

Financial Stability Committees and the Basel III Countercyclical Capital Buffer*

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We evaluate how a country's governance structure for macroprudential policy affects its use of the Basel III countercyclical capital buffer (CCyB). We find that stronger governance raises the likelihood of a country increasing its CCyB. The probability of increasing the CCyB is higher in countries with stronger financial stability committees (FSCs), defined by those with tools and voting processes. However, most countries have not set up strong FSCs. The probability is even higher under an alternative governance structure where the FSC or ministry of finance has direct authority to set the CCyB. This is perhaps because setting the CCyB involves establishing a new macrofinancial analytical process to regularly evaluate emerging systemic risks and allows these entities with new responsibilities to influence the process. In addition, credit growth has substantial effects on the likelihood of increasing the CCyB, while the credit-to-GDP gap is not significant.

JEL Codes: H11, G21, G28, P16.

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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 G-20 stated that:

The Financial Stability Board (FSB), Basel Committee on Bank Supervision (BCBS), and Committee on the Global Financial System (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.

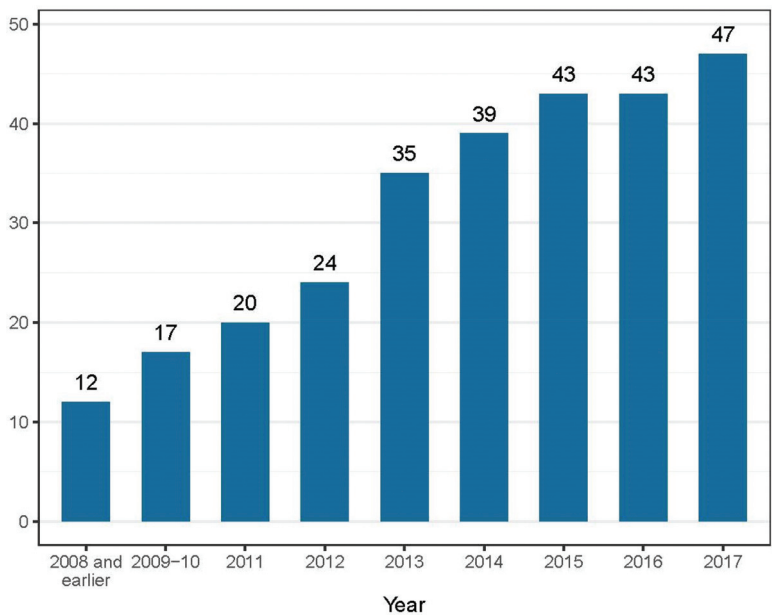
In addition:

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 during the global financial crisis (GFC), countries have been building out their macroprudential policy frameworks, specifically to (i) measure and monitor systemic risk; (ii) implement policies to mitigate identified systemic risks; and (iii) establish institutional and governance structures for implementing policy.

In this paper, we test whether governance structures for macroprudential policies affect countries' decisions to implement the Basel III countercyclical capital buffer. Our analysis encompasses the entirety of the first full era for the official use of the Basel III countercyclical capital buffer up to the onset of the COVID-19 pandemic and, in this regard, provides a valuable study of the factors influencing countries' use of a new macroprudential tool. We consider in depth the effects of existing financial regulators and multi-agency financial stability committees (FSCs), which have increased

**Figure 1. Cumulative Number of FSCs,
by Year of Formation**



dramatically in number from 12 before the GFC to 47 in 2017 in our sample of 58 countries (Figure 1 and Table 1).¹ 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 increase in FSCs represents a fundamental change in the governance for macroprudential policies to reduce financial stability risks.

In earlier work, we found that the probability of creating an FSC increased with country size and decreased when the central bank was also 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

¹As 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.

Table 1. Macroprudential Governance Characteristics

	Number of Countries		
A. FSC Characteristics			
No FSC		11	
FSC Exists		47	
Number of Agencies on FSC			
2		4	
3		14	
4		18	
5 or More		11	
FSC Clusters*	Weakest		Strongest
Countries	13		13
Formal FSC	2		13
Chair	7		13
FSC Votes	3		13
Good Tools	1		13
B. Direct Authorities and Advisors for CCyB			
FSC Sets		2	
CB Advises		1	
MF or Government Sets		4	
FSC Advises		2	
CB Advises		2	
Both Advise		0	
CB Sets		34	
FSC Advises		1	
Independent PR Sets		15	
FSC Advises		5	
CB Advises		2	
Both Advise		0	
Country Does Not Have CCyB		3	
C. Microprudential Authority Characteristics			
CB Is the PR		34	
CB Is a Wide PR		18	
Independent PR		24	
*Defined by cluster analysis of FSCs based on formal FSC, formal chair, voting process, and tools (hard or semi-hard, including if the FSC is a formal advisor for the CCyB).			

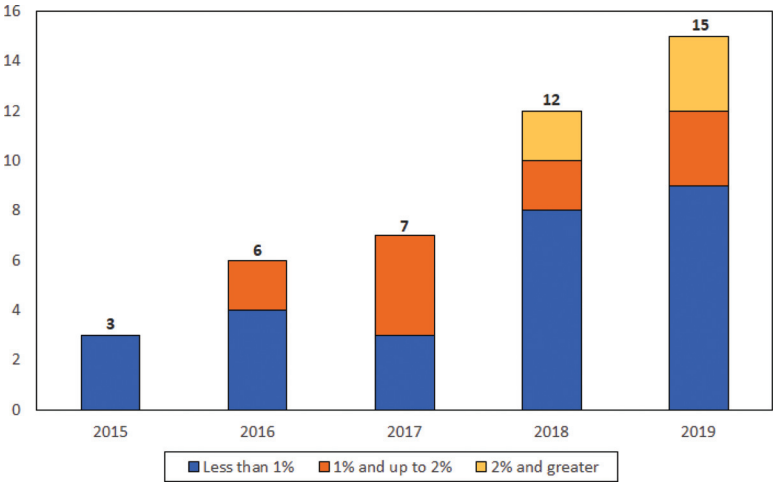
have been created, we documented significant distinctions in characteristics that would affect their ability to take actions or mobilize the actions of other agencies. We used cluster analysis to identify the FSCs with relatively strong governance mechanisms for taking policy actions.

We extend that analysis in this paper and identify a cluster of relatively strong FSCs based on whether they are formally established in legislation, have a designated chair, have a voting process, and have tools to take actions either on their own or via a comply-or-explain mechanism. We find that only 13 FSCs (one-quarter of FSCs in our sample) are relatively strong, whereas most do not have any tools and many are missing at least one other basic governance feature. These differences raise questions about whether FSCs are created based on functional delegation motives to improve accountability for financial stability and exert a strong influence on the macroprudential decisions made by other agencies, or whether they are designed primarily to convene and discuss risks.

We focus on the Basel III countercyclical capital buffer (CCyB), which 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 to support the provision of credit.² Between 2015 and 2019, 15 countries made multiple decisions to activate and use the CCyB (Figure 2 and Table 2). 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 macrofinancial analytical process likely would be a new one and would provide

²The Basel III capital surcharge for global or domestic systemically important banks (SIBs) and the Basel III capital conservation buffer (CCoB) are also macroprudential tools. However, we do not consider them in our study because countries have less discretion over their use than they have with the CCyB. Capital surcharges for SIBs are designed to address part of the negative externalities implied by these institutions by increasing their going-concern loss absorbency and thereby reducing the probability of their failure, while the CCoB, which can be drawn down (subject to the bank then facing restrictions on dividend payments, share buybacks, and staff bonus payments), allowing capital requirements to vary somewhat, can offset some procyclicality. Capital surcharges for SIBs are set primarily based on internationally agreed methodologies for assessing a SIB's systemic importance and the magnitude of the SIB's additional loss absorbency, while the CCoB is set at an internationally agreed level of 2.5 percent.

Figure 2. Number of Countries That Have Set the CCyB Above Zero and Size of the Buffer



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

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.

To test the effects of governance, we first evaluate the effects of FSC clusters on CCyB actions. In general, a finding that FSCs exert an influence and FSCs in the strongest cluster have more influence would be more consistent with a functional delegation motive than with a symbolic delegation motive for creating FSCs. Second, we evaluate the effects of different agencies having the direct responsibility to set the CCyB, where the agencies are the FSC or ministry of finance (or government agency more broadly), the central bank, or an independent bank prudential regulator. 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, as well as the strictness of the microprudential bank regulatory regime.

We define the use of CCyB by an indicator variable equal to 1 if a country sets it to be greater than 0 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

Table 2. Countries That Have Raised Their Countercyclical Capital Buffers and Governance

	Year of First Raise	Authority for CCyB	FSC Exists	FSC Strongest	FSC Weakest	FSC Chair	CB Is FSC Member	CB Role	Banking Crisis That Started 07–08
Belgium Bulgaria Czechia Denmark France	2019	CB	N	—	—	—	—	Sets CCyB on its own.	Y
	2018	CB	Y	N	N	MF	Y	Sets CCyB on its own.	N
	2015	CB	N	—	—	—	—	Sets CCyB on its own.	N
	2018	Gov	Y	Y	N	CB	Y	—	Y
	2018	FSC ^a	Y	Y	N	MF	Y	Makes a recommendation to FSC based on CB and PR analysis.	Y
Germany Hong Kong Iceland	2019	PR	Y	Y	N	MF	Y	CB provides analysis to FSC.	Y
	2015	CB	Y	Y	N	MF	Y	Sets CCyB on its own.	N
	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 Lithuania Luxembourg	2018	CB ^a	Y	N	Y	No chair	Y	—	Y
	2017	CB ^a	N	—	—	—	—	Sets CCyB on its own.	N
	2018	PR ^a	Y	Y	N	MF	Y	Is consulted by PR but does not make a recommendation.	Y
	2013	MF	Y	N	Y	MF	Y	Makes a recommendation to MF, which CB publishes in its MPR.	N
Slovakia Sweden	2016	CB ^a	N	—	—	—	—	Sets CCyB on its own.	N
	2014	PR	Y	N	N	MF	Y	Is consulted (with other bodies) by PR but does not make a recommendation.	Y
United Kingdom	2017 ^b	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.
Source: BCBS website (<https://www.bis.org/bcbbs/CCyB/>); ESRB website (https://www.esrb.europa.eu/national_policy/ccb/html/index.en.html); websites of the agencies that set the CCyB; and Laeven and Valencia (2018).

economic conditions—importantly, credit growth—that vary over time and across countries. Our sample includes the entire set of decisions (with one exception) made by 58 countries to activate and increase the CCyB since its formal phase-in began in 2016.³ We exclude releases of the CCyB in 2020 in response to the COVID pandemic because decisions to activate and deactivate CCyBs are based on very different considerations. Indeed, the Basel Committee on Banking Supervision (BCBS) guidance (BCBS 2010) for national authorities foresaw such a difference and noted the greater relevance of high-frequency financial market variables as stress measures for informing a quick release of the CCyB, rather than economic and credit variables to measure a gradual buildup of financial system vulnerabilities for informing increases in the CCyB. This difference was indeed borne out when all but one of the 15 countries with a positive CCyB reduced or wholly released the buffers quickly after the onset of COVID, and suggests a very different model for determining a release rather than an increase, with basically only one common factor for releases to date.⁴

Overall, we find that governance has a measurable effect on the probability of using the CCyB. Countries with FSCs in the strongest cluster are more likely to use the CCyB than countries with FSCs in weaker clusters. In particular, we estimate that countries with FSCs in the strongest cluster are more than twice as likely to activate the CCyB than countries with other FSCs when credit growth is rapid. This difference arises even though many of the strongest FSCs do not set the CCyB themselves. These results are consistent with a functional delegation motive for the strongest FSCs. We find more significant effects for activating the CCyB when the FSC or

³The exception is when the U.K. Financial Policy Committee raised the CCyB in March 2016 but then lowered it quickly after the vote for Brexit. We do not include these actions since they are related more to Brexit and are not typical financial cycle developments, as explained further below.

⁴Of the 15 countries that had announced positive CCyB setting prior to the onset of the COVID pandemic, 9 reduced their CCyBs to 0 percent (Belgium, Denmark, France, Germany, Iceland, Ireland, Lithuania, Sweden, and the United Kingdom), 5 reduced their CCyBs but held them above 0 percent (Bulgaria, Czechia, Hong Kong, Norway, and Slovakia), and 1 did not change its CCyB (Luxembourg).

ministry of finance has the direct authority to set the CCyB—about three times more likely to use it—than when responsibilities are left with the prudential regulators. These results suggest that decisions are affected by specific delegation of responsibilities or establishment of FSCs with authorities to take actions.

In addition, we do not find that the probability of using the CCyB is related to the credit-to-GDP gap, the variable recommended by the BCBS for setting the CCyB (BCBS 2010). The credit-to-GDP gap is never significant in any of our regressions; indeed, many countries report that they activated the CCyB even though the credit-to-GDP gap is negative. In contrast, we find that the economic effects of credit growth are substantial. An increase in credit growth in the previous two years by one standard deviation leads to a predicted probability of using the CCyB of around 50 percent in countries with the strongest FSCs and 80 percent in countries where the FSC or MF has direct authority to set the CCyB. These probabilities are notably higher than the probabilities when credit growth is evaluated at its average growth.

For a couple of reasons, countries that may be most willing to adopt macroprudential bank capital policies like the CCyB also may be more likely to set up governance structures that can be effective. One reason may be that the country previously experienced a severe past financial crisis and another may be that it has weak microprudential regulation. We control for these possibilities by including variables to reflect these factors, and with bivariate regression analysis. To control for the severity of the GFC, we include a measure of either the fiscal costs related to bank restructurings (as a ratio to GDP) or the peak bank non-performing loan ratio if the country had a banking crisis that started in 2007 or 2008, as defined by Laeven and Valencia (2018). We control for weak microprudential regulations with a measure that sums three indicator variables related to how quickly a country implements Basel III and the size of structural capital buffers adopted. In the bivariate probit analysis, we model jointly the decision to use the CCyB and the institutional setup. We find that with regard to countries' decision to use the CCyB, when the CCyB is set by the FSC or ministry of finance, the GFC fiscal cost variable and strictness of the microprudential governance are significant, while the governance variable remains significant and appears to be strengthened.

While we link CCyB actions to economic, financial, and governance variables, we cannot say whether countries' CCyB actions are indeed the right ones for them to have taken, given that our empirical models can only reflect actual and not necessarily optimal policy responses. That said, we do not find evidence supporting broad underutilization based on comparing model-predicted probabilities for countries that have increased the CCyB with those that did not as of 2019. Specifically, we find significant differences in the distributions of predicted probabilities between the two groups and find that only three countries that had not increased the CCyB had a relatively high model-predicted probability.

1.1 Related Literature

This paper adds to only one other of which we are aware that focuses on evaluating the effects of governance on macroprudential policy implementation. Lim et al. (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 considerations of institutional structures draw on earlier work by Nier et al. (2011), who propose a set of desirable characteristics for effective macroprudential governance, including a strong role for the central bank, but do not rank governance structures. Lim et al.'s analysis is based on institutional structures in 2011, before many of the FSCs in our data set 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 or the central bank as the prudential regulator influences policy actions and the sensitivity of actions to credit growth.

This paper is also related to those on macroprudential policy implementation in the international political economy literature, where a key topic is that relatively few macroprudential policy actions are being taken. This situation, as argued by Baker (2018), arises from macroprudential policy regimes not having given adequate attention to explaining the "social purpose" of the policy agenda and, as argued by Kranke and Yarrow (2019), stems from

macroprudential authorities relying too much on microprudential practices to implement new macroprudential ideas. Clearly, the public's understanding of the social purpose to macroprudential policy across countries is a factor, in addition to governance, that could affect the use of the CCyB. Our paper focuses on governance structures and leaves this interesting and relevant issue to further study.

The paper's empirical results also inform the political economy literature that considers alternative hypotheses for the creation of FSCs; that is, elected officials creating FSCs for functional or symbolic delegation reasons. One hypothesis in this literature is that FSCs are created by elected officials as a delegation of functional responsibilities for complex and technical issues, consistent with Alesina and Tabellini (2007) 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 GFC 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. Our analysis to link governance to actual implementation of bank-capital macroprudential policies adds an important dimension to understanding the motivations for establishing macroprudential institutional structures.

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 in 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, are 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 et al. (2017) 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. We would note that Cerutti, Claessens, and Laeven (2017) in robustness analysis look at whether the fraction of a country's macroprudential tools controlled by the central bank influences tool effectiveness, but do not find any effect. In our analysis, we consider the role of a broader set of agencies and FSCs, as well as the central bank as a prudential regulator.

Our paper also relates to research on the effects of microprudential governance structures—specifically, how closely central banks and prudential regulators are integrated—for bank safety and soundness outcomes, including Goodhart and Schoenmaker (1995), Merrouche and Nier (2010), Nier et al. (2011), and Koetter, Roszbach, and Spagnolo (2014).⁵ All of these studies focus only on the integration of central banks and prudential regulators, whereas we focus on the authorities of a broader set of agencies and FSCs.

⁵Goodhart and Schoenmaker (1995) study 104 large bank failures in the 1980s to early 1990s and find that countries with more closely integrated central banks and prudential regulators have lower actual and expected bank failure rates. Nier et al. (2011) find that such countries have lower costs, in terms of failed banking assets, capital injections, and guarantees, while Merrouche and Nier (2010) find that such countries experience less severe buildups of banking imbalances (measured by the ratio of loans to deposits). In contrast to these findings, Koetter, Roszbach, and Spagnolo (2014), for a sample of 44 countries, find no improvement in the credit risk or non-performing loan ratio at banks when the central bank is the prudential regulator.

These papers also focus on outcomes, whereas we focus on the use of policy tools and, in particular, the CCyB.

The remainder of the paper is organized as follows. Section 2 provides some details on implementation of the CCyB and related Basel III capital buffers. Section 3 discusses how FSCs could influence macroprudential 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 Countercyclical and Other 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 as 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.

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 United Kingdom, 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.

Figure 2 summarizes the CCyB activation decisions of the countries in our data set.⁶ 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 15, one-quarter of the 55 countries in our data set that have operationalized a CCyB framework.⁷ The figure also shows the levels to which the CCyB has been raised, which have increased as the economic and financial cycle has continued to expand in most countries. In 2019, six countries have the CCyB above 1 percent,

⁶Data are from BCBS, European Systemic Risk Board (ESRB), and countries' websites. We cross-checked with the International Monetary Fund (IMF) Macroprudential Policy Survey when we collected the information from countries' websites.

⁷Three 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.

and three of them at 2.5 percent, the maximum level eligible for reciprocity treatment. With the onset of the COVID pandemic toward the end of the first quarter of 2020, all but one of the 15 countries that had activated their CCyBs had deactivated it (9 countries) or reduced it to some lower value (5 countries). In our empirical analysis, we focus on CCyB decisions in its building phase because decisions to release it are distinct from those to raise it, as anticipated by the BCBS (2010).⁸

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 (i) to maintain the structural resilience of the financial system in expansionary times to aggregate shocks; (ii) to increase resilience by preemptively building buffers; and (iii) 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 preemptive as well as to be guided by tail risks. This means macroprudential policies could be very unpopular. When credit is expanding rapidly,

⁸In Edge and Liang (2021), we provide a detailed discussion of countries' capital actions in the COVID pandemic. Most of the 14 countries that relaxed their CCyBs took only that action to relax capital constraints.

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 United States).

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 preemptive, governance structures need to include mechanisms to avoid policy inertia and inaction. We define policy inertia as less willingness to take preemptive 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—albeit not the CCyB that we focus on in this paper—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.

3.1 The Rise and General Characteristics of FSCs

In our data set of 58 countries, 47 countries now report having an FSC, whereas only 12 countries did before the GFC (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, which is also 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.⁹

At a minimum, FSCs can improve communication and coordination across multiple regulatory agencies. Most of the 47 FSCs have either 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 macroeconomy.¹⁰ The ministry of finance is on 40 FSCs and is the chair of 25 FSCs, indicating much higher representation in financial regulatory and stability issues than before the GFC. 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

⁹We 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.

¹⁰Of the 47 countries with FSCs in our data set, the central bank is the bank prudential regulator in 25 countries. For the 58 countries in our data set, this number is 34.

an interagency 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 the authority 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.)

3.2 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 countercyclical 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 primary story for FSCs since the expertise of financial agencies came into question during the GFC. 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 United States that support a motive to improve accountability but are vague on what authorities the new committee will have:

Harry Reid, Senate Majority Leader: “We are moving to this financial reform bill because we need transparency, we need accountability.”

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

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 preemptive, 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 GFC, 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.

3.3 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 an FSC to have an influence on policy actions, and it might even have a negative influence, since policies that might have been implemented by a single agency now need to be deliberated among the multiple agencies of an 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.¹¹

4. Macprudential 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).

4.1 FSC Governance Variables

Macroprudential governance variables include *FSC exists*, which is whether or not an FSC exists in a country, or a single agency is the macroprudential authority. FSCs also vary by the number of agencies represented, denoted by the variable *No. of agencies*. These variables are reported in panel A of Table 1.

FSCs can be grouped using cluster analysis in terms of their ability to take actions. In a previous paper (Edge and Liang 2019), we defined stronger FSCs by 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) or semi-hard tools (e.g., “comply or explain” authority).

In this paper, we expand our definition of “good tools” to include whether the FSC makes a formal recommendation on the CCyB. For example, in Germany, which is one of these countries, the prudential regulator is the authority that sets the CCyB, but the central

¹¹We do not consider whether FSCs affect the use of borrower-based policies, such as loan-to-value (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.

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. FSCs make formal recommendations on the CCyB in eight countries (see the appendix). There is considerable but not complete overlap between FSCs having general comply or explain authority and the authority to make formal CCyB recommendations.

Characteristics of the strongest and weakest FSCs are shown in Table 1. The clusters *FSC strongest* and *FSC weakest* each include 13 countries. For *FSC strongest*, all FSCs are formally established, have a formal chair, have a voting process, and all have hard or semi-hard tools. In contrast, for *FSC weakest*, many are de facto, only one has any tools, and only two have a voting process, sharply different from the strongest group. More detail on the clusters is provided in the dendrogram in Figure 3, where the clusters are ordered from the weakest FSCs, on the left (olive), to the strongest FSCs, on the right (blue) with no implied ordering of governance strength within each of the four clusters. (For figures in color, see the online version of the paper at <http://www.ijcb.org>.) The variable *FSC strongest* is equal to 1 for the 13 countries with FSCs in the rightmost (blue) cluster, and equal to 0 otherwise. The eight FSCs in the teal cluster just left of the strongest cluster have similar 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 two leftmost clusters (shown in red and olive) as even less able to act. The variable *FSC weakest* is equal to 1 for the 13 countries with FSCs in the leftmost (olive) cluster, and equal to 0 otherwise.

Of note—and as seen in the table below the dendrogram—the *FSC strongest* cluster is in countries with stronger rule of law and higher per capita income, and with higher fiscal costs-to-GDP related to the GFC. 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 having stronger FSCs.

At the same time, however, the countries in the *FSC weakest* cluster share similar traits with the strongest—relatively strong

Figure 3. FSC Ability to Act Dendrogram and Characteristics of Clusters

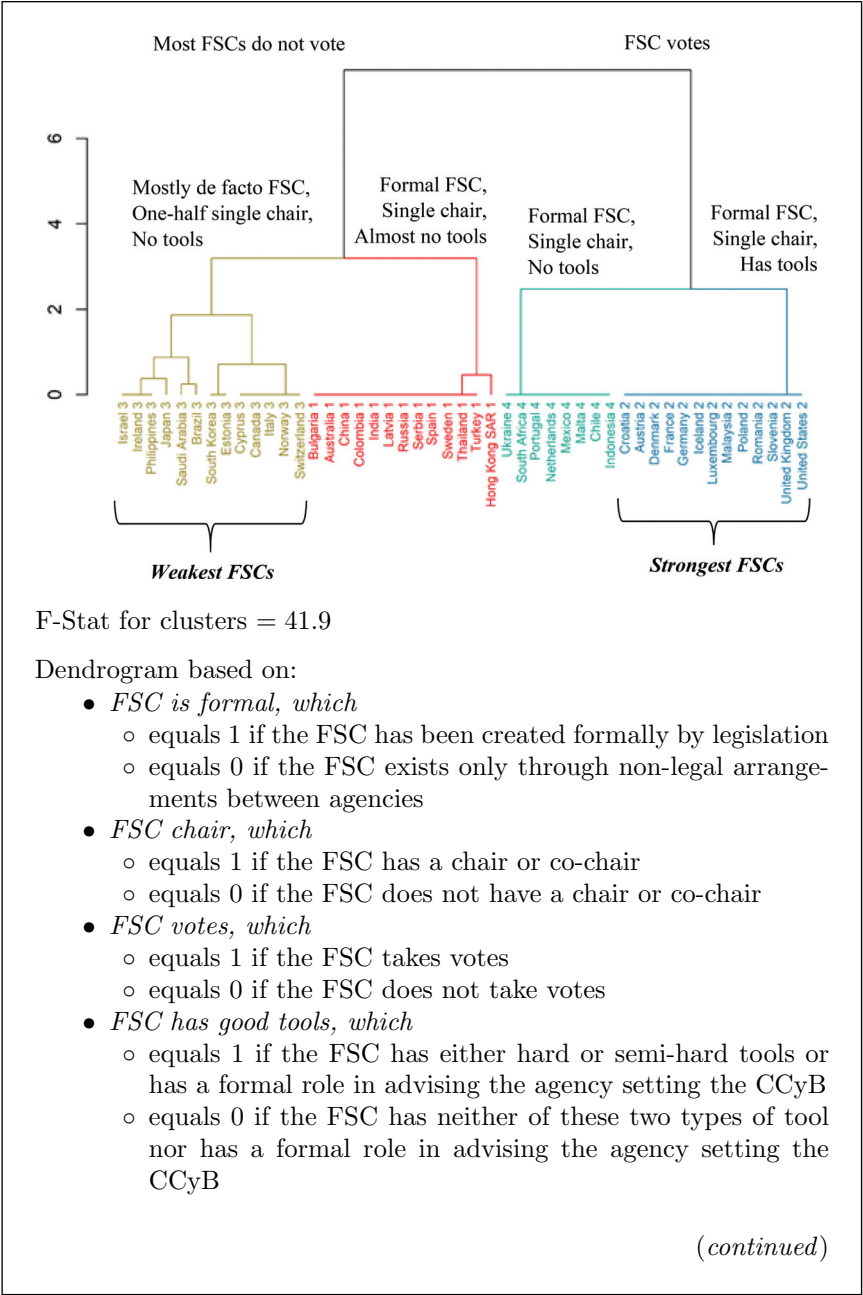


Figure 3 Table. Characteristics of Clusters in the FSC Ability to Act Dendrogram

	Weakest			Strongest
	Olive (3)	Red (1)	Teal (4)	Blue (2)
<i>A. Dendrogram Info. and Avg. Values of Variables</i>				
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***
<i>B. Average Values of Other FSC Variables</i>				
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
<i>C. Avg. Values of Other Pru. Gov. Variables</i>				
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 LTVs	0.15	0.23	0.12	0.15
Early FSR	0.77	0.69	0.88	0.92
<i>D. Avg. Values of Other Gov. Variables</i>				
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
<i>E. Avg. Values of Economy Variables</i>				
Log GDP (2007)	26.72	26.60	26.11	26.63
Per capita GDP (2007)	36.2**	22.3**	20.8**	39.1**
Private Credit-to-GDP (2007)	106.14	82.63	89.36	114.24
Number of Crises	0.92	1.31	1.12	1.15
Financial Development Index	0.70	0.56	0.54	0.69
Financial Institutions Development Index	0.71	0.57	0.61	0.75
Financial Markets Development Index	0.67	0.53	0.46	0.61
Peak Non-performing Loans in Crisis	0.03	0.03	0.04	0.08
Fiscal Cost-to-GDP of Crisis	0.03*	0.01*	0.04*	0.06*

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.

As a rough cross-check on this categorization of *FSC strongest* and *FSC weakest* countries, we compare our categorizations based on cluster analysis to assessments from the IMF's Financial Stability Assessment Programs (FSAP) in cases where we are able to match countries.¹² To be sure, our approach to categorizing the strength of countries' FSCs based on cluster analysis differs from a more qualitative approach that the IMF uses for their assessments, but it could still be informative to make comparisons. To do so, we look at the set of 29 countries that the IMF has identified as having "significant financial sectors" and, as such, warrant an FSAP every five years. Exactly eight countries in this set are in our *FSC strongest* group of countries and another eight are in our *FSC weakest* group.

In general, our characterizations of the eight matched weakest FSCs are very consistent with the IMF FSAP evaluations. This alignment largely arises from the simple fact that one of our factors common to *FSC weakest* is that the arrangements are not formal, and essentially all of the FSAP reports emphasize that formalizing the FSC and giving it a mandate would improve macroprudential governance.¹³ The alignment between our characterization of the eight matched strongest FSCs and the IMF FSAP evaluations is

¹²Given the large number of IMF FSAP reports that we consider in making our comparisons, we have not included IMF FSAP reports in our list of references. FSAP reports can be found at the following link: <https://www.imf.org/en/Publications/fssa?sortBy=CountryName#PublicationSearchListByType>. The specific countries for which we review FSAP reports are listed in subsequent footnotes.

¹³The eight countries in our *FSC weakest* group that undergo IMF FSAPs every five years are Brazil, Canada, Ireland, Italy, Japan, Korea, Norway, and Switzerland. For Brazil, Canada, Italy, Japan, Korea, and Switzerland, IMF FSAP reports state that formal FSCs with a mandate could improve a country's macroprudential governance structure. In the case of Norway, although it does not have a formal FSC, its ministry of finance has been made the single macroprudential authority, and the chair of the FSC and the FSAP report views this structure as having worked well. That said, the IMF does consider that Norway's institutional framework could be strengthened. We were unable to consider how well aligned our categorization of Ireland's FSC was with the IMF FSAP, since its most recent FSAP was 2016 but its FSC was formed in 2017.

more mixed because once the basic features of good governance are in place, the IMF will provide more nuanced assessments than can be done in our cluster analysis. For example, the FSAPs comment on voting procedures (Denmark and Luxembourg), rather than whether or not the FSC votes, and on the quality of engagement and roles of different members (Poland and Australia) rather than if there is a formal committee or chair.¹⁴ To illustrate further the nuances, for the United States, the FSAP notes the FSC has direct powers and is effective as a coordination mechanism, but may not be strong enough for the complexity of its financial system. All that being said, we believe that the IMF FSAPs would view the eight FSCs in our strongest group as clearly stronger than the eight FSCs in our weakest group.

4.2 *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). Information on agencies' roles in setting the CCyB are reported in panel B of Table 1, while information on the agency that is a country's microprudential regulatory authority is reported in panel C.

¹⁴The eight countries in our *FSC strongest* group that undergo IMF FSAPs every five years are Austria, Denmark, France, Germany, Luxembourg, Poland, the United Kingdom, and the United States. For France, Germany, and the United Kingdom, FSAP reports are largely in agreement with our assessment that these countries have strong FSCs. For Denmark and Luxembourg, FSAP reports raise concerns that these two countries' FSC decisions require votes to be unanimous, since they view that this could lead to inaction bias. The FSAP for Austria suggests that its FSC could be strengthened if the central bank, not the ministry of finance, were chair. The FSAP for Poland suggests that its FSC requires a stronger commitment from its member agencies to bring relevant developments to the FSC for its consideration. For the United States, the FSAP report describes the FSC as "an effective mechanism for coordination across all financial sector agencies" and notes its "power to designate activities and entities as systemically important and recommend heightened prudential standards as it deems appropriate." Nonetheless the FSAP expresses concern that the FSC may not be sufficiently strong relative to the complexity of the U.S. financial system and its many financial regulators.

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 (wherever it is also the prudential regulator), which we denote by *CB sets CCyB* in our regressions, and the independent prudential regulator (PR) sets it in 15 countries, which we denote 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*.¹⁵

Details of the governance structures for the 15 countries that made decisions to raise the CCyB are reported in Table 2. There is wide variation in authorities of the FSC or the central bank in the countries that have turned on the CCyB. The group includes countries with and without FSCs and with *FSC strongest* and *FSC weakest*.

5. Decision to Use the CCyB: Empirical Specifications and Results

5.1 Benchmark Empirical Specification

To evaluate the decision to use the CCyB, we use a pooled cross-section data set for 54 of the countries in our full data set.¹⁶ A country-year observation is 1 if the CCyB is greater than zero.

¹⁵The appendix 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.

¹⁶Chile, 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.

Decision CCyB_{i,t} = 1 if CCyB_{i,t} > 0 for country *i* in any year *t* from 2015 to 2019.

Decision CCyB_{i,t} = 0 if CCyB_{i,t} = 0 in any year and country has a framework to implement.

We model the decision with a random-effects binomial logit model:

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

where $X_{i,t-1}$ are financial and economic variables that vary over the credit or business cycle for country *i* in year $t - 1$, Z_i are other country *i* characteristics, and $\varepsilon_{CCyB,it}$ is the equation error term. We consider a wide range of economic cycle, 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 in our benchmark analysis we look only at whether it is above zero 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 United Kingdom, no country over the pre-COVID time period that we focus on in our analysis had lowered its CCyB, reflecting the fact that in the years in our sample, countries were still in the

Table 3. Regression and Cluster Analysis Variables

		Mean	Std. Dev.	10 th Pctl.	90 th Pctl.
<i>A. FSC Macropprudential Governance Variables</i>					
FSC Exists	Collected in our data set 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 data set 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 data set 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 data set and equal to 1 if the MF is chair of the FSC and 0 if not.	0.41	0.5	0	1
<i>B. CB and PR Governance Variables</i>					
CB is a PR	Collected in our data set 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 data set 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 data set 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 data set and equal to 1 if the PR sets the CCyB and 0 if not.	0.26	0.44	0	1
<i>C. Macroeconomic and Financial Variables</i>					
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

(continued)

Table 3. (Continued)

		Mean	Std. Dev.	10 th Pctl.	90 th Pctl.
D. Other Financial and Country Governance Variables					
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 non-performing 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
Strict Microprudential Capital Regime	Collected in our data set and described in Section 5.	1.34	0.86	0	2
Financial Development Index	Measured by Sviryzdenka (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
Financial Market Development Index	Measured by Sviryzdenka (2016) in IMF WP 16/5. See above.	0.55	0.26	0.19	0.86
Financial Institution Development Index	Measured by Sviryzdenka (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, Masciandaro, and Tabellini (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, Masciandaro, and Tabellini (1991) and updated by Amone and Romelli (2013) and based on linkages between the CB and government in terms of credit provision by the CB to the government. The CB being a PR is dropped from the measure.	0.78	0.18	0.38	1
Rule of Law	Measured by the World Bank and now the Inter-American Development Bank (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

expansionary phase of the business cycle. In the case of the United Kingdom, 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. However, the FPC then lowered it quickly after the vote for Brexit to help prevent the amplification of heightened volatility in a few financial markets. For our estimations, we drop the United Kingdom’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 later in mid-2017.

For governance variables G_i , we include FSC clusters and other regulatory structures to evaluate the effects of governance arrangements, and if they shed light on either symbolic political or functional delegation as motivations for FSCs. 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 decisionmaking. Most FSCs have either three or four member agencies, but the range is from two to nine. While having more agencies could improve communication, it could also hinder coordination and reduce efficient decisionmaking.

Thus, to interpret the effect of FSCs, we want to consider the joint effect of *FSC exists* and *No. of FSC agencies*.¹⁷ 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*

¹⁷In 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.

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 as follows:

- Functional delegation would be supported by the 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* ≤ 0 or:
 - coefficient on *FSC strongest* ≤ 0 , or
 - coefficient on *FSC weakest* ≥ 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 .

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 GFC for each country. According to the criteria in Laeven and Valencia (2018), 38 percent of the countries in our data set had a banking crisis that started in 2007 or 2008. The severity of the crisis can be measured by the GFC's fiscal costs-to-GDP ratio related to bank restructuring or by its peak bank non-performing loan ratio. Countries that had a banking crisis and higher costs may

be more determined in their use of macroprudential bank capital policies.

Another country characteristic that we consider is the strictness of its microprudential capital regime. Microprudential and macroprudential capital regimes address different risks, but both use the quantity and quality of capital at banks. To the extent that capital serves dual purposes, the strictness of a country's microprudential capital regime could influence its decision to activate the CCyB. Our measure of the strictness of the microprudential capital regime is the sum of three indicator variables. These variables are whether the country implemented (that is, finalized the regulation for) the Basel III CCoB before the median completion year of 2014 in our sample; whether a country began the phase-in of the CCoB before the median start year of 2016 in our sample; and whether a country's minimum capital surcharge for global or domestic SIBs is greater than 1 percent. This strictness variable should be related to the aggressiveness of prudential bank regulators to implement a stricter capital regime.

We also consider some additional country-level control variables in some of our specifications. Two indicators of financial development, an index for financial markets and an index for financial institutions, reflect differences across countries in terms of significance of non-bank market-intermediated finance (as measured by Svirydenka 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 that we consider include central bank political independence and central bank operational independence (see Grilli, Masciandaro, and Tabellini 1991 and Amone and Romelli 2013), and measures of rule of law and checks and balances, both from the World Bank.

5.2 *Benchmark Results*

Regression results for decisions to use the CCyB based on FSC clusters are shown in Table 4A, decisions based on direct authorities are shown in Table 4B, and marginal effects for key regressions and variables are shown in Table 5. The first result to highlight is that the coefficients on credit growth for the past year and in the prior year

Table 4B. Decision to Use CCyB, Based on Direct Authorities

	Dependent Variable: Decision to Use CCyB					
	(7)	(8)	(9)	(10)	(11)	(12)
Credit Growth(t-1)	50.76*** (2.65)	51.73*** (3.00)	52.58*** (3.20)	38.21*** (2.80)	39.30* (1.96)	38.95** (2.50)
Credit Growth(t-2)	32.04** (2.13)	31.33** (2.28)	32.14** (2.10)	26.53** (2.12)	27.14* (1.72)	25.23* (1.91)
Real GDP Growth(t-1)	43.66 (1.43)	47.58* (1.71)	46.95 (1.52)	27.99 (1.03)	29.19 (0.89)	28.99 (1.04)
CPI Inflation(t-1)	88.03*** (2.74)	94.18*** (3.47)	95.46*** (3.19)	56.87** (2.35)	59.36* (1.69)	60.79** (2.24)
Crisis Fiscal Cost-to-GDP	35.50** (2.05)	41.36** (2.46)	35.16** (2.00)	35.44* (1.94)	37.58 (1.39)	41.64* (1.95)
Strict Micropru. Regime	-3.107 (-1.21)	-3.107 (-1.21)	-4.679** (-2.39)	-2.071 (-1.52)	-2.214 (-1.57)	
FSC Exists	1.249 (0.25)	2.914 (0.57)	-1.088 (0.22)			
No. of FSC Agencies	-3.113** (-2.11)	-3.453** (-2.27)	-3.137** (-2.24)			
FSC or MF Sets CCyB	11.40** (2.19)	13.55*** (4.08)	8.244* (1.70)	7.888** (2.01)		
FSC Advises on CCyB	3.984 (1.04)	4.135 (1.33)	5.277 (1.09)	1.451 (0.40)		
CB Sets CCyB			-1.937 (0.71)	-0.719 (0.26)	-9.737** (-2.08)	-9.553** (-2.09)
CB Advises on CCyB			(-0.51)	1.632 (0.37)	0.907 (0.20)	-0.277 (-0.05)
PR Sets CCyB			8.911 (1.48)		-8.247 (-1.62)	-9.201** (-1.99)
Constant	-6.522 (-1.06)	-11.48*** (-2.97)	-2.967 (-0.60)	-12.42** (-2.38)	-3.776 (-0.74)	-6.578 (-1.39)
Observations	270	270	270	270	270	270
Country Groups	54	54	54	54	54	54
Log-Likelihood	-58.57	-59.35	-58.14	-61.16	-61.15	-61.82

Note: 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 statistical significance is denoted by * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5. Probabilities of Using CCyB by Governance Structure and Higher Credit Growth

	Pr (CCyB) = 1	Pr (CCyB) = 1 (with credit growth(t-1) and credit growth(t-2) at its mean + 1 s.d.)
<i>A. Equation (4) for FSC Strongest^a</i>		
Strongest FSC Cluster		
No. of FSC Agencies = 5	0.20*** (.05)	0.50*** (.02)
Not Strongest FSC Cluster	0.14 (.09)	0.22** (.10)
No. of FSC Agencies = 5	0.12 (.10)	0.19*** (.03)
FSC Does Not Exist	0.03*** (.00)	0.13 (.10)
	0.18*** (.01)	0.45*** (.13)
<i>B. Equation (7) for FSC and MF (Government)^a</i>		
FSC or MF Sets CCyB (or FSC Advises)	0.51*** (.06)	0.81*** (.06)
FSC or MF Does Not Set CCyB (nor FSC Advises)	0.05 (.05)	0.19*** (.03)
<i>C. Equation (11) by PR or CB</i>		
PR Sets CCyB	0.14* (.08)	0.24** (.12)
Either CB Sets CCyB or CB Advises on CCyB	0.12 (.18)	0.19*** (.03)
Neither PR nor CB Set the CcyB nor CB Advises on CCyB	0.44** (.16)	0.61*** (.25)
^a FSC exists, except where noted. Note: This table presents estimated probabilities for use of CCyB based on specifications in columns 4, 7, and 11 from Tables 4A and 4B, to evaluate the effects of <i>FSC strongest</i> , <i>FSC or MF Sets CCyB</i> , and <i>PR Sets CCyB or CB Sets CCyB</i> , respectively. Independent variables are set at their means unless specified otherwise; the independent variables are presented in Table 3. Standard errors are in parentheses, and statistical significance is denoted by * <i>p</i> < 0.1, ** <i>p</i> < 0.05, *** <i>p</i> < 0.01.		

are almost always positive and significant (all columns of Tables 4A and 4B), suggesting that the use of CCyB is consistent with reducing systemic risks.

We also 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 measure was less than 2 percent, the threshold suggested by the BCBS for activation, and indeed was often negative. Specifically, the average credit-to-GDP gap for countries with *Decision CCyB* = 1 was -7.9 percent, even lower than the average of -6.3 percent for countries with *Decision CCyB* = 0. We believe that current gap measures have not been helpful in identifying episodes of credit excess in the post-GFC period since the run-up to the GFC has made an estimate of a sustainable trend highly uncertain. Specifically, 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 in recent years despite large 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 real GDP growth is rarely statistically 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 GFC and had higher fiscal costs-to-GDP for bank restructuring are also more likely to use the CCyB. Because the variables fiscal costs-to-GDP and peak bank non-performing loan ratio are highly correlated, and results are similar for each, we report results only for fiscal costs in the regressions. In addition, countries that have stricter of microprudential capital regimes are less likely to use the CCyB, though this finding is statistically significant in only one of our specifications.

For asset prices, we tried equity returns, but generally returns in the previous two years are not statistically 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 the 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. The coefficient on *FSC strongest* is positive and significant (columns 3 and 4 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, the coefficient on *FSC weakest*, the cluster with no tools and only weak mechanisms to facilitate decisionmaking, is negative and significant (column 5 of Table 4A). This result is in contrast to the positive coefficient on *FSC strongest* (columns 3 and 4), 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 6), the coefficient on *FSC weakest* becomes insignificant but the coefficient on *FSC strongest* remains positive and significant.

The variables *FSC exists* and *No. of FSC agencies* are included in all of the regressions shown in columns 3 to 6 of Table 4A. The coefficients on *FSC exists* are positive but almost always insignificant and the coefficients on *No. of FSC agencies* are negative and significant. As described above, we need to consider the net effect of these two variables for interpreting whether FSCs are more consistent with functional delegation rather than symbolic political delegation. 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. 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 system and a preference to not use the CCyB because it might not reduce systemic risks if higher capital leads to more activities moving away from banks to non-banks. To test this alternative explanation, we include an index for the financial development of markets, but it has an insignificant coefficient, 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 4 of Table 4A. The coefficient on *FSC strongest* implies that the probability of the CCyB being greater than zero is 20 percent when all other variables are at their means, and the estimate is statistically significant. In contrast, based on the same type of calculation, the probability of the CCyB being above zero when the FSC cluster is not the strongest is lower, 12 percent, and the estimate is not statistically significant. These probabilities are in line with strong FSCs being formed to play more than merely a symbolic role for macroprudential policies.

In addition, countries with larger FSCs are less likely to use the CCyB than countries with larger FSCs, consistent with fewer coordination problems. In particular, the probability when there are five agencies for *FSC strongest* is 14 percent, though not statistically significant, and only 3 percent for when the FSC cluster is not strongest. Both are considerably lower than when evaluated at their average of 3.4 members.

An additional important distinction between *FSC strongest* and other FSCs is evident when we look at the effects of higher credit growth on the probability of using the CCyB. Table 5 also shows, for the various governance arrangements, the probability of using the CCyB with a higher rate of credit growth of one standard deviation above its mean in both the last year (that is, $t - 1$) and the year before ($t - 2$).¹⁸ In particular, when credit growth is one standard deviation higher, the probability of the CCyB being activated is 50 percent. When *FSC* is not strongest, the probability of CCyB being activated is only 19 percent, much lower than for *FSC strongest* with higher credit growth.

Turning from FSC-cluster variables to direct authorities to set the CCyB, the coefficient on *FSC or MF sets CCyB* is positive and

¹⁸These probability estimates are calculated based on the specifications in Tables 4A and 4B. We also estimated the equations with interaction terms for the FSC governance variables and credit growth to allow the effects of credit growth to vary with the FSC governance. But none of the interaction effects were not significant, suggesting the marginal effects of higher credit growth can be evaluated using the specification without interactions.

significant (column 7 of Table 4B), indicating a higher probability relative to the omitted categories of when either the *CB sets CCyB* or *PR sets CCyB*. In addition, 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 9 and 10). Excluding *FSC or MF sets CCyB* and including both *CB sets CCyB* and *PR sets CCyB* (columns 11 and 12) 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.

As we did for FSC related variables, we report in Table 5 the probability of using the CCyB based on direct authorities. The estimates from Equation (7) of Table 4B suggest that when the *FSC or MF sets CCyB* and when the *FSC advises on CCyB*, there is a high probability, 51 percent, of the CCyB being activated. This probability is notably higher than it is for *FSC strongest*.

Probability estimates based on coefficients from Equation (11) of Table 4B 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 14 percent, similar to when the *CB sets CCyB* or *CB advises on CCyB*. Both probabilities are lower than the probability when neither the prudential regulator nor the central bank sets it. In that case, the estimates indicate that the probability of the CCyB being activated is 44 percent.

In addition, the probability of using the CCyB is quite sizable for when the *FSC or MF sets CCyB* and when credit growth is higher. Specifically, the probability of using the CCyB is 81 percent when the *FSC or MF sets CCyB* and credit growth is one standard deviation above its mean in both the last year and the year before based on Equation (7), and is 61 percent when neither the prudential regulator or central bank sets it based on Equation (11) of Table 4B. But for *CB sets CCyB* and *PR sets CCyB* (considered by Equation (11)), the probabilities when recent credit growth has not been as large, is around 12 to 14 percent.

Overall, the probability of the CCyB being activated is much higher in countries where an FSC or MF (or government more

generally) has the direct authority to set the CCyB than in countries where the FSC is in *FSC strongest* cluster, and also in countries where either the existing regulator (central bank or prudential regulator) sets the CCyB. The differences may reflect two factors. First, there could be a greater willingness to use the CCyB when it is delegated specifically (it is a hard tool) rather than when it is a semi-hard, indirect tool such as comply or explain, which involves publicly advising a member agency to take an action. Second, the difference could arise because when an FSC or government agency is given a new responsibility for setting the CCyB, they likely put in place new processes 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.

As a robustness exercise, we reestimate all the panel logit specifications that we report in Tables 4A and 4B as panel probit specifications (not shown). As is to be expected (and as discussed by Amemiya 1981 and cited by Hsiao 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. Additionally, for robustness purposes, we report logit estimations for a single year, 2019, to alleviate possible concerns that standard errors are underestimated for the governance variables in the panel estimations, 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 MF 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 is not misleading.¹⁹

¹⁹The average probability of using the CCyB derived from the cross-section equations are similar, though higher, than those from the estimations using the panel data set, 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.

Table 6. Robustness: Logit Model of Decision to Use CCyB in 2019 Only

	Dependent Variable: Decision CCyB = 1 in 2019		
	(1)	(2)	(3)
Credit Growth(t-1)	15.87** (2.06)	17.33** (2.11)	12.84** (1.84)
Credit Growth(t-2)	18.50** (2.08)	19.71** (2.06)	11.76 (1.53)
Crisis Fiscal Cost-to-GDP	8.62 (1.42)	10.15 (1.50)	10.73* (1.84)
FSC Exists	0.46 (0.03)	-0.25 (-1.18)	
No. of FSC Agencies	-0.50 (-1.38)	-0.44 (-1.20)	
FSC Strongest	1.34* (1.66)		
FSC or MF Sets CCyB		2.54** (2.32)	
FSC Advises on CCyB		0.81 (0.83)	
CB Sets CCyB			-2.21* (-1.72)
CB Advises on CCyB			-0.50 (-0.32)
PR Sets CCyB			-2.27* (-1.70)
Constant	-0.15 (-1.13)	0.22 (0.02)	-0.19 (-0.01)
Observations	54	54	54
Pseudo R^2	0.269	0.325	0.228
Log-Likelihood	-23.34	-21.54	-24.64
Note: This table presents cross-sectional results of financial and governance variables on whether a country had activated its CCyB in 2019. The dependent variable is a dummy for the 15 countries where the CCyB is above zero in 2019, and 39 where the CCyB is at zero in 2019. The independent variables are presented in Table 3. The t-values are in parentheses, and statistical significance is denoted by * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.			

As part of our robustness analysis, we also look at the size of the CCyB rather than just whether it was above zero. We estimate a panel tobit model, where our dependent variable is the highest level

of the CCyB in the year. The dependent variable for this regression is continuous, but it is censored from below at 0 percent (the minimum possible level for the CCyB) and censored from above at 2.5 percent (the maximum level). In general, we find the coefficients for the governance variables related to direct authorities to set the CCyB, *FSC* or *MF sets CCyB*, have largely the same significance as in their binomial logit counterparts, but the FSC governance variables, *FSC strongest* and *FSC weakest* become insignificant, indicating less ability of general governance measures to distinguish sharply between lower and higher non-zero settings. We would note that with only 43 observations set above zero, we may have too few observations to reliably estimate relationships between specific settings for the CCyB and our explanatory variables.²⁰

We cannot determine whether countries' CCyB actions are the right ones for them to have taken, given that our empirical models that link CCyB decisions to economic, financial, and governance variables reflect actual and not necessarily optimal policy responses. That said, by looking at the fitted model-predicted probabilities implied by country and financial characteristics, we do not find evidence consistent with broad relative underutilization in 2019. In particular, we find for the 39 countries that had not turned on the CCyB a median fitted probability of 0.12, with a 10th to 90th percentile range of 0.005 to 0.42. Of these countries, only three countries had a fitted probability of above 0.50, suggestive of underutilization for three countries. This distribution of fitted probabilities is significantly lower than the distribution for the 15 countries that had turned on the CCyB, with a median of 0.42, and a 10th to 90th percentile range of 0.15 to 0.89.

For comparison, the IMF Global Financial Stability Report (October 2019) has argued that for their analysis of 29 countries (which are those identified as having significant financial sectors), the CCyB should have been used more, based on non-financial credit

²⁰We also estimate as panel ordered logits, with 0 denoting the CCyB being set at zero, 1 being set at its first non-zero level, and 2 being set at its second or subsequent CCyB level. We find, similar to results for the panel tobit estimations, the direct authority measures are significant in some specifications, but the FSC governance measures lose significance.

measures alone. They graph a positive relationship between a summary index of non-financial business and household credit vulnerabilities and the level of the CCyB, and show that a number of countries in the two highest quintiles for this index did not have a positive level for the CCyB. Their analysis, however, does not control for any other variables, which we do with variables such as GDP growth, inflation, and the cost of previous financial crises. In addition, Aikman et al. (2020) evaluate the level of the CCyB in 15 countries based on a summary measure of risks to GDP growth from financial vulnerabilities; that is, a measure of “GDP-at-risk” (see Adrian, Boyarchenko, and Giannone 2019 and Adrian et al. 2022). They characterize three countries as activists and three as laggards based on outliers from a regression of CCyB on GDP-at-risk. However, they classify other types of capital buffers as the Basel III CCyB for two countries (Canada and Switzerland), which we do not, and these observations have a significant effect on their estimated regression line. It is difficult to compare their results with ours because of their small sample, a lack of a uniform definition of CCyB, and a different sample period.

5.3 *Bivariate Empirical Specification and Results*

We take two approaches to address the concern that the estimated effects of the governance variables may reflect a common underlying factor determining the decision to use the CCyB and to create a stronger governance structure for financial stability. First, in regressions reported in Tables 4A and 4B, we have already tried to control for this potential effect by including either the fiscal cost-to-GDP ratio or the peak bank non-performing loan ratio during the GFC. The basis for including these variables is that a country having experienced a more severe crisis during the GFC might be more likely to both have a strong FSC and be more willing to activate its CCyB sooner. Second, in this section, we use an additional modeling specification, a bivariate recursive probit model as described by Maddala (1983) and Greene (1998, 2018). This bivariate probit specification models the decision to use the CCyB on governance features and other country variables, as in Tables 4A and 4B, and also models the governance features on various country characteristics, but not on *Decision CCyB*.

The model is a cross-section model and is specified as

$$\begin{aligned}
 & Prob(Decision\ CCyB_i) \\
 &= \frac{1}{1 + \exp[-(a + b \cdot X_i + f \cdot FSC\ governance_i + c \cdot G_i + d \cdot Z_i + \varepsilon_{CCyB,i})]} \\
 Prob(CCyB\ governance_i) &= \frac{1}{1 + \exp[-(k + l \cdot G_i + m \cdot Z_i + \varepsilon_{gov,i})]},
 \end{aligned}$$

where X_i , Z_i , and G_i are as described earlier, and $\varepsilon_{CCyB,i}$ and $\varepsilon_{gov,i}$ are equation error terms that have bivariate standard normal distributions with correlation ζ . To explain *CCyB governance*, either *FSC strongest* or *FSC or MF sets CCyB*, we include the variables of fiscal cost-to-GDP, rule of law, per capita GDP, whether the *CB is a PR*, the strictness of the prudential regulatory regime, and an index of financial market development.

The results for bivariate probit models and its single-equation probit counterpart are shown in Table 7. They are estimated for the cross-section of 54 countries in 2019 only, since the governance variables for our sample are constant over the period when CCyB decisions were made. Bivariate probit estimates indicate that the significance of the governance variables, *FSC Strongest* and *FSC or MF sets CCyB*, is greater when estimated as part of a system that also considers the governance structure. In particular, coefficients on *FSC strongest* and *FSC or MF sets CCyB* (panel A, columns 1 and 3) are larger and more statistically significant than results from the single-equation probit (columns 2 and 4). In addition, the coefficients on credit growth are positive and significant, consistent with earlier results.

To explain the governance variables in the bivariate probit, per capita GDP appears to be a determinant of both *FSC strongest* and *FSC or MF sets CCyB = 1* (panel B). No other variables we tried, including fiscal cost-to-GDP (or alternatively peak non-performing loans, not shown) help to explain *FSC strongest*. But a few variables help to explain *FSC or MF sets CCyB*. In particular, countries with more dominant financial-market-based systems and for which the central bank is not a prudential regulator are more likely to have given the FSC or MF (government) direct authority to set the

Table 7. Bivariate Probit and Probit to Use CCyB in 2019

A. Decision CCyB = 1 in 2019				
	Bivariate Probit	Single-Equation Probit	Bivariate Probit	Single-Equation Probit
FSC Strongest	2.17*** (6.15)	0.77 (1.52)		
FSC or MF Sets CCyB			2.73*** (6.01)	1.51** (2.39)
Credit Growth(t-1)	7.43* (1.84)	9.29** (2.05)	10.06** (2.14)	10.36** (2.14)
Credit Growth(t-2)	8.34* (1.81)	10.68** (2.07)	10.60** (1.97)	11.61** (2.07)
Fiscal Cost-to-GDP	1.65 (0.71)	4.97 (1.38)	6.09** (1.99)	5.95* (1.73)
Strict Micropru. Regime	-.30 (-1.16)	-.35 (-1.29)	-.57** (-2.05)	-.51* (-1.76)
FSC Exists	-.24 (-0.37)	.09 (0.12)	-.38 (-0.58)	-.14 (-0.18)
No. of Agencies on FSC	-.15 (-0.90)	-.31 (-1.44)	-.15 (-0.83)	-.27 (-1.20)
Constant	-.43 (-0.76)	-.09 (-0.13)	.16 (-0.27)	.02 (0.04)
B. FSC Strongest = 1 or FSC or MF Sets CCyB = 1				
	FSC Strongest = 1		FSC or MF Sets CCyB = 1	
Per Capita GDP	.002* (1.66)		.003** (2.10)	
CB as PR	.19 (0.73)		-.94* (-1.67)	
Strict Micropru. Regime	-.18 (-0.58)		-.48 (-0.47)	
Financial Market Dev.	-.89 (-1.00)		1.35 (0.83)	
Fiscal Cost-to-GDP	.91 (-.42)		-1.51 (-0.50)	
Rule of Law	.41 (1.14)		.16 (-.30)	
Constant	-1.10** (-2.28)		-2.31** (-3.27)	
Observations	54	54	54	54
Pseudo R2		.27		.33
Log-Likelihood	-46.92		-33.38	
Note: This table presents cross-sectional results of whether a country used its CCyB in 2019 based on financial and governance variables from a single-equation probit and a bivariate probit model. The dependent variable for the probit is a dummy on whether a country's CCyB is above zero or at zero, conditional on a framework for implementing CCyB. The dependent variable for the bivariate probit is either FSC Strongest or FSC or MR Sets CCyB. The independent variables are presented in Table 3. Statistical significance is denoted by * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.				

CCyB. These results suggest that the findings for the effect of governance on using the CCyB are not driven by a common underlying factor.

6. Conclusion

This paper is the first, to our knowledge, to study the effects of new institutional arrangements for macroprudential policy on the use of Basel III countercyclical capital buffers. We use a sample with the entirety of decisions to increase the CCyB since it was formally phased in beginning in 2016. The paper presents empirical evidence that the probability of using the CCyB increases with stronger governance and with 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 tools and good governance characteristics—have a higher probability of activating the CCyB than countries with FSCs in the weakest cluster. 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 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 recursive probit estimations, and find the effects of the governance variables remain significant and even strengthened.

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 analytical and

decision 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.

In addition, we do not find that central banks with direct powers are more likely than independent bank regulators to use the CCyB, 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 it being the prudential regulator.

Our findings have implications for two research areas related to governance for macroprudential policy. First, only a small share 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 decisionmaking. 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 stronger FSCs or ministries of finance, this paper strongly suggests that establishing accountability matters for decisionmaking.

Appendix. FSC and Central Bank Formal Advisory Roles

**Table A.1. Formal Advisory Roles for the
FSC and CB for Setting the CCyB**

	Sets the CCyB	FSC Role in Setting the CCyB	CB Role Setting 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).

(continued)

Table A.1. (Continued)

	Sets the CCyB	FSC Role in Setting the CCyB	CB Role Setting the CCyB
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.
United Kingdom	FSC	NA	CB prepares analysis for FSC but does not make a recommendation.

Source: BCBS website (<https://www.bis.org/bcbs/CCyB/>); ESRB website (<https://www.esrb.europa.eu/national.policy/ccb/html/index.en.html>); and websites of the agencies that set the CCyB.

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