is a compilation of reports sent in by IMF countries that describe how they have implemented post-crisis regulatory reforms, including macroprudential policies.
  - The information is self-reported the database and does not include information for a number of the 58 countries in our dataset. Also, each country does not provide the same information nor all of the information that we want to collect.
  - Link to database: <https://www.elibrary-areaaer.imf.org/Macroprudential/Pages/Home.aspx>
- For countries that are on the Basel Committee for Bank Supervision (BCBS) we can also find information about their implementation of the G-SIB surcharge and D-SIB surcharge from progress reports on the adoption of the Basel regulatory framework published by the BCBS based on monitoring undertaken by the Regulatory Consistency Assessment Programme (RCAP).
  - Progress reports have been published semi-annually by BCBS since the fall of 2011.
  - Link to all RCAP reports: [https://www.bis.org/bcbs/implementation/rcap\\_reports.htm](https://www.bis.org/bcbs/implementation/rcap_reports.htm). Link to the list of BCBS countries: <https://www.bis.org/bcbs/membership.htm>.
- The Financial Stability Board (FSB) has published each November since 2011 the list of banks identified by the FSB, BCBS, and national authorities as global systemic important banks. Given the G-SIBs in each country, this list provides us with the range of magnitudes of the G-SIB surcharge in different countries.
  - Link to FSB G-SIB lists: <http://www.fsb.org/work-of-the-fsb/policy-development/systematically-important-financial-institutions-sifis/global-systemically-important-financial-institutions-g-sifis/>
- The European Systemic Risk Board's (ESRB's) National Macroprudential Policy web-site has information on the implementation of the D-SIB in European Free Trade Association (EFTA) countries.
  - EFTA countries are EU countries plus Iceland, Lichtenstein, Norway, and Switzerland.
  - Link to ESRB's web-site: [https://www.esrb.europa.eu/national\\_policy/html/index.en.html](https://www.esrb.europa.eu/national_policy/html/index.en.html)
- An additional source that we used for all countries (including non-EFTA and non-BCBS countries) was a write-up of a 2015 survey by the BIS Financial Stability Institute on Basel II, 2.5, and III implementation (link: <https://www.bis.org/fsi/fsiop2015.htm>).
- Where gaps in our dataset remained, we also consulted individual country CB or PR websites.

### *Sources for the countercyclical capital buffer (CCyB)*

- For countries that are members of the BCBS, the BCBS reports their CCyBs on its web-site. This web-site does not, however, give history. As discussed below, for EFTA countries, the history of CCyB settings is available on the ESRB's web-site. One non-EFTA country, Hong Kong, has to date activated its CCyB and so for Hong Kong we looked at HKMAs web-site to find Hong Kong's past CCyB settings.
  - Link to BCBS web-site: <https://www.bis.org/bcbs/CCyB/>
- For countries in the European Free Trade Association (EFTA) – EU countries plus Iceland, Lichtenstein, Norway, and Switzerland – the ESRB reports on its website countries' current and historic CCyB setting.
  - Link to ESRB's web-site: [https://www.esrb.europa.eu/national\\_policy/ccb/html/index.en.html](https://www.esrb.europa.eu/national_policy/ccb/html/index.en.html)
- There are 10 countries in our dataset that are neither EFTA nor BCBS countries and, of these, three have not operationalized the CCyB. For the seven countries that have operationalized the CCyB we looked at the web-sites of the agency that we know sets their CCyB to confirm that their CCyB setting was 0 percent.
  - The seven countries are Malaysia, New Zealand, Peru, Philippines, Serbia, Thailand, and Ukraine.
  - The information was also cross-checked with that in the IMF's Macroprudential Policy Survey database.