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Financial Stability Governance and Central Bank Communications*

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Abstract

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JEL Classification: G15, G28.
Keywords: Financial Stability Governance, Natural Language Processing, Central Bank Communications, Financial Cycle.

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Abstract

We investigate how central banks' governance frameworks influence their financial stability communication strategies and assess the effectiveness of these strategies in preventing a worsening of financial cycle conditions. We develop a simple conceptual framework of how central banks communicate about financial stability and how communication shapes the evolution of the financial cycle. We apply our framework using data on the governance characteristics of 24 central banks and the sentiment conveyed in their financial stability reports. We find robust evidence that communications by central banks participating in interagency financial stability committees more effectively mitigate a deterioration in financial conditions and advert a potential financial crisis. After observing a deterioration in conditions, such central banks also transmit a calmer message, given observed financial conditions and general news sentiment, suggesting that the ability to use policy tools other than communications strengthens incentives not to just "cry wolf".

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1. Introduction

After the Global Financial Crisis of 2008 to 2009, many countries took steps to enhance the resilience of their financial system and prevent the buildup of vulnerabilities. Among these steps, countries strengthened their macroprudential regulatory frameworks. Many central banks also obtained a more explicit financial stability mandate and incorporated financial stability objectives in their decision-making process (see also Jeanneau, 2014). With these changes, financial stability monitoring has become an even more important task for central banks, and communications about financial stability have also become a tool to influence financial agents' behavior (see, for instance, Born et al., 2014). Although the literature on monetary policy communications is large (see, for instance, Blinder et al., 2008; Ericsson, 2016; and Stekler and Symington, 2016), central banks' financial stability communications have garnered less attention.[1] Moreover, the drivers and the effects of financial stability communications, including how such communications interact with financial stability (or macroprudential) governance and supervisory oversight frameworks, have largely remained unexplored in the literature.

In this paper, we study how differences in financial stability governance frameworks across countries relate to central banks' financial stability communication strategies and the relative effectiveness of these communications in preventing a deterioration in financial vulnerabilities. To understand how governance frameworks might interact with central banks' communication strategies, we first propose a simple conceptual framework. We start from the assumption that, from a financial stability perspective, the goal of a central bank is to minimize the occurrence of financial crises by using its full set of tools, of which we focus on the role of financial stability communications. The central bank's communication process is as follows. First, the central bank uses private and public information to form an assessment of current financial vulnerabilities and the way these vulnerabilities might evolve in

[1] Arseneau (2020) explores how central bank communications related to financial stability may be associated with the financial cycle from a theoretical perspective.

the future. Then, depending on the country's financial stability governance characteristics, including the central bank's role in the country's macroprudential governance, as well as its independence, transparency, and resources, the central bank decides both its communication strategy and whether to adjust its policy instruments, such as macroprudential measures or the monetary policy stance. Finally, financial vulnerabilities evolve depending on initial conditions and the central bank's communication strategies and policies. For simplicity, financial vulnerabilities can evolve only into two possible states, one of which implies a turning point in the financial cycle potentially related to the advent of a financial crisis.

With this framework in mind, we propose a set of testable hypotheses related to the interactions between financial stability communication and a country's macroprudential governance framework. To empirically test these hypotheses, we merge three databases. The first one details the macroprudential governance and supervisory oversight frameworks of 24 countries, including the role of the central bank (see Correa et al., 2019, and Edge and Liang, 2017). The second database uses text analysis techniques to determine the sentiment conveyed by communications used by central banks to transmit their assessment of financial vulnerabilities. In particular, we extend the database of financial stability sentiment (FSS) indexes constructed from financial stability reports (FSRs) by Correa, Garud, Londono, and Mislang (2021) (CGLM hereafter). The third one includes a set of country-specific measures of financial vulnerabilities, including the credit-to-GDP gap, the debt-service ratio, the growth in credit, and several asset valuation and other systemic risk measures.

We use panel-data and probit models to assess how cross-country differences in macroprudential governance and supervisory oversight frameworks affect central banks' communication strategies. We exploit the cross-country heterogeneity to investigate how the FSS conveyed by central banks' communications affects the evolution of financial cycle characteristics, our proxies for financial vulnerabilities, depending on four governance and supervisory oversight characteristics: (i) whether the central bank participates in an interagency financial stability committee, either *de facto* or *de jure*; (ii) whether the committee is *de jure*—that

is, implemented through a formal legal arrangement; (iii) whether the committee has the power to implement policy tools, including macroprudential instruments; and (iv) whether the central bank has supervisory oversight powers for banks domiciled in the country.

In the first set of empirical tests, we explore whether a country's financial stability governance framework matters for the effectiveness of central banks' financial stability communications. We find that the communication of those central banks participating in interagency financial stability committees is relatively more effective in limiting a deterioration of financial cycle characteristics than communication of other central banks. We also explore whether the effect of central banks' communications varies by governance characteristics around turning points in the financial cycle, where turning points are defined as local credit-to-GDP maximums followed by a decrease in the credit-to-GDP gap over at least the next four quarters. The evidence here suggests that central banks participating in interagency committees are more effective in limiting a buildup of financial vulnerabilities right before turning points, some of which are financial crises.

We next use a probit model to assess whether the predictive power of the FSS index for financial cycle turning points depends on the macroprudential governance framework. We find that for central banks *without* any of the four governance characteristics, a deterioration in the communicated sentiment helps predict turning points in the financial cycle—a 1 percent increase in the FSS index (that is, a deterioration in sentiment) of these central banks is associated with a 0.21 to 0.26 percent higher probability of a turning point. In other words, those central banks often"cry wolf" and the "wolf actually comes." However, communication by central banks participating in a committee with the ability to implement macroprudential tools is effective at reducing the probability of a turning point in the financial cycle. These central banks signal financial stability risks and act in accordance.

In the second set of the empirical tests, we investigate the drivers of the relative effectiveness of communications by exploring whether governance frameworks matter for how central banks incorporate information in their financial stability communications. Our framework

suggests that some central banks could strategically deviate from the publicly available information when communicating through FSRs. We test for this deviation by exploring the dynamic relation between the sentiment in financial stability reports and that in news articles. We calculate an index of sentiment based on news articles related to financial stability, which we name NS. Although the NS and FSS indexes are highly correlated, we find that after a deterioration in the sentiment conveyed by news articles, central banks participating in financial stability committees transmit a calmer message in their FSRs than central banks not participating in these committees—that is, after observing a deterioration in financial conditions, a central bank participating in a financial stability committee transmits a calmer message than central banks without this characteristic.

The finding for the differences between the FSS and NS indexes might reflect that a central bank having at its disposal other policy instruments acts accordingly or is able to influence other agencies to use such policy instruments. To further explore this possibility, we assess whether the FSS index is associated with either changes in macroprudential policies (Cerutti, Correa, Fiorentino, and Segalla, 2016) or the monetary policy rate. We expect the communication of a central bank that can influence, directly or indirectly, macroprudential actions to be positively correlated with such actions. Consistent with this intuition, we find that a deterioration in sentiment conveyed by central banks participating in interagency financial stability committees with authority for macroprudential or related policy instruments is followed by a tightening of these instruments.

Sentiment in FSRs also relates to monetary policy rates, which central banks control, depending on governance characteristics. In particular, we document that a deterioration in sentiment is followed by lower interest rates, but only for those central banks participating in interagency financial stability committees. Thus, even when monetary policy could be tightened in general to prevent a further expansion in the financial cycle, only central banks participating in committees seem to balance financial stability concerns and monetary policy objectives using this tool.

In terms of the literature, the paper combines two strands: one focusing on financial stability governance frameworks and one focusing on central bank communications. The literature on central banks' financial stability governance frameworks and the implementation of macroprudential policies has gained much interest after the Global Financial Crisis (see Edge and Liang, 2017; Masciandaro and Volpicella, 2016, and papers cited therein). The literature on central banks' communication strategies and their interactions with central banks' characteristics has focused mostly on the role of transparency for communicating monetary policy (see, for instance, Morris and Shin, 2002; Ehrmann and Fratzscher, 2007; Blinder et al., 2008; and Cukierman, 2009). Some recent studies have explored aspects of the sentiment conveyed in monetary policy communications—for example, how communications can spill over across countries (Armelius et al., 2018). We contribute to this literature by showing that governance frameworks also shape financial stability communication strategies and the effectiveness of these strategies to alleviate a deterioration in financial cycle conditions.

The specific literature on financial stability communications is still developing. To this date, it has been mostly descriptive (see, for instance, Allen et al., 2004; Cihak, 2006; and Cihak et al., 2012), and only a few papers have explored the effect of central banks' communications on financial cycle characteristics. Osterloo et al. (2011) explore the effect of the publication of FSRs on a number of business and financial cycle characteristics, while Harris et al. (2019) analyze the effects of the Bank of England's FSR publication on stock returns and CDS spreads. Born et al. (2014) and CGLM use text analysis techniques to proxy the sentiment conveyed by central banks' financial stability communications and to investigate the effect of sentiment on financial cycle characteristics.[2] CGLM show that their FSS index is a useful predictor of banking crises, as sentiment deteriorates just prior to the start of those events. This evidence suggests that financial stability communication

[2]Born et al. (2014) use Diction, a general-purpose text analysis dictionary, to extract the sentiment conveyed by these communications. CGLM construct a dictionary tailored to the financial stability context, as they find that a large portion of words in FSRs convey a different sentiment when used in a financial stability context.

alone is insufficient to avoid a deterioration in financial vulnerabilities.[3] Our novel evidence, however, suggests that financial stability communication can be more powerful in countries with robust financial stability governance frameworks.

Our work can help explain why central banks without a direct macroprudential or supervisory oversight role rely more on communication to transmit concerns about financial stability, as they may need it to signal to other agencies with supervisory oversight to act when financial vulnerabilities increase. Our empirical evidence also suggests that those central banks with access to more detailed information about the conditions of the financial system might transmit a calmer message that conveys the system's resilience following an adverse shock.

The rest of the paper is organized as follows. Section 2 develops a conceptual framework to understand the interaction between governance frameworks and central banks' communication strategies. Section 3 provides our empirical evidence regarding the role of governance frameworks in explaining the effectiveness of central banks' financial stability communications. Section 4 explores differences in communication strategies, including in relation to using financial cycle indicators, deviation from the sentiment in news articles, and implementation of macroprudential and monetary policy tools. Section 5 concludes.

2. Understanding central banks' communication strategies

In this section, we propose a simple conceptual framework to understand the interaction between countries' financial stability governance frameworks and their central banks' communication strategies. The framework motivates the hypotheses tested empirically in sections 3 and 4.

The proposed framework describes actions that take place over three periods and its main intuition is summarized in figure 1. In the first period, t, the central bank observes the

[3] An increasing number of studies use textual information to complement other indicators in models designed as early warning systems. For example, Huang et al. (2019) use the text from the Financial Times in a model to predict financial crises.

initial financial conditions, $FC_{i,t}$, forms its expectations about the evolution of the financial cycle, $E_t^{CB}(FC_{i,t+h})$, and decides its general communication strategy. In the second period, $t+l$, the central bank communicates its views about the current financial conditions and, potentially, about the evolution of the financial cycle, $FSS_{i,t+l}$ and $FSS_{i,t+h}$, respectively. Besides communicating about financial stability, the central bank might, in this period, use other policy tools, including monetary policy and macroprudential tools. In the final period, $t+h$, financial stability conditions evolve depending on initial financial stability conditions, the decisions made by the central bank, including financial stability communication, and other shocks to the financial cycle. For simplicity, we assume that only two states are possible in period $t+h$, a good state, which occurs with probability π, and a bad state (financial crisis or turning point in the cycle), which occurs with probability $1-\pi$. From a financial stability perspective, the goal of the central bank is to decide the mixture of tools and communications that minimizes the probability of the bad state. We now provide more details about the conceptual framework.

The financial and other information the central bank of country i observes in the first period, t, includes not only the information available to the public, I_t^{public}, but also information available exclusively to the central bank, $I_t^{private}$, such as information obtained directly from financial institutions for supervisory purposes. Based on the financial conditions observed, the central bank forms expectations about the evolution of the financial cycle. In particular, the central bank will determine its expectations about time $t+h$ (final) financial cycle conditions,

$$E_{i,t}^{CB}(FC_{i,t+h}) = F_i^{CB}(I_{i,t}^{public}, I_{i,t}^{private}, C_{i,t}),$$

where C_t is a set of characteristics of the country's central bank, including the financial stability governance framework in which it operates, its level of transparency and independence, its credibility, and its resources.

In the second period, the central bank uses its communication strategically to reveal

some of its assessment of current financial conditions and, potentially, of the evolution of the financial cycle. Its communication about both current and future financial conditions, $FSS_{i,t+l}$ and $FSS_{i,t+h}$, depend on the set of information available to the central bank and the central bank's characteristics,

$$FSS_{i,t+l} = F_i^{current}(I_{i,t}^{public}, I_{i,t}^{private}, C_{i,t}), \tag{1}$$

$$FSS_{i,t+h} = F_i^{future}(I_{i,t}^{public}, I_{i,t}^{private}, C_{i,t}). \tag{2}$$

These assessments become part of the information set available to the public at time l, I_{t+l}^{public}.

The central bank's public assessments, $FSS_{i,t+l}$ and $FSS_{i,t+h}$, however, might differ from $FC_{i,t}$ and $E_{i,t}^{CB}(FC_{i,t+h})$, respectively—that is, the central bank does not necessarily reveal (all) the private information it observes about current financial cycle conditions nor its (full) expectations about the evolution of the financial cycle, and it may reveal its private information in a (deliberately) biased manner. There are three main reasons why $FSS_{i,t+l} \neq FC_{i,t}$ and/or $FSS_{i,t+h} \neq E_{i,t}^{CB}(FC_{i,t+h})$. The first one is institutional: The central bank does not reveal (all) information transparently because it is not fully independent or has other limits on being fully transparent. For example, legally, it cannot reveal certain institution-specific information. The second one is strategic: The central bank questions the value of full transparency. For example, it may have private information that points to a deterioration in financial stability conditions beyond what the set of information available to the public suggests, but revealing this could simply accelerate or exacerbate the occurrence of the bad state—for instance, lead to a financial crisis (see Cukierman, 2009). The third reason is about coherence in communication given the other tools it has at its disposal and the confidence it has in them. For example, if the central bank believes it has the tools to prevent a financial crisis (or financial boom) and is willing to use the tools, it may decide to transmit a message of calm even in the face of a deterioration (loosening) in financial conditions. The first reason could make for a systematic bias or more noisy communication. The second reason would

create a specific asymmetry in that bad information is not revealed. The third reason could imply that the bank's communication affects its use of other tools and vice-versa.

The final financial cycle conditions, FC_{t+h}, are then a function of time-t conditions, the central bank communication strategy (FSS) and its policy actions (PA) at time $t+l$, its governance framework and other characteristics, and shocks to financial stability, $z_{i,t+h}$:

$$FC_{i,t+h} = F_i(I_{i,t}^{public}, I_{i,t}^{private}, FSS_{i,t+l}, PA_{i,t+l}, C_{i,t}) + z_{i,t+h}. \tag{3}$$

We assume that, in terms of financial stability—that is, setting aside its other mandates—the central bank's problem is to decide its communication strategy, which in our framework is represented by $FSS_{i,t+l}$ and $FSS_{i,t+h}$, such that it minimizes $1-\pi$, the probability of the bad state. Our simple framework then implies that the central bank's communication strategy, and the extent to which this strategy is effective at preventing the deterioration of financial cycle conditions will differ by a number of central bank characteristics, including the financial stability governance framework in which it operates.

In the following sections, we formulate a set of hypotheses based on the intuition from this framework and test them empirically. In section 3, we assess whether governance frameworks matter for the effectiveness of central banks' communications—that is, we empirically test equation (3). In section 4, we explore what determines the way that financial stability communications are adjusted and what influences relatively more effective communication strategies—that is, we empirically test equations (1) and (2).

3. The effectiveness of financial stability communications

In this section, we explore whether the effectiveness of central banks' communications depends on countries' financial stability governance frameworks. We first introduce the data and then identify which features of these governance frameworks make communication strategies relatively more (or less) effective in alleviating the deterioration of financial cycle characteristics and the risks of turning points in the financial cycle.

3.1. Data

We use a panel dataset consisting of quarterly data for 24 countries for the sample period between 2005 and 2019. Our dataset consists of three types of data: (i) an index of sentiment from FSRs (FSS index), (ii) a set of characteristics related to countries' financial stability governance frameworks, and (iii) a set of financial cycle indicators.

Financial stability sentiment. For each country, we characterize central banks' financial stability communications using the FSS index as developed in CGLM. For each FSR, the FSS index is calculated as follows:

$$FSS\ index_{country,period} = \frac{\#Negative\ words - \#Positive\ words}{\#Total\ words}, \tag{4}$$

where the negative or positive connotation of words is obtained from the financial stability dictionary proposed by these authors.[4] Although many central banks are publishing FSRs today, we restrict our sample to those central banks that have published at least one FSR annually since 2005. As pointed out by CGLM, working with this reduced sample has two main advantages. First, it allows to compare the indexes for a homogeneous period. Second, it increases the reliability of the empirical tests because most countries excluded from our sample began publishing FSRs only around the Global Financial Crisis.

Panel (a) of figure 2 shows the time series for the cross-country average of the demeaned FSS indexes. We use demeaned FSS indexes, calculated by removing the time-series average FSS, to facilitate the comparison across countries. Table 1 shows a set of summary statistics for the FSS indexes. The average FSS increases (that is, sentiment deteriorates) in several key episodes, such as the failure of Lehman Brothers in September of 2008, the approval of the second EU-IMF bailout for Greece in the first quarter of 2012, and the Brexit referendum in the summer of 2016. Around these episodes, FSS reached historical maximums for most countries in our sample.

[4]The dictionary created by Correa, Garud, Londono, and Mislang (2017) can be found in Juan M. Londono's website: https://juanmlondono.wordpress.com/.

Governance frameworks. Table 2 summarizes the governance framework characteristics for the central banks of the countries in our sample as of December of 2019. We center our attention on a subset of the characteristics reported in the financial stability governance framework database in Correa, Edge, and Liang (2019). We enhanced those entries by adding a time dimension, which captures changes in the status of a country's governance framework. These not mutually exclusive characteristics are whether: (i) the central bank participates in an interagency financial stability committee; (ii) the committee has the power to implement policy tools, including macroprudential tools; and (iii) the central bank has supervisory oversight powers for banks domiciled in the country. The table also includes the date(s) for whenever changes in each characteristic occurred within the sample period (in most cases, from not having a particular characteristic, "N", to having it, "Y").

Panels (b) and (c) of figure 2 show the time series of cross-country average FSS indexes for central banks with and without some of the governance characteristics in table 2. These panels provide some intuition for the way communication strategies and the effectiveness of communication could vary across central banks depending on governance frameworks. Although the FSS indexes in each panel are highly correlated across countries, there are interesting differences in the levels and dynamics of FSS indexes between central banks participating in committees or with a supervisory oversight role and those without these characteristics, especially around episodes of high uncertainty.

Financial conditions. Table 3 shows a set of publicly-available variables typically used to characterize each country's financial cycle and the conditions and vulnerabilities of its financial system (see Borio, 2014). Of this set of indicators, we use the following variables related to credit to assess the effectiveness of financial stability communications: the credit-to-GDP gap, the annual growth in credit to the nonfinancial private sector to GDP, and the debt-service ratio. Because these measures are slow-moving variables (compared with asset prices), we also explore in section 4 how information from asset valuations and systemic risk, which tends to display higher frequency time variation, is incorporated in FSRs.

Table 4 shows a set of summary statistics for our benchmark measures of financial conditions in each country. There is substantial heterogeneity in the mean credit-to-GDP-gap (column (2)) for the countries in our sample (by construction, the average gap is zero for large samples). The mean gap ranges from -9.90 (the United Kingdom) to 20.19 (Hong Kong). Standard deviations in the gap (column (3)) range from 4.0 (Austria) to 14.8 (Hong Kong). To characterize turning points in the financial cycle, we construct a dummy that takes the value of 1 whenever there is a local maximum in the credit-to-GDP gap followed by a decline in the gap over at least the next four quarters and zero otherwise. We use this definition of turning points in the financial cycle because our sample is relatively short and includes very few financial crises (as defined by Laeven and Valencia (2013), for instance). Column (1) provides the number of these turning points for each country. In our sample (60 quarters in total), there are no credit-to-GDP gap turning points in Germany but nine in both Hong Kong and Singapore, the most in the sample.[5]

There are also important differences in the dynamics of credit growth across countries. The mean annual credit growth (column (4)) ranges from -1.24 percent (Argentina) to 9.69 percent (Turkey), and its volatility (column (5)) ranges from 1.76 percent (Austria) to 11.81 percent (Turkey). As shown in columns (6) and (7), the debt-service ratio is available for a much smaller set of countries (this characteristic is unavailable for Argentina, Austria, Chile, Hong Kong, New Zealand, and Singapore). For the countries with available data, the average debt-service ratio ranges from 3.79 percent (Indonesia) to 27.27 percent (Netherlands). Compared with the other two characteristics of the financial cycle, the debt-service ratio is less volatile, with its standard deviation ranging from 0.53 percent (Indonesia) to 4.92 percent (Turkey).

[5]Table A.1 in the internet appendix shows the dates when turning points occurred for all countries in our sample.

3.2. Financial stability communications and the evolution of the financial cycle

Based on our conceptual framework, we first test how financial stability governance frameworks affect the relation between central banks' communications and the evolution of the financial cycle. In particular, we investigate how countries' financial stability governance characteristics influence the association between the FSS index and the (four-quarters-ahead) evolution of the selected financial cycle indicators using the following panel-data regression:

$$FC_{i,t+4} = \alpha + (\beta_1 + \beta_2 D_{i,t-1}) FSS_{i,t} + \gamma \mathbf{C_{i,t-1}} + e_{i,t+h}, \tag{5}$$

where FC_t is one of the financial cycle characteristics related to credit in table 4, $D_{i,t}$ is a dummy that takes the value of 1 when the country's central bank has one of the four characteristics in the governance framework database (see table 2) and zero otherwise, FSS_t is the financial stability sentiment index, and $\mathbf{C_{i,t}}$ is a vector that includes the following control variables: the change in real GDP with respect to the previous year, the change in the GDP deflator with respect to the previous year, and the unemployment rate. The dummy for the specific governance characteristic is lagged to control for potential endogeneity between FSS_t and D_t (although, as noted, the time variation is small for these characteristics). Regression (5) is the empirical counterpart to equation (3) in the conceptual framework introduced in section 2, where we allow the functional form F for the effect of central banks' communications on future financial conditions to depend on financial stability governance frameworks.[6]

Table 5 presents the evidence for the role of each of the four governance characteristics in explaining the differential effects of financial stability communication on the four-quarters-ahead credit-to-GDP gap (panel A), the annual credit growth (panel B), and the debt-service ratio (panel C). In all estimations, we use country fixed effects to account for other time-invariant country characteristics unrelated to governance and Huber-White standard errors.[7]

[6] In section 4.3, we control for policy actions in the regression setting in equation (5).

[7] Clustering at the country-level is not feasible, given the small number of countries in the sample.

For the purpose of brevity, we omit the constant terms and the coefficients associated with the control variables in the reported estimations.

The results in column (1) of panel A suggest that the relation of the FSS index with the four-quarters-ahead credit-to-GDP gap is not statistically significant when we do not consider governance characteristics. The specifications presented in the following columns, however, suggest material differences across countries. Specifically, financial stability communication by central banks participating in (interagency) committees (columns (2) to (4)) or with a supervisory oversight role (column (5)) is relatively more effective in limiting increases in the credit-to-GDP gap, as the coefficients associated with the interactions between all these four governance indicator variables and the FSS index, β_2, are negative and significant.

Panel B of table 5 summarizes the results considering the annual growth in total credit to the private nonfinancial sector (as a ratio of GDP), another measure of the evolution of the financial cycle. This measure avoids some of the potential drawbacks of the credit-to-GDP gap, including what specific method is used to calculate this measure (Edge and Meisenzahl, 2011). The results, however, show similar patterns to those documented in panel A. Specifically, a deterioration in financial stability sentiment is followed by a decrease in credit growth for those central banks with the financial stability governance characteristics explored but, this time, the relation is just significant for those participating in (interagency) financial stability committees. This evidence supports the findings of Edge and Liang (2017). The coefficients associated with central banks with the power to implement macroprudential tools (column (4)) and a supervisory oversight role (column (5)) remain negative but are not significant. The results showing the effectiveness of sentiment in FSRs published by central banks participating in a committee are robust to using the debt-service ratio as the financial cycle measure (panel C). The values for β_2 across specifications are again negative but, this time, are significant only for those central banks that participate in committees with powers (column (4)). The specifications in panel C, however, suffer from a loss of power due to the smaller sample of countries.

As a robustness check, table 6 explores whether other country-specific characteristics unrelated to financial stability governance, but arguably also proxying for the quality of a country's financial governance, can explain the different effects of financial stability communication on financial cycle variables. In particular, we test for the relevance of the following set of institutional, banking, and linguistic characteristics (in addition to the effect of participating in a financial stability committee): the transparency index of Dincer and Eichengreen (2014), the central bank independence index of Garriga (2016), the financial openness index of Chinn and Ito (2006), the foreign bank ownership share of Claessens and van Horen (2014), the ratio of total international banking claims to local bank claims from the Bank for International Settlements, and a dummy that takes the value of 1 when English is one of the native languages of the country and zero otherwise. The results show that the coefficients associated with the interaction between all these additional variables and the FSS index, β_3, are not statistically significant at any standard confidence level. Importantly, the differential effects of participating in a committee, β_2, remain negative and significant in almost all cases when using the first two financial cycle indicators (panels A and B). However, the results for the debt-service ratio (panel C) do not show any significant coefficients for the interaction between the FSS index and participation in a committee after controlling for the additional variables. As noted before, the lack of significance in this case could be driven, in part, by the smaller sample of countries for which debt-service ratio data are available. Overall, our results suggest that the differential effects of communication by various central banks reported in table 5 are not driven by any other observable and related country-specific characteristics.

3.3. Financial stability communications around turning points in the financial cycle

After testing how financial stability governance frameworks affect the mapping between central banks' communications and the evolution of financial cycle indicators, we now test how

communication strategies and their effectiveness may vary over time. Specifically, we focus on the final decision point in our conceptual framework and assess the following questions: Do governance characteristics affect how financial stability communication changes around turning points in the financial cycle? If so, does this change in communication make some central banks relatively more effective at preventing these turning points?

We first explore whether the patterns documented in table 5 change around turning points in the financial cycle. To do so, we use the following panel-data estimation setting:

$$FC_{i,t+4} = \alpha + (\beta_1 + \beta_2 D_{i,t-1} + \beta_3 TP_{i,t+4} + \beta_4 D_{i,t-1} TP_{i,t+4}) FSS_{i,t} + \gamma \mathbf{C_{i,t-1}} + e_{i,t+4}, \quad (6)$$

where $TP_{i,t}$ is a dummy that takes the value of 1 when there is a turning point in credit-to-GDP gap followed by a decrease in the gap over at least the next four quarters (see table 4). Our regression setting does not assume perfect foresight of turning points, but rather explores, from an econometric point of view, whether communication is more effective before these turning points, which is why TP is included contemporaneously to the left-hand-side variable of equation (6).

Panel A of table 7 summarizes the results on the relation between the FSS index and the credit-to-GDP gap. The coefficients associated with how the FSS index relates to the evolution of the credit-to-GDP gap before a turning point for central banks without the governance characteristics, β_3, are consistently positive and significant. We interpret this finding as showing that for those central banks, communication is a relatively good predictor of the evolution of the credit-to-GDP gap just before a turning point. A deterioration in sentiment for those central banks is followed by an overall increase in the credit-to-GDP gap, as the estimates of $\beta_1 + \beta_3$ are all positive and significant, with this result mostly explained by the periods before a turning point, as signaled by the relative magnitude and significance of β_3. Thus, central banks without these governance characteristics may be more aggressive at communicating the impending financial stress of a turning point. In contrast, we find that central banks participating in committees do signal concerns ("cry wolf") before crises, but the rela-

tion with the four-quarter-ahead evolution of the financial cycle indicators, $\beta_1 + \beta_2 + \beta_3 + \beta_4$, is much weaker. This finding follows from the sign and significance of the coefficient for the interaction term between the FSS index and the various governance dummies, β_2, which is negative and statistically significant, as also documented in table 5. Although, on average, communications by central banks with the financial stability governance characteristics are associated with smaller fluctuations in financial cycle characteristics, these communications are not necessarily able to prevent some of the turning points when they take place.

The evidence in panels B and C of table 7 largely confirm these results. For instance, a deterioration in sentiment for central banks without any of the financial stability governance characteristics is followed by a significant deterioration of credit growth before turning points—that is, $\beta_1 + \beta_3$ is positive and significant. This result holds for the debt-service ratio, except for central banks in committees with power or with an oversight role (columns (4) and (5)).

To further investigate the effectiveness of central banks' communications around turning points in the financial cycle, we use the following probit specification:

$$Pr[TP_{i,t+4} = 1] = \Phi[X_{i,t}\beta], \tag{7}$$

where the vector $X_{i,t}$ contains the demeaned FSS index. This setting is an alternative way of testing one of the implications of our conceptual framework—namely, the effectiveness of communication at preventing a financial crisis (a version of equation (3)).

Table 8 summarizes the estimates of equation (7). The results show that an increase in the financial stability sentiment conveyed by central banks without any of the governance characteristic is followed by a significantly higher probability of a turning point in the financial cycle. This evidence is consistent with the results reported in table 7—that is, for a central bank without these governance characteristics, the financial cycle is little affected by the central bank's actions, and the probability of a turning point in the financial cycle is higher than for other central banks. The coefficient associated with the FSS index is only

negative and statistically significant—that is, a deterioration in sentiment lowers the probability of a turning point in the cycle—for central banks participating in a financial stability committee with powers (column (5)). The evidence in table 8 suggests that the results in CGLM, where it was found that central banks' communication is a useful predictor of crises and turning points in the financial cycle, are driven mostly by central banks not participating in a committee or without a supervisory oversight role.

In the internet appendix, we find that the main results in our probit specifications are robust along several dimensions: (i) to considering two alternative FSS indexes, a "negativity" index, which is calculated using only negative words, and a "summary" index, which is calculated using only the text in FSR's summaries (table A.2); and (ii) to considering the credit-to-GDP gap and debt-service ratio as control variables (table A.3). When we add these control variables, the sentiment in FSRs published by central banks that participate in a committee becomes positive and significant. However, these estimates have to be taken with caution as the sample drops by half relative to table 8 when including the debt-to-service ratio as one of the control variables.

4. Communication strategies

In this section, building again on the intuition from the conceptual framework in section 2, we explore the extent to which governance frameworks and the policy tools available to central banks determine their communication strategies. First, we assess how private and public information about the financial cycle influence central banks' communications, conditional on their governance framework. Second, we investigate whether central banks convey information that differs in its sentiment from that reflected in news articles depending on their governance characteristics. These two tests explore the communication strategies decided between time t and $t + l$ in our conceptual framework. Third, we explore the trade offs faced by central banks in their communication strategies when taking into account other tools at their disposal, such as the use of macroprudential instruments or monetary policy.

4.1. How are financial conditions reflected in financial stability communications?

In section 3, we showed that some governance characteristics yield relatively more effective financial stability communications—that is, they limit pronounced increases in financial cycle indicators. We now explore whether central banks' communication strategies respond differently to the financial cycle depending on the governance framework they operate. To do so, we use the following panel-data regression setting:

$$FSS_{i,t+1} = \alpha + (\beta_1 + \beta_2 D_{i,t-1})X_{i,t} + \gamma \mathbf{C_{i,t-1}} + e_{i,t+1}, \tag{8}$$

where $X_{i,t}$ is one of the financial cycle indicators listed in table 3. Compared with the previous tests, we include a broader set of indicators of this kind to capture the full nature of the financial cycle. $D_{i,t-1}$ is an indicator variable that takes the value of 1 for central banks participating in interagency financial stability committees. This setting is the empirical counterpart of equation (1) in our conceptual framework in section 2. Because the FSS index is interpolated using a step function when FSRs are available for frequencies lower than four quarters, the one-quarter-ahead evidence is essentially a contemporaneous regression setting of how central banks incorporate financial cycle information in the sentiment conveyed in their FSRs.

Table 9 reports the regression results. The positive and often significant estimates for β_1 suggest that the financial stability sentiment of central banks incorporates (near) contemporaneous information from the credit-to-GDP gap, credit growth, debt-service ratio, SRISK-to-GDP ratio, banks' stock price volatility, and household credit. In other words, a deterioration in these indicators is accompanied by a deterioration in the FSS index. However, sentiment in the reports by those central banks participating in a committee deteriorates less following an increase in some of these financial cycle indicators, as shown by the negative and significant estimates for coefficient β_2. In particular, the negative and statistically significant coefficients for the credit-to-GDP gap, the logarithm of the credit-to-GDP ratio,

the debt-service ratio, and household credit suggest that the mapping between the evolution of these indicators and the financial stability sentiment communicated is weaker for central banks participating in an interagency committee. Thus, financial stability governance seems to affect the communication strategies of central banks, as hypothesized in our conceptual framework.

4.2. Deviations between the sentiment in FSRs and in news articles

We next study the deviation between the sentiment in FSRs and the sentiment conveyed in news articles related to financial stability. This analysis allows us to establish a benchmark to compare the sentiment in central banks' communications to gain further insights into their communication strategies. To do so, we calculate a financial stability sentiment index for each country using news articles related to financial stability, instead of FSRs. Similar to the FSS index, the news index, which we call NS, is calculated as the proportion of negative to positive words in each quarter (as in equation (4)) using all news articles in the Refinitiv Machine Readable News (MRN) Reuters Daily News Feed database associated with financial stability topics. To select articles related to financial stability, we filter all articles in which the body of the article contains at least one of the top bigrams found in all FSRs in our sample. To link these articles to each country, we make sure the headline and the body of the article contain a country-name stem (for instance "Argentin" for Argentina).

Figure 3 compares the evolution of the (demeaned at the country level) FSS and NS indexes since 2005.[8] Panel (a) compares the time series for all countries, while panels (b) and (c) do the same for central banks in a financial stability committee and with a supervisory oversight role, respectively. Irrespective of the governance characteristic, the NS and FSS indexes follow similar dynamics and both tend to increase (that is, a deterioration in sentiment) around episodes of heightened financial vulnerabilities or stress. As can be seen from the figures, however, NS tends to increase less than FSS in some of these key episodes.

[8]The time series of NS can be found in Juan M. Londono's website: https://juanmlondono.wordpress.com/.

To formally compare the dynamics of the FSS and NS indexes, table 10 presents the results of a lead-lag analysis between the two sentiment indexes. Panel A shows that the information from NS is reflected in the one-month-ahead FSS index—the coefficient for NS is positive and statistically significant. This finding holds irrespective of the governance characteristic considered. Importantly, the association is lower for central banks participating in interagency financial stability committees (columns (1) to (3))—that is, the estimate of β_2 is negative and significant in those cases. The estimations in panels B and C report the contemporaneous relation between the FSS and NS indexes and the relation of lead values of the FSS index on one-month-ahead values of the NS index, respectively. The high, but relatively lower associations between the FSS and NS indexes for central banks participating in an interagency financial stability committee, are confirmed in these panels. Interestingly, in panel C, β_2 is now only statistically significant and negative for the committee dummy (column (1)) and becomes positive and statistically significant for central banks with a supervisory oversight role (column (4)).

Overall, this evidence suggests that central banks participating in a committee choose a communication strategy different from those institutions lacking such a financial stability governance arrangement. In particular, following a deterioration in financial conditions, central banks that are part of financial stability committees convey a calmer message, on average, compared with their counterparts that are not part of committees. This result is true when benchmarking the sentiment communicated by these central banks to financial cycle indicators, as shown previously, and when that benchmark is the financial stability sentiment conveyed in news reports.

Our evidence is in line with the reasoning in our conceptual framework that central banks might differ on how they convey their assessment of current or expected financial conditions possibly because of the following strategic considerations: (i) Communication by itself is effective at turning around the deterioration of financial cycle characteristics, (ii) revealing private information or alarming markets might accelerate the onset of a crisis, or (iii) they

are confident about their ability to use tools, directly or indirectly, to prevent financial crises. We already tested the first consideration in sections 3.2 and 3.3, and the second consideration is difficult to test, at least with our data. In the remainder of this section, we explore the third consideration—namely, whether central banks can use or influence the use of tools to limit extreme events associated with the financial cycle.

4.3. Financial stability communications and policy actions

To explore further the strategic consideration relating central banks' communication and the implementation of policy actions available to the central bank, we estimate the following equation:

$$PA_{i,t+4} = \alpha + (\beta_1 + \beta_2 D_{i,t-1}) FSS_{i,t} + \gamma \mathbf{C_{i,t}} + e_{i,t+4}, \tag{9}$$

where $PA_{i,t}$ is either the cumulative macroprudential policy index of Cerutti, Correa, Fiorentino, and Segalla (2016) or the monetary policy rate targeted by the country's central bank, and $\mathbf{C_{i,t}}$ are the macroeconomic control variables used in our previous estimations. Based on our conceptual framework, we expect that central banks that have macroprudential tools or can influence other agencies that have those instruments are more likely to use them as their financial stability communications become more negative. We expect the same type of relation between these communications and monetary policy.

The results are presented in table 11. The results in panel A show that communication by central banks in a committee (column (2)) or in a committee with powers (column (4)) appears relatively more "coherent," in the sense that a deterioration in sentiment is followed by a tightening in macroprudential policies (β_2 and $\beta_1 + \beta_2$ are positive and significant), whereas communication by central banks with none of the governance characteristics is followed by either no change or a relaxation in these tools (β_1).

The results in panel B suggest that a deterioration in sentiment is followed by a reduction in monetary policy rates only for those central banks participating in interagency financial

stability committees (columns (2) to (4)). This result could be interpreted as lack of coherence between communication and actions, as monetary policy could be tightened to prevent a further expansion in the financial cycle. It could also indicate, however, that these central banks balance financial stability concerns and monetary policy objectives using different tools. If the central bank thinks that it could fail to meet its monetary policy objectives (price stability and, in some cases, employment) after a turning point in the financial cycle, it may act early to prevent a material deterioration in the economic outlook. At the same time, it may try to use macroprudential tools to curtail financial vulnerabilities as suggested by the analysis presented in panel A.

Given that communication is more coherent for central banks with some of the financial stability governance characteristics, we next explore whether central banks' communications complement other policy actions in preventing the deterioration of financial cycle conditions. This evidence helps gain insights into the governance and policy settings under which communication by itself is effective in alleviating the deterioration of financial cycle conditions. To do so, we estimate the following augmented version of the panel-data specification in equation (5):

$$FC_{i,t+4} = \alpha + (\beta_1 + \beta_2 D_{i,t-1})FSS_{i,t} + \beta_3 MP_{i,t} + \beta_4 IR_{i,t} + \gamma \mathbf{C_{i,t-1}} + e_{i,t+4},$$

where, again, $D_{i,t-1}$ is an indicator equal to 1 when the country's central bank participates in an interagency financial stability committee and zero otherwise, and where we control for lagged policy actions, with $MP_{i,t}$ the cumulative macroprudential index and $IR_{i,t}$ the monetary policy rate. The results, reported in table 12, suggest that, after controlling for policy actions, sentiment in FSRs published by central banks participating in interagency financial stability committees is more effective in limiting increases in the credit-to-GDP gap and credit growth (columns (1) and (2)).[9]

[9]In unreported results, available upon request, we use an even stronger test by controlling for current policy actions ($MP_{i,t+1}$ and $IR_{i,t+4}$), and our results remain the same, which suggests that words (that is, the sentiment in FSRs) matter beyond actions.

Finally, table 13 reports the results using the probit specification described in equation (7), where we assess the predictive power of the FSS index for turning points in the financial cycle after controlling for policy actions. The results, which can be compared to those in table 8, show that the sentiment reflected in FSRs published by central banks without any of the governance characteristics, after controlling for policy actions, remains a better predictor of turning points than that of other central banks. Thus, policy actions matter too, but they do not overturn the differential effects of communications. Together, these results suggest that for central banks without any of the governance characteristics, sentiment deteriorates more (they cry wolf) and fewer policy actions are implemented (less coherent communication) than for central banks with financial stability governance characteristics. Importantly, central banks without governance characteristics are less likely to prevent the occurrence of a turning point in the financial cycle.

5. Conclusion

Financial stability communication and macroprudential policies have gained prominence as part of the set of policy tools available to central banks worldwide. Yet, the interaction between central banks' financial stability communications and countries' financial stability governance and supervisory oversight frameworks, including the allocation of powers to use macroprudential tools, remains mostly unexplored in the literature.

We investigate how differences in governance frameworks across countries explain central banks' financial stability communication strategies and the effectiveness of these strategies in preventing turning points in the financial cycle. To do so, we first develop a simple conceptual framework to understand how central banks incorporate public and private information and decide their communication strategy. In turn, we show how this strategy plays a role in the evolution of the financial cycle. Using the sentiment in financial stability communications derived from text in FSRs published by the central banks of 24 countries and data on their respective countries' financial stability governance frameworks, we empirically test whether

governance frameworks are important determinants of the effectiveness of financial stability communication strategies.

We find that communications by central banks participating in an interagency financial stability committee are relatively more effective in ameliorating the deterioration in financial vulnerabilities and the occurrence of turning points in the financial cycle. We then investigate what drives the effectiveness of communication by exploring whether governance frameworks matter for central banks' communication strategies. After observing an increase in financial vulnerabilities or a worsening of the sentiment reflected in news articles, we find that central banks in financial stability committees transmit a calmer message than banks without this characteristic. To understand why central banks might decide to transmit a calmer message, we explore the relation between communication and other policy actions, and we find that governance characteristics affect the coherence in financial stability communications—that is, changes in the implementation of policy actions follow a deterioration in sentiment for those central banks with direct or indirect access to macroprudential tools or a supervisory oversight role. Moreover, we find evidence that financial stability communications by central banks with some governance characteristics are more effective at alleviating the deterioration of the financial cycle and the occurrence of crises, even after controlling for the implementation of policy actions.

References

Allen, F., Francke, L., Swinburne, M. W., 2004. Assessment of the Riskbank's work on financial stability issues Sveriges Riskbank Economic Review.

Armelius, H., Bertsch, C., Hull, I., Zhang, X., 2018. Spread the Word: International Spillovers from Central Bank Communication. Working Paper Series 357, Sveriges Riksbank (Central Bank of Sweden).

Arseneau, D. M., 2020. Central Bank Communication with a Financial Stability Objective. Finance and Economics Discussion Series 2020-087, Board of Governors of the Federal Reserve System (U.S.).

Blinder, A. S., Ehrmann, M., Fratzscher, M., Haan, J. D., Jansen, D.-J., 2008. Central bank communication and monetary policy: A survey of theory and evidence. Journal of Economic Literature 46, 910–945.

Borio, C., 2014. The financial cycle and macroeconomics: What have we learnt? Journal of Banking and Finance 45, 182–198.

Born, B., Ehrmann, M., Fratzscher, M., 2014. Central bank communication on financial stability. Economic Journal 124, 701–734.

Brownlees, C. T., Engle, R. F., 2016. SRISK: A conditional capital shortfall measure of systemic risk. The Review of Financial Studies (forthcoming).

Cerutti, E., Correa, R., Fiorentino, E., Segalla, E., 2016. Changes in Prudential Policy Instruments — A New Cross-Country Database Working paper, International Monetary Fund.

Chinn, M., Ito, H., 2006. What matters for financial development? Capital controls, institutions, and interactions. Journal of Developments Economics 81, 163–192.

Cihak, M., 2006. How do central banks write on financial stability? Unpublished working paper. International Monetary Fund.

Cihak, M., Muñoz, S., Ten Sharifuddin, S., Tintchev, K., 2012. Financial stability reports: What are they good for? Unpublished working paper. International Monetary Fund.

Claessens, S., van Horen, N., 2014. Foreign banks: Trends and impact. Journal of Money, Credit, and Banking 46, 295–326.

Correa, R., Edge, R. M., Liang, J. N., 2019. A New Dataset of Macroprudential Policy Governance Structures. IFDP Notes 2017-11-07, Working paper, Board of Governors of the Federal Reserve System (U.S.).

Correa, R., Garud, K., Londono, J. M., Mislang, N., 2017. Constructing a Dictionary for Financial Stability IFDP Notes. Washington: Board of Governors of the Federal Reserve System, June 2017.

Correa, R., Garud, K., Londono, J. M., Mislang, N., 2021. Sentiment in Central Banks' Financial Stability Reports. Review of Finance 25, 85–120.

Cukierman, A., 2009. The limits of transparency. Economic notes 38, 1–37.

Dincer, N. N., Eichengreen, B., 2014. Central Bank Transparency and Indepence: Updates and New Measures. International Journal of Central Banking 10, 189 –253.

Drehmann, M., Illes, A., Juseliusm, M., Santos, M., 2015. How much income is used for debt payments? A new database for debt service ratios. BIS Quarterly Review, September .

Edge, R. M., Liang, J. N., 2017. New Financial Stability Governance Structures and Central Banks Working paper, Brookings institution.

Edge, R. M., Meisenzahl, R. R., 2011. The Unreliability of Credit-to-GDP Ratio Gaps in Real Time: Implications for Countercyclical Capital Buffers. International Journal of Central Banking .

Ehrmann, M., Fratzscher, M., 2007. The timing of central bank communication. European Journal of political Economy 23, 124–145.

Ericsson, N., 2016. Eliciting GDP forecasts from the FOMC's minutes around the financial crisis. International Journal of Forecasting 32, 571–583.

Garriga, A. C., 2016. Central bank independence in the world. A new dataset. International Interactions 42, 849–868.

Harris, R., Karadotchev, V., Sowerbutts, R., Stoja, E., 2019. Have FSRs got news for you? Evidence from the impact of Financial Stability Reports on market activity. Bank of England working papers 792, Bank of England.

Huang, C., Simpson, S., Ulybina, D., Roitman, A., 2019. News-based Sentiment Indicators. IMF Working Papers 19/273, International Monetary Fund.

Jeanneau, S., 2014. Financial stability objectives and arrangements—What is new? BIS papers No. 76.

Laeven, L., Valencia, F., 2013. Systemic banking crises database. IMF Economic Review 61, 225–270.

Masciandaro, D., Volpicella, A., 2016. Macro prudential governance and central banks: Facts and drivers. Journal of international money and finance 61, 101–119.

Morris, S., Shin, H. S., 2002. Social value of public information. The American Economic Review 92, 1521–1534.

Osterloo, S., de Haan, J., Jong-A-Pin, R., 2011. Financial stability reviews: A first empirical analysis. Journal of Financial Stability 2, 337–355.

Stekler, H. O., Symington, H., 2016. Evaluating qualitative forecasts: The FOMC minutes, 2006–2010. International Journal of Forecasting 32, 559–570.

Wooldridge, J., 2002. Econometric Analysis of Cross Section and Panel Data. MIT press.

Table 1: Financial stability sentiment index. Summary statistics

This table shows a set of summary statistics (mean, standard deviation, abbreviated as St. Dev., minimum, and maximum) for the financial stability sentiment (FSS) indexes of the 24 countries in our sample. We also report the minimum and maximum dates when the FSS index takes on its lowest and highest values, respectively.

Country	Mean	St. dev.	Minimum	Date minimum	Maximum	Date maximum
Argentina	-0.24	0.70	-1.55	2005q2	1.16	2009q2
Australia	1.34	0.64	0.13	2006q1	2.70	2019q4
Austria	0.59	0.74	-1.00	2018q4	2.18	2009q2
Belgium	0.93	0.53	0.10	2005q2	2.13	2009q2
Canada	2.18	0.97	0.35	2017q4	3.81	2008q4
Chile	0.75	0.66	-1.29	2005q1	2.19	2007q4
Czech Republic	1.19	0.61	0.42	2006q2	2.49	2009q2
Denmark	1.19	1.11	0.02	2017q2	4.43	2008q4
Germany	1.57	0.61	0.43	2005q1	2.73	2018q4
Hong Kong	0.63	0.89	-0.87	2017q3	2.45	2008q4
Hungary	1.31	0.78	0.22	2005q2	2.92	2011q4
Indonesia	0.28	0.73	-1.45	2010q3	1.83	2009q1
Netherlands	1.97	0.84	0.37	2017q4	3.93	2009q2
New Zealand	1.18	0.74	-0.06	2010q2	3.04	2008q4
Norway	1.48	0.92	-0.28	2005q1	2.53	2014q4
Poland	0.83	0.50	-0.05	2006q2	1.85	2009q2
Portugal	0.80	0.69	-0.03	2018q2	2.47	2009q2
Singapore	1.14	1.05	-0.48	2006q2	3.56	2008q4
South Africa	2.07	0.71	0.94	2018q2	4.07	2009q1
Spain	0.79	0.96	-1.08	2006q2	2.55	2011q4
Sweden	1.46	0.64	0.59	2005q1	3.08	2008q4
Switzerland	1.54	0.98	-0.09	2006q2	3.53	2009q2
Turkey	0.34	0.66	-0.96	2017q2	1.63	2011q4
UnitedKingdom	1.87	0.70	0.89	2014q2	3.45	2008q2

Table 2: Financial stability governance frameworks

This table summarizes the financial stability governance frameworks for the central banks of the countries in our sample as of December 2019. "Y" ("N", respectively) denotes that the central bank of that country has (does not have, respectively) a particular governance characteristic. For central banks participating in an interagency financial stability committee, we specify whether this committee is official or established "de facto" ("D") through less formal memorandums of understanding. We also report the dates when changes to these frameworks have occurred within our sample period (in most cases, from not having a particular characteristic to having it). A more detailed description of this database can be found in Correa et al. (2019).

Country	Committee (Yes/No/ De facto)	Date	Committee with powers	Date	Supervisory oversight	Date (year)
Argentina	N		NA		Y	
Australia	Y		N		N	
Austria	Y	8-Sep-14	Y	8-Sep-14	Y	
Belgium	N	31-Jul-10	N		Y	2011
Canada	D		N		N	
Chile	Y	31-Jul-11	N	31-Jul-11	N	
Czech Republic	N		NA		Y	
Denmark	Y	28-Feb-13	N	28-Feb-13	N	
Germany	Y	31-Jan-13	N	31-Jan-13	Y	
Hong Kong	Y		N		Y	
Hungary	N[1]	16-Sep-13	N	1-Jan-10	Y	2013
Indonesia	Y[2]	30-Dec-05	N	30-Dec-05	N	2014
Netherlands	N		NA		Y	
New Zealand	D	1-Jan-06	N	1-Jan-06	Y	
Norway	Y[3]	1-Dec-08	Y	1-Nov-15	N	
Poland	N		NA		N	
Portugal	N		NA		Y	
Singapore	N		NA		Y	
South Africa	D	1-Jun-08	N	1-Jun-08	Y	
Spain	D	17-Jan-12	N	17-Jan-12	Y	
Sweden	Y	19-Dec-13	N	19-Dec-13	N	
Switzerland	D	23-Feb-10	N	23-Feb-10	N	
Turkey	Y	8-Jun-11	N	8-Jun-11	N	
United Kingdom	D[4]	28-Feb-11	Y	19-Dec-12	Y	2012

[1] De facto committee between 1/1/2010 and 09/16/2013. [2] Committee was de facto between 12/30/2005 and 11/30/2011. [3] Committee was de facto between 12/1/2008 and 11/01/2015. [4] Committee was de facto between 2/28/2011 and 12/19/2012.

Table 3: Financial cycle indicators. Data sources and definitions

Variable	Description	Source	Units
Credit-to-GDP gap	Deviations of the credit-to-GDP ratio from its long-run trend (see Borio, 2014).	BIS	Percent
Growth in credit to GDP	Growth rate of the total credit to the nonfinancial private sector to GDP.	BIS	Percent
DSR, private nonfinancial	Debt-service ratio. Ratio of interest payments plus amortizations to income for private nonfinancial borrowers (see Drehmann et al., 2015).	BIS	Percent
SRISK to GDP	SRISK-to-GDP ratio. SRISK is the systemic risk measure in Brownlees and Engle (2016). It is defined as the capital shortfall of a bank conditional on a severe market decline. SRISK is aggregated at the country or banking system level and divided by nominal GDP.	V-Lab, NYU Stern	Percent
Bank CDS	Value-weighted average of the 5-year unsecured CDS spreads of a group of representative financial institutions.	Markit, Federal Reserve Board	Percent
Stock volatility	Quarterly realized volatility of the main stock index, calculated as the square root of the sum of daily squared returns.	Bloomberg	Percent (annualized)
Real property price	Log change in the BIS real property price index from last year.	BIS	Percent
Household credit	Total credit to households.	BIS	U.S. dollar millions

Table 4: Financial cycle indicators. Summary statistics

This table reports a set of summary statistics for the credit-to-GDP gap, the annual growth in total credit to the private nonfinancial sector (relative to GDP), and the debt-service ratio for the sample period from January 2005 to December 2019. In the first column, we also report the number of turning points in the credit-to-GDP gap, defined as local maximums followed by a decrease in the gap over at least the next 4 quarters.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Credit-to-GDP gap			Credit growth		Debt-service ratio	
Country	Turning points	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Argentina	2	-3.49	6.27	-1.24	9.63	NA	NA
Australia	2	-0.83	11.37	1.08	3.25	21.06	1.14
Austria	2	-4.27	4.04	0.43	1.76	NA	NA
Belgium	4	1.28	10.08	2.38	5.19	19.60	1.53
Canada	5	5.59	6.22	2.61	2.84	21.38	1.74
Chile	3	0.19	10.32	3.42	6.52	NA	NA
Czech Republic	5	9.60	7.22	3.00	4.52	7.22	0.69
Denmark	4	2.28	24.43	1.02	3.95	26.22	2.67
Germany	0	-7.05	4.69	-0.76	2.63	10.83	0.74
Hong Kong	9	20.19	14.80	4.53	5.49	20.63	3.70
Hungary	4	0.67	23.42	0.30	8.41	12.57	3.55
Indonesia	7	3.13	7.68	2.88	7.28	3.79	0.53
Netherlands	3	-3.24	11.56	0.93	3.06	27.27	1.90
New Zealand	2	-7.96	13.69	0.42	3.59	NA	NA
Norway	5	7.39	11.53	2.00	4.28	26.68	2.25
Poland	6	0.42	5.97	4.93	7.26	7.15	0.97
Portugal	4	-7.35	26.92	-0.44	4.61	18.15	2.01
Singapore	9	3.55	12.41	2.62	5.40	NA	NA
South Africa	2	1.01	5.45	1.49	5.01	8.72	0.99
Spain	1	-7.84	36.58	-0.41	5.84	18.71	3.32
Sweden	6	8.66	13.36	3.25	4.37	22.01	1.63
Switzerland	4	5.46	7.46	1.85	2.05	17.09	0.75
Turkey	7	8.43	5.09	9.69	11.81	11.37	4.92
United Kingdom	4	-9.90	14.02	-0.24	3.12	16.84	1.90

Table 5: Financial stability governance frameworks and the way that financial stability communications relate to financial cycle indicators

This table reports the results for the following panel-data regression:

$$FC_{i,t+4} = \alpha + (\beta_1 + \beta_2 D_{i,t-1}) FSS_{i,t} + \gamma \mathbf{C_{i,t-1}} + e_{i,t+4},$$

where $FC_{i,t}$ is one of the following financial cycle indicators: the credit-to-GDP gap (panel A), the 4-quarters credit growth (panel B), and the debt-service ratio (panel C). $D_{i,t}$ is a dummy that takes the value of 1 when the country has one of the characteristics in the financial stability governance framework database and zero otherwise, and is lagged to control for endogeneity with $FSS_{i,t}$, the financial stability sentiment index calculated using the text in financial stability reports. $\mathbf{C_{i,t}}$ includes the following control variables: the change in real GDP with respect to the previous year, the change in the GDP deflator with respect to the previous year, and the unemployment rate. Huber-White standard errors (see Wooldridge, 2002) are reported in parentheses. *,**, and *** represent the usual 10%, 5%, and 1% significance levels, respectively. In all estimations, we consider country fixed effects to account for other time-invariant country characteristics not related to governance. For the purpose of brevity, we omit the constant terms and the coefficients associated with the control variables in the reported estimations.

Panel A. Credit-to-GDP gap

	(1)	(2)	(3)	(4)	(5)
	Homogeneous	Committee	Official committee	Committee with power	Supervisory oversight
FSS (β_1)	1.82	3.36	2.94	2.09	4.91*
	(1.80)	(1.95)	(1.62)	(1.79)	(1.78)
D*FSS (β_2)		-3.87*	-5.80**	-6.17*	-6.63*
		(1.68)	(1.97)	(2.67)	(2..54)
$\beta_1 + \beta_2$		-0.51	-2.86	-4.09	-1.72
		(1.57)	(1.86)	(3.09)	(2.14)
R^2	0.21	0.23	0.24	0.22	0.25
N	1192	1192	1192	1192	1192

Table 5: Financial stability governance frameworks and the way that financial stability communications relate to financial cycle indicators, continued

Panel B. Credit growth

	(1)	(2)	(3)	(4)	(5)
	Homogeneous	Committee	Official committee	Committee with power	Supervisory oversight
FSS (β_1)	0.37	0.92**	0.56	0.39	0.6
	(0.36)	(0.32)	(0.32)	(0.36)	(0.43)
D*FSS (β_2)		-1.37**	-0.97*	-0.52	-0.48
		(0.46)	(0.38)	(1.08)	(0.64)
$\beta_1 + \beta_2$		-0.45	-0.41	-0.12	0.11
		(0.42)	(0.47)	(1.14)	(0.54)
R^2	0.07	0.1	0.08	0.07	0.07
N	1192	1192	1192	1192	1192

Panel C. Debt-service ratio

FSS (β_1)	0.18	0.27	0.31	0.13	0.48
	(0.33)	(0.39)	(0.31)	(0.33)	(0.40)
D*FSS (β_2)		-0.21	-0.77	-1.61***	-0.95
		(0.33)	(0.49)	(0.37)	(0.57)
$\beta_1 + \beta_2$		0.06	-0.46	-1.48*	-0.46
		(0.32)	(0.42)	(0.58)	(0.35)
R^2	0.06	0.06	0.09	0.08	0.1
N	877	877	877	877	877

Table 6: Other country characteristics and the way that financial stability communications relate to financial cycle indicators

This table reports the results for the following panel-data regression setting:

$$FC_{i,t+4} = \alpha + (\beta_1 + \beta_2 D_{i,t-1} + \beta_3 X_{i,t-1}) FSS_{i,t} + \gamma \mathbf{C_{i,t-1}} + e_{i,t+4},$$

where $FC_{i,t}$ is one of the following financial cycle indicators: the credit-to-GDP gap (panel A), the 4-quarters credit growth (panel B), and the debt-service ratio (panel C). $D_{i,t}$ is a dummy that takes the value of 1 when the country's central bank participates in an interagency financial stability committee and zero otherwise, and is lagged to control for endogeneity with $FSS_{i,t}$, the financial stability sentiment index calculated using the text in financial stability reports. $X_{i,t}$ is one of the following country-specific characteristics: the transparency index in Dincer and Eichengreen (2014), the central bank independence index in Garriga (2016), the financial openness index in Chinn and Ito (2006), and the foreign bank ownership (BIS). $\mathbf{C_{i,t}}$ are the following control variables: the change in real GDP with respect to the previous year, the change in the GDP deflator with respect to the previous year, and the unemployment rate. Huber-White standard errors (see Wooldridge, 2002) are reported in parentheses. *,**, and *** represent the usual 10%, 5%, and 1% significance levels, respectively. In all estimations, we consider country fixed effects to account for other time-invariant country characteristics not related to governance. For the purpose of brevity, we omit the constant terms and the coefficients associated with the control variables in the reported estimations.

Panel A. Credit-to-GDP gap

	(1)	(2)	(3)	(4)	(5)	(6)
	Transparency	Independence	Financial openness	Foreign bank ownership	Bank international claims	English native language
FSS (β_1)	6.01	4.09	0.88	2.68	2.47	4.05
	(6.08)	(3.80)	(2.58)	(2.37)	(2.19)	(2.26)
$D * FSS$ (β_2)	-5.12*	-2.95	-3.82*	-3.91*	-3.56*	-3.87*
	(2.22)	(1.77)	(1.71)	(1.71)	(1.68)	(1.66)
$X * FSS(\beta_3)$	-0.04	-4.65	2.75	0.03	0.00	-2.55
	(0.45)	(5.03)	(2.51)	(0.03)	(0.00)	(2.09)
R^2	0.18	0.48	0.24	0.23	0.28	0.23
N	862	663	1035	1165	1136	1192

Table 6: Other country characteristics and the way that financial stability communications relate to financial cycle indicators, continued

Panel B. Credit growth

	(1) Transparency	(2) Independence	(3) Financial openness	(4) Foreign bank ownership	(5) Bank international claims	(6) English native language
FSS (β_1)	0.93*	1.8	0.22	0.78	0.83	1.03*
	(0.34)	(1.07)	(2.03)	(0.46)	(0.51)	(0.39)
$D * FSS$ (β_2)	-1.59*	-2.17*	-1.60**	-1.25*	-1.40**	-1.37**
	(0.67)	(0.94)	(0.48)	(0.45)	(0.49)	(0.47)
$X * FSS(\beta_3)$	0.38	-1.68	0.67	0.00	0.00	-0.4
	(0.60)	(1.54)	(2.16)	(0.01)	(0.00)	(0.76)
R^2	0.1	0.23	0.12	0.09	0.11	0.1
N	1192	663	1035	1165	1136	1192

Panel C. Debt-service ratio

FSS (β_1)	0.24	0.66	-3.02	-0.14	-0.51	0.25
	(1.85)	(0.77)	(2.28)	(0.45)	(0.58)	(0.41)
$D * FSS$ (β_2)	-0.38	-0.17	-0.06	-0.21	-0.11	-0.21
	(0.34)	(0.18)	(0.32)	(0.32)	(0.31)	(0.32)
$X * FSS(\beta_3)$	0.04	-0.44	3.50	0.02	0.00	0.21
	(0.15)	(1.05)	(2.31)	(0.01)	(0.00)	(0.70)
R^2	0.06	0.19	0.12	0.09	0.11	0.06
N	602	503	877	870	833	877

Table 7: Financial stability governance frameworks and the way that financial stability communications relate to financial cycle indicators around turning points

This table reports the results for the following panel-data regression:

$$FC_{i,t+4} = \alpha + (\beta_1 + \beta_2 D_{i,t-1} + \beta_3 TP_{i,t+4} + \beta_4 D_{i,t-1} TP_{i,t+4}) FSS_{i,t} + \gamma \mathbf{C_{i,t-1}} + e_{i,t+4},$$

where $FC_{i,t}$ is one of the following financial cycle indicators: the credit-to-GDP gap (panel A), the 4-quarters credit growth (panel B), and the debt-service ratio (panel C). $D_{i,t}$ is a dummy that takes the value of 1 when the country's central bank has one of the characteristics in the governance framework database and zero otherwise, $TP_{i,t}$ is a dummy that takes the value of 1 when there is a turning point in the credit-to-GDP gap followed by a decrease in the gap over at least the next 4 quarters, and $FSS_{i,t}$ is the financial stability sentiment index calculated using the text in financial stability reports. $\mathbf{C_{i,t}}$ are the following control variables: the change in real GDP with respect to the previous year, the change in the GDP deflator with respect to the previous year, and the unemployment rate. Huber-White standard errors (see Wooldridge, 2002) are reported in parentheses. *,**, and *** represent 10%, 5%, and 1% significance levels, respectively. In all estimations, we consider country fixed effects to account for other time-invariant country characteristics not related to governance. For the purpose of brevity, we omit the constant terms and the coefficients associated with the control variables in the reported estimations.

Panel A. Credit-to-GDP gap

	(1)	(2)	(3)	(4)	(5)
	Homogeneous	Committee	Official committee	Committee with power	Supervisory oversight
FSS (β_1)	1.26	2.76	2.41	1.53	4.37*
	(1.72)	(1.92)	(1.57)	(1.72)	(1.75)
D*FSS (β_2)		-3.67*	-5.62**	-5.91*	-6.50*
		(1.70)	(1.92)	(2.58)	(2.50)
TP*FSS (β_3)	4.52***	4.19**	3.81**	4.29***	3.20*
	(0.92)	(1.48)	(1.12)	(1.06)	(1.16)
D*TP*FSS (β_4)		-0.15	1.73	0.91	1.92
		(1.99)	(2.65)	(2.83)	(1.77)
$\beta_1 + \beta_3$	5.77**	6.96**	6.22**	5.82**	7.57***
	(1.88)	(2.00)	(1.71)	(1.97)	(1.98)
$\beta_1 + \beta_2 + \beta_3 + \beta_4$		3.14	2.32	0.82	2.99
		(1.99)	(3.35)	(1.29)	(2.68)
R^2	0.22	0.24	0.25	0.23	0.26
N	1192	1192	1192	1192	1192

Table 7: Financial stability governance frameworks and the way that financial stability communications relate to financial cycle indicators around turning points, continued

Panel B. Credit growth

	(1)	(2)	(3)	(4)	(5)
	Homogeneous	Committee	Official committee	Committee with power	Supervisory oversight
FSS (β_1)	018	0.70*	0.37	0.2	0.36
	(0.35)	(0.30)	(0.31)	(0.35)	(0.40)
D*FSS (β_2)		-1.28**	-0.92*	-0.45	-0.38
		(0.45)	(0.38)	(1.07)	(0.63)
TP*FSS (β_3)	1.55***	1.54*	1.39**	1.52**	1.45**
	(0.40)	(0.59)	(0.43)	(0.41)	(0.51)
D*TP*FSS (β_4)		-0.37	0.81	0.65	0.19
		(0.69)	(0.94)	(1.16)	(0.58)
$\beta_1 + \beta_3$	1.73**	2.24**	1.76**	1.71**	1.81*
	(0.48)	(0.68)	(0.49)	(0.51)	(0.69)
$\beta_1 + \beta_2 + \beta_3 + \beta_4$		0.6	1.65	1.92***	1.62**
		(0.58)	(0.90)	(0.27)	(0.55)
R^2	0.09	0.11	0.09	0.09	0.09
N	1192	1192	1192	1192	1192

Panel C. Debt-service ratio

FSS (β_1)	0.11	0.17	0.24	0.07	0.42
	(0.32)	(0.39)	(0.31)	(0.31)	(0.39)
D*FSS (β_2)		-0.14	-0.71	-1.52**	-0.93
		(0.33)	(0.47)	(0.38)	(0.56)
TP*FSS (β_3)	0.57***	0.74*	0.55*	0.51**	0.38**
	(0.13)	(0.28)	(0.19)	(0.15)	(0.12)
D*TP*FSS (β_4)		-0.53	-0.7	0.00	0.41
		(0.37)	(1.01)	(0.00)	(0.25)
$\beta_1 + \beta_3$	0.68	0.91**	0.79*	0.58	0.8
	(0.35)	(0.30)	(0.27)	(0.37)	(0.40)
$\beta_1 + \beta_2 + \beta_3 + \beta_4$		0.24	-0.62	-0.94	0.28
		(0.42)	(1.32)	(0.66)	(0.36)
R^2	0.07	0.07	0.1	0.09	0.11
N	877	877	877	877	877

Table 8: Financial stability governance frameworks and the heterogeneous predictive power of financial stability communications for turning points in the financial cycle

This table reports the results for the following probit regression:

$$Pr[TP_{i,t+4} = 1] = \Phi[X_{i,t}\beta],$$

where $TP_{i,t}$ is a dummy that takes the value of 1 when there is a turning point in the credit-to-GDP gap followed by a decrease in the gap over at least the next 4 quarters and $X_{i,t}$ contains the demeaned financial stability sentiment index calculated using the text in financial stability reports, $FSS_{i,t}$. For each governance framework characteristic, we split the sample into central banks with that characteristic ("Yes") and those without it ("No"). *,**, and *** represent 10%, 5%, and 1% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Committee		Official committee		Committee with powers		Supervisory oversight	
	Yes	No	Yes	No	Yes	No	Yes	No
FSS	0.05	0.26**	-0.16	0.25**	-1.03***	0.21**	0.03	0.25**
	(0.13)	(0.10)	(0.18)	(0.08)	(0.16)	(0.07)	(0.14)	(0.09)
R^2	0.00	0.03	0.01	0.02	0.13	0.01	0.00	0.02
N	1140	906	729	1317	174	1872	1119	927

Table 9: Financial stability governance frameworks and communication strategies

This table reports the results for the following panel-data regression:

$$FSS_{i,t+1} = \alpha + (\beta_1 + \beta_2 D_{i,t-1})X_{i,t} + \gamma \mathbf{C_{i,t-1}} + e_{i,t+1},$$

where $FSS_{i,t}$ is the financial stability sentiment index calculated using the text in financial stability reports, $D_{i,t}$ is a dummy that takes the value of 1 when the country's central bank participates in an interagency financial stability committee and zero otherwise, and $X_{i,t}$ is each one of the financial cycle characteristics (column headers). $\mathbf{C_{i,t}}$ are the following control variables: the change in real GDP with respect to the previous year, the change in the GDP deflator with respect to the previous year, and the unemployment rate. Huber-White standard errors (see Wooldridge, 2002) are reported in parentheses. *,**, and *** represent 10%, 5%, and 1% significance levels, respectively. In all estimations, we consider country fixed effects to account for other time-invariant country characteristics not related to governance. For the purpose of brevity, we omit the constant terms and the coefficients associated with the control variables in the reported estimations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Independent (RHS) variable	CGDP Gap	Log of CGDP	Credit growth	DSR	SRISK to GDP	Bank CDS	Bank volatility	Log of prop. price	Log of hshold credit
RHS variable (β_1)	0.02***	0.92	0.03**	0.09*	0.11**	0.2	0.04***	-0.19	1.00**
	(0.00)	(0.47)	(0.01)	(0.04)	(0.03)	(0.10)	(0.00)	(0.31)	(0.35)
D*RHS (β_2)	-0.02*	-0.07*	-0.03	-0.02*	0.01	-0.02	0.00	-0.05	-0.09*
	(0.01)	(0.03)	(0.02)	(0.01)	(0.02)	(0.09)	(0.00)	(0.04)	(0.04)
$\beta_1 + \beta_2$	0.00	0.89	-0.01	0.06	0.12**	0.18*	0.03***	-0.55	0.97**
	(0.01)	(0.50)	(0.02)	(0.04)	(0.03)	(0.08)	(0.00)	(0.29)	(0.33)
R^2	0.09	0.07	0.08	0.11	0.14	0.09	0.19	0.04	0.08
N	1209	1209	1187	890	1056	824	1153	1103	1209

Table 10: Strategic communication. Deviations between the sentiment in financial stability reports and in news articles

This table reports the results for a lead-lag analysis between the financial stability sentiment index, FSS, and the financial stability sentiment from news articles, NS. NS is calculated as explained in section 4.2. Panel A shows the results for the following regression, in which we explore how information from NS is collected in the 1-month-ahead FSS index:

$$FSS_{i,t+1} = \alpha + (\beta_1 + \beta_2 D_{i,t-1})NS_{i,t} + e_{i,t+1}.$$

Panel B shows the results for the following contemporaneous regression:

$$FSS_{i,t} = \alpha + (\beta_1 + \beta_2 D_{i,t-1})NS_{i,t} + e_{i,t}.$$

Finally, panel C shows the results for the following regression, in which we explore how information from FSS is collected in the 1-month-ahead NS index:

$$NS_{i,t+1} = \alpha + (\beta_1 + \beta_2 D_{i,t-1})FSS_{i,t} + e_{i,t+1}.$$

In all regressions, $D_{i,t-1}$ is a dummy that takes the value of 1 when the country's central bank has one of the characteristics in the governance framework database and zero otherwise. Huber-White standard errors (see Wooldridge, 2002) are reported in parentheses. *,**, and *** represent 10%, 5%, and 1% significance levels, respectively.

Panel A. 1-month-ahead FSS

	(1)	(2)	(3)	(4)
	Committee	Official committee	Committee with power	Supervisory oversight
NS (β_1)	0.57***	0.56***	0.50***	0.44***
	(0.06)	(0.06)	(0.06)	(0.07)
D*NS (β_2)	-0.20*	-0.27**	-0.31**	0.07
	(0.08)	(0.08)	(0.09)	(0.11)
$\beta_1 + \beta_2$	0.33***	0.28***	0.23***	0.38***
	(0.04)	(0.04)	(0.04)	(0.05)
R^2	0.17	0.18	0.17	0.16
N	1660	1660	1660	1660

Table 10: Strategic communication. Deviations between the sentiment in financial stability reports and in news articles, continued

Panel B. Contemporaneous relation

	(1)	(2)	(3)	(4)
	Committee	Official committee	Committee with power	Supervisory oversight
NS (β_1)	0.53***	0.51***	0.46***	0.38***
	(0.05)	(0.06)	(0.05)	(0.06)
D*NS (β_2)	-0.21**	-0.27**	-0.29**	0.09
	(0.07)	(0.08)	(0.08)	(0.09)
$\beta_1 + \beta_2$	0.32***	0.24**	0.17	0.47***
	(0.06)	(0.07)	(0.08)	(0.07)
R^2	0.14	0.15	0.14	0.13
N	1685	1685	1685	1685

Panel C. 1-month-ahead NS

FSS (β_1)	0.29***	0.26***	0.24***	0.16**
	(0.05)	(0.05)	(0.05)	(0.05)
D*FSS (β_2)	-0.11*	-0.08	-0.15	0.21*
	(0.05)	(0.06)	(0.13)	(0.09)
$\beta_1 + \beta_2$	0.26***	0.27***	0.28***	0.37***
	(0.04)	(0.04)	(0.04)	(0.05)
R^2	0.09	0.09	0.09	0.10
N	1656	1656	1656	1656

Table 11: Coherence in communication. The relation between financial stability communications, macroprudential tools, and monetary policy

This table reports the results for the following panel-data regression:

$$PA_{i,t+4} = \alpha + (\beta_1 + \beta_2 D_{i,t-1})FSS_{i,t} + \mathbf{C_{i,t}} + e_{i,t+4},$$

where $PA_{i,t}$ is either the cumulative macroprudential index from Cerutti, Correa, Fiorentino, and Segalla (2016) (Panel A) or the monetary policy rate (panel B). $D_{i,t-1}$ is a dummy that takes the value of 1 when the country's central bank has one of the characteristics in the governance framework database and zero otherwise, $FSS_{i,t}$ is the financial stability sentiment index calculated using the text in financial stability reports, and $\mathbf{C_{i,t}}$ are the following control variables: the change in real GDP with respect to the previous year, the change in the GDP deflator with respect to the previous year, and the unemployment rate. Huber-White standard errors (see Wooldridge, 2002) are reported in parentheses. *,**, and *** represent 10%, 5%, and 1% significance levels, respectively. In all estimations, we consider country fixed effects to account for other time-invariant country characteristics not related to governance. For the purpose of brevity, we omit the constant terms in the reported estimations.

Panel A. Cumulative macro prudential policies

	(1)	(2)	(3)	(4)	(5)
	Homogeneous	Committee	Official committee	Committee with power	Supervisory Oversight
FSS (β_1)	-0.01	-0.38*	-0.15	-0.04	-0.2
	(0.16)	(0.14)	(0.18)	(0.17)	(0.24)
D*FSS (β_2)		0.97**	0.78	0.86**	0.4
		(0.31)	(0.45)	(0.24)	(0.23)
$\beta_1 + \beta_3$		0.59*	0.62	0.82*	0.2
		(0.34)	(0.45)	(0.29)	(0.17)
R^2	0.02	0.09	0.04	0.03	0.03
N	764	764	764	764	764

Panel B. Monetary policy rate

FSS (β_1)	-0.34	-0.03	-0.12	-0.31	-0.15
	(0.25)	(0.15)	(0.14)	(0.20)	(0.33)
D*FSS (β_2)		-0.74***	-1.13***	-0.81**	-0.46
		(0.18)	(0.23)	(0.25)	(0.46)
$\beta_1 + \beta_3$		-0.77**	-1.25**	-1.12***	-0.61*
		(0.24)	(0.33)	(0.28)	(0.26)
R^2	0.06	0.11	0.13	0.08	0.07
N	860	1035	1035	1035	1035

Table 12: Financial stability governance frameworks and the heterogeneous relation between communications and financial cycle indicators, controlling for policy actions

This table reports the results for the following augmented version of the panel-data regression in table 5:

$$FC_{i,t+4} = \alpha + (\beta_1 + \beta_2 D_{i,t-1})FSS_{i,t} + \beta_3 MP_{i,t} + \beta_4 IR_{i,t} + \gamma \mathbf{C_{i,t-1}} + e_{i,t+4},$$

where where FC_t is one of the financial cycle characteristics related to credit in table 4, FSS_t is the financial stability sentiment index, $D_{i,t-1}$ is a dummy that takes the value of 1 if the central bank participates in an interagency financial stability committee, and we control for lagged policy actions, specifically, $MP_{i,t}$, the cumulative macroprudential index from Cerutti et al. (2016), and $IR_{i,t}$, the monetary policy rate. $\mathbf{C_{i,t}}$ are the following control variables: the change in real GDP with respect to the previous year, the change in the GDP deflator with respect to the previous year, and the unemployment rate. Huber-White standard errors (see Wooldridge, 2002) are reported in parentheses. *,**, and *** represent 10%, 5%, and 1% significance levels. In all estimations, we consider country fixed effects to account for other time-invariant country characteristics not related to governance. For the purpose of brevity, we omit the constant terms and the coefficients associated with the control variables in the reported estimations.

	(1) Credit-to-GDP gap	(2) Credit growth	(3) Debt-service ratio
FSS (β_1)	3.84**	0.18	0.48**
	(1.17)	(0.34)	(0.13)
D*FSS (β_2)	-3.42*	-1.29*	-0.21
	(1.48)	(0.53)	(0.17)
$\beta_1 + \beta_2$	0.42	-1.12*	0.27
	(1.30)	(0.51)	(0.17)
MP	1.28	0.22	0.34***
	(0.69)	(0.15)	(0.07)
IR	2.23*	0.65	0.39**
	(1.01)	(0.34)	(0.11)
R^2	0.16	0.09	0.26
N	976	977	783

Table 13: Financial stability governance frameworks and the predictive power of financial stability communications for turning points in the financial cycle, conditional on policy actions

This table reports the results for the following panel-data probit regression:

$$Pr[TP_{i,t+4} = 1] = \Phi[X_{i,t}\beta],$$

where $TP_{i,t}$ is a dummy that takes the value of 1 when there is a turning point in the credit-to-GDP gap followed by a decrease in the gap over at least the next 4 quarters and $X_{i,t}$ contains the demeaned financial stability sentiment index calculated using the text in FSRs, $FSS_{i,t}$, the cumulative macroprudential index from Cerutti et al. (2016), and the monetary policy rate. For each governance framework characteristic, we split the sample into central banks with that characteristic ("Yes") and those without it ("No"). *,**, and *** represent 10%, 5%, and 1% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Committee		Official committee		Committee with powers		Supervisory oversight	
	Yes	No	Yes	No	Yes	No	Yes	No
FSS	-0.05	0.29**	-0.48*	0.25***	-1.96***	0.18*	-0.09	0.22**
	(0.14)	(0.09)	(0.21)	(0.07)	(0.14)	(0.07)	(0.22)	(0.08)
MP	0.05**	0.03	0.05*	0.05**	0.21***	0.04**	0.07**	0.02
	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.01)
IR	0.00	0.05**	0.04*	0.03	0.18*	0.03	0.02	0.05*
	(0.01)	(0.02)	(0.02)	(0.02)	(0.08)	(0.01)	(0.02)	(0.02)
R^2	0.02	0.05	0.07	0.04	0.29	0.03	0.03	0.03
N	500	496	289	707	51	945	455	541

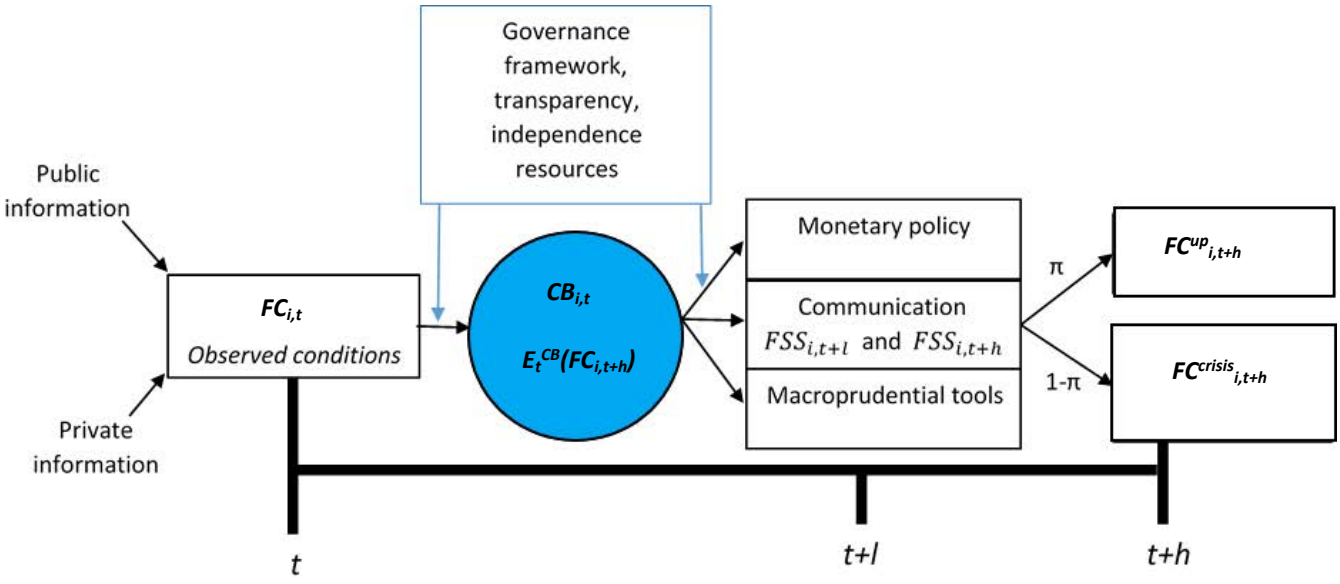
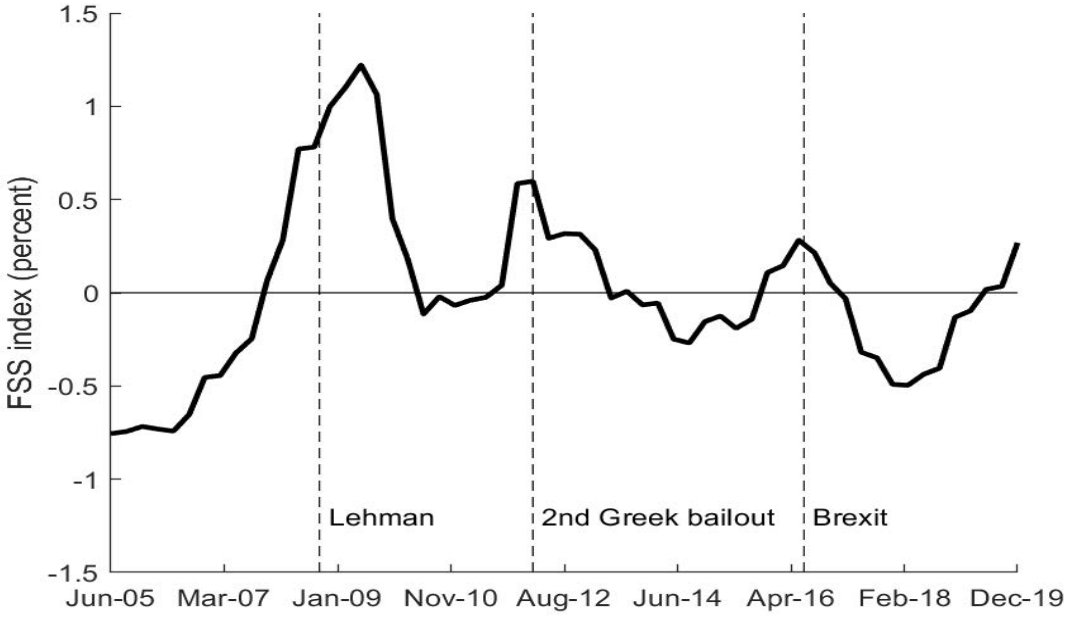
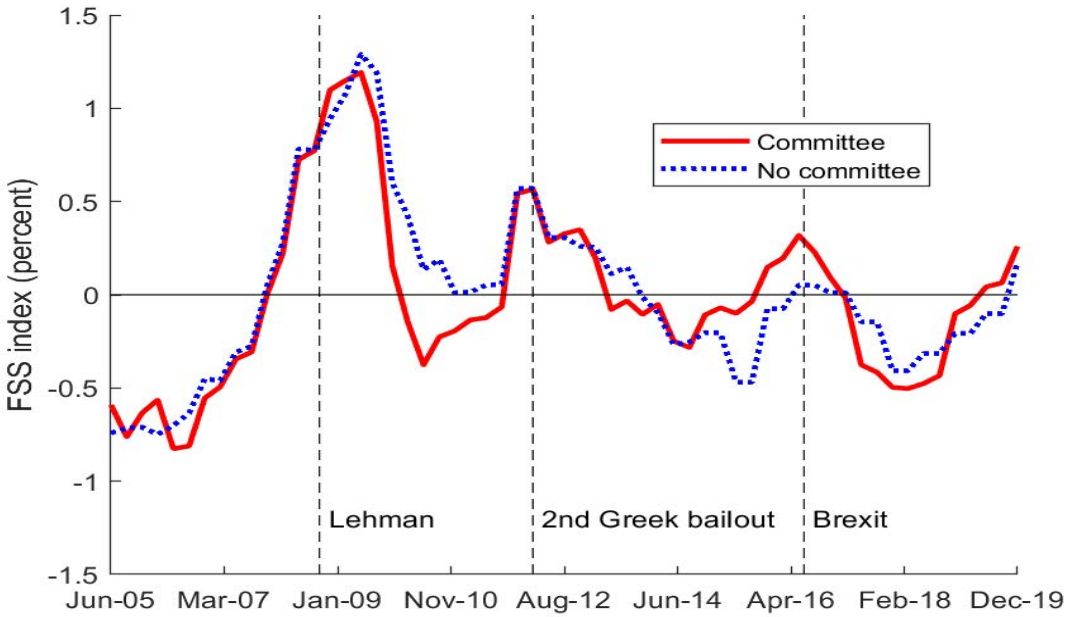


Figure 1: Central bank communication and financial stability governance

This figure shows a diagram for the conceptual framework used to understand the interaction between financial stability governance frameworks and central bank communication.



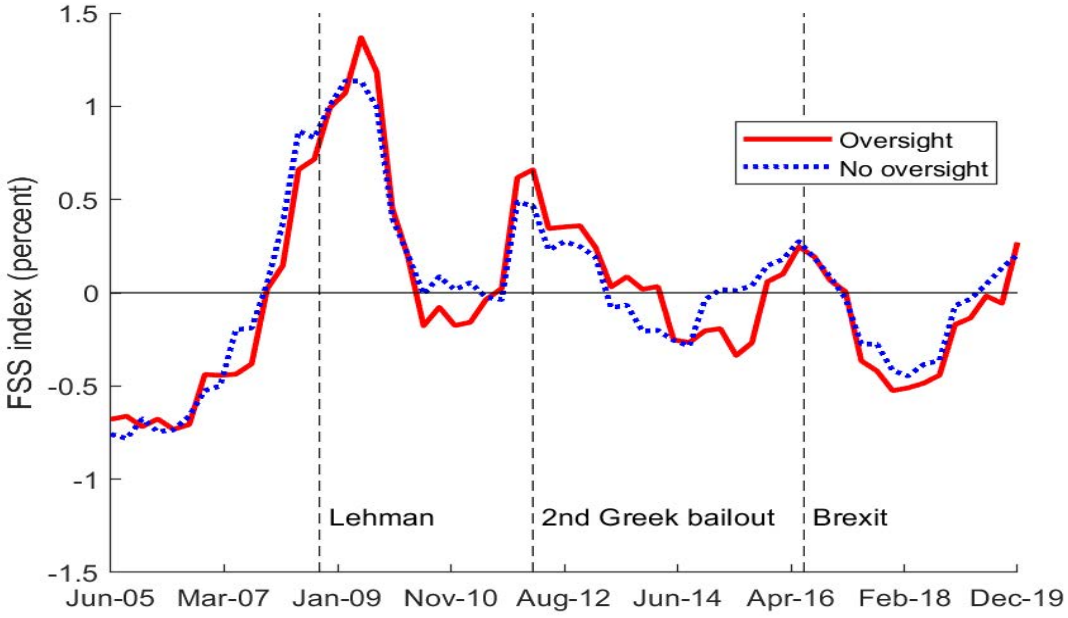
(a) All countries



(b) Interagency financial stability committee

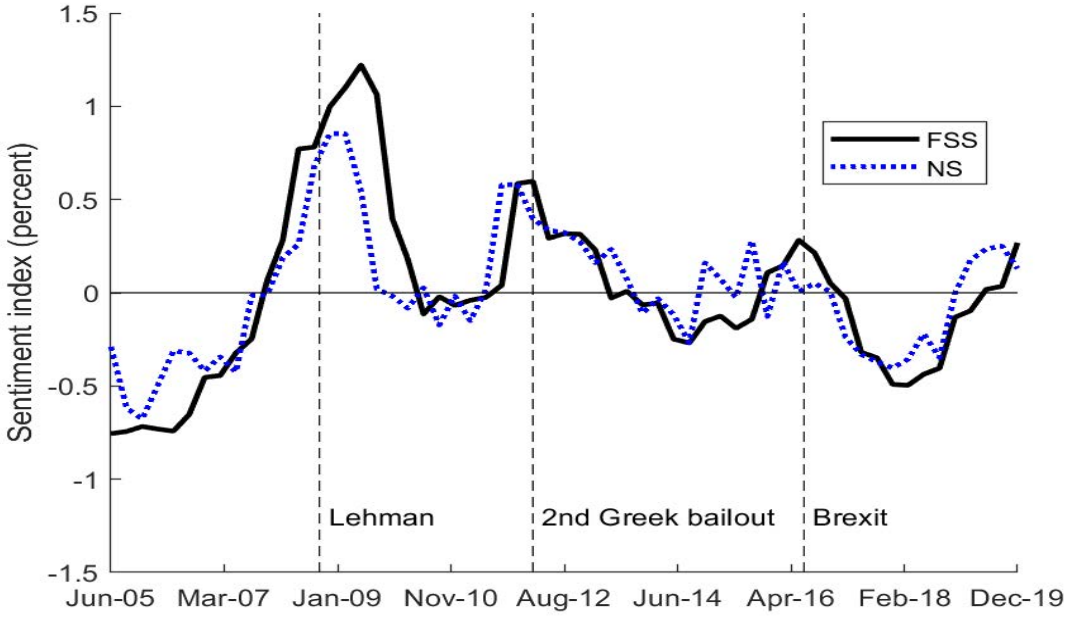
Figure 2: Financial stability sentiment indexes. Averages across countries with certain governance frameworks

Panel (a) shows the equally-weighted average of all countries' demeaned financial stability sentiment (FSS) indexes. Panel (b) shows the average across all countries for which the central bank participates (red solid line) or does not participate (dashed blue line) in an interagency financial stability committee. Panel (c) shows the average across all countries for which the central bank has (red solid line) or does not have (dashed blue line) a supervisory oversight role for financial institutions. For reference, we add vertical lines for the following key dates (quarterly equivalent): the collapse of Lehman Brothers (marked as October 2008), the second Greek bailout (marked as March 2012), and the Brexit referendum (market as July 2016).

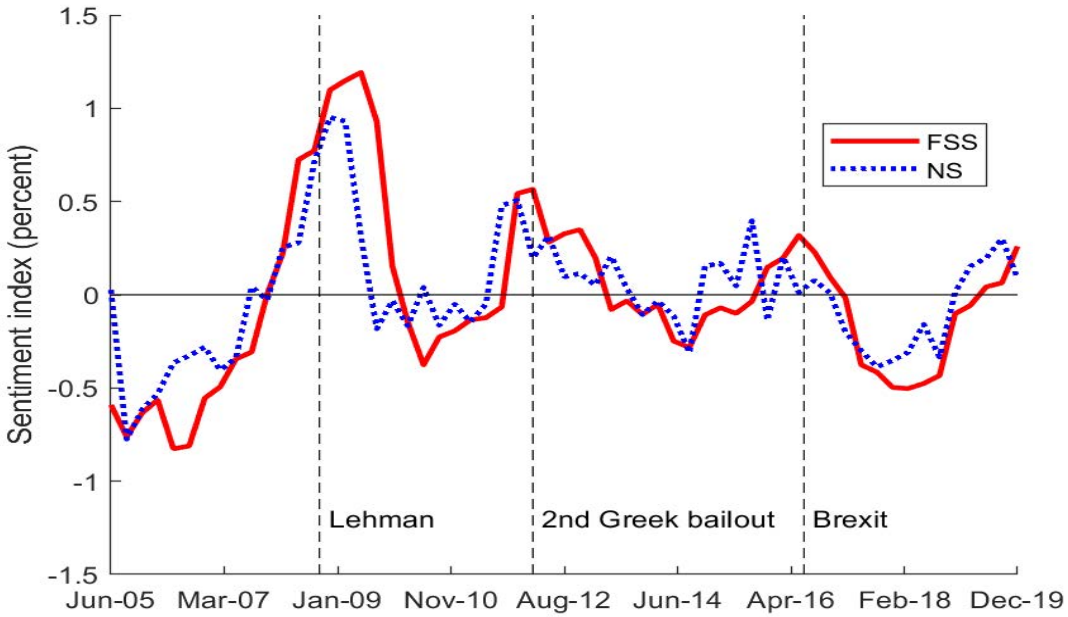


(c) Supervisory oversight role

Figure 2: Financial stability sentiment indexes. Averages across countries with certain governance frameworks, continued



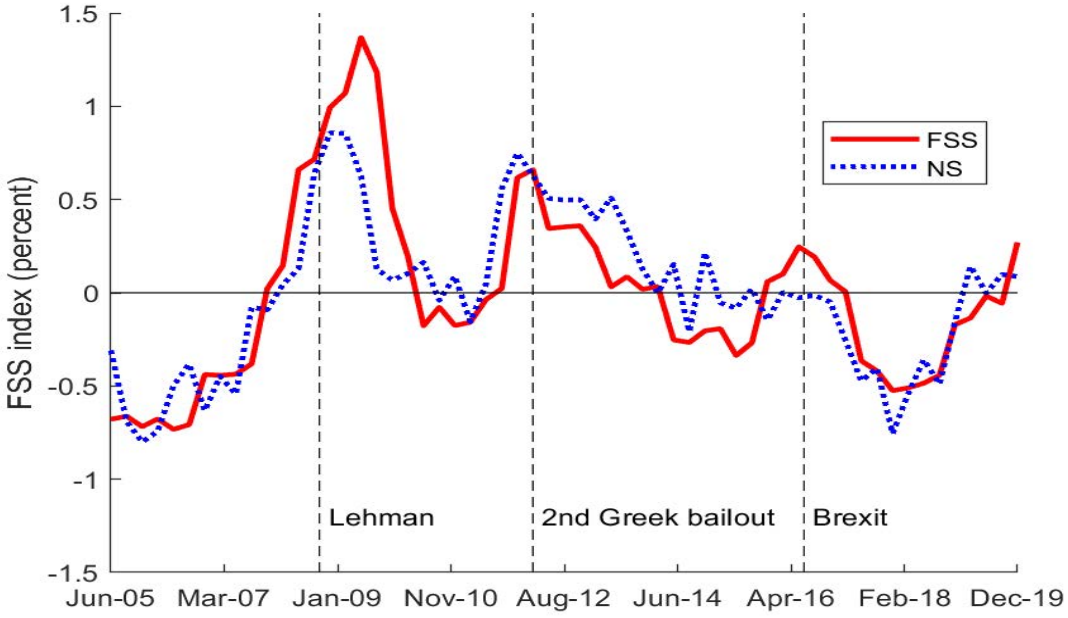
(a) All countries



(b) Interagency financial stability committee

Figure 3: Financial stability sentiment indexes from financial stability reports and from news articles. Averages across countries with certain governance frameworks

Panel (a) compares the sentiment from financial stability reports with that obtained from news articles. These indexes are calculated as the proportion of negative to positive words in either financial stability reports (FSS) or financial stability news articles (NS). The time series shown are equally-weighted averages of all countries' demeaned sentiment indexes. Panel (b) shows the average across all countries for which the central bank participates in an interagency financial stability committee. Panel (c) shows the average across all countries for which the central bank has a supervisory oversight role for financial institutions. For reference, we add vertical lines for the following key dates (quarterly equivalent): the collapse of Lehman Brothers (marked as October 2008), the second Greek bailout (marked as March 2012), and the Brexit referendum (market as July 2016).



(c) Supervisory oversight role

Figure 3: Financial stability sentiment indexes from financial stability reports and from news articles. Averages across countries with certain governance frameworks, continued

Internet appendix of "Financial Stability Governance and Central Bank Communications"

Table A.1: Turning points in the credit-to-GDP gap

This table shows the dates when turning points in the credit-to-GDP gap occurred for each country in our sample. Turning points are defined as local credit-to-GDP maximums that are followed by a decrease in the gap over at least the next 4 quarters.

Country	Turning points	Dates
Argentina	2	2014q1, 2018q3
Australia	2	2007q3, 2016q2
Austria	2	2006q3, 2010q2
Belgium	4	2009q3, 2012q2, 2013q2, 2016q2
Canada	5	2009q4, 2011q3, 2013q2, 2016q3, 2018q2
Chile	3	2009q1, 2009q3, 2015q3
Czech Republic	5	2009q4, 2011q2, 2013q4, 2016q3, 2018q3
Denmark	4	2007q4, 2009q3, 2011q3, 2012q1
Germany	0	
Hong Kong	9	2005q2, 2007q3, 2008q3, 2011q2, 2012q1, 2014q2, 2015q1, 2017q2, 2017q4
Hungary	4	2006q2, 2009q1, 2010q2, 2011q3
Indonesia	7	2013q4, 2014q2, 2014q4, 2015q2, 2016q4, 2017q4, 2018q3
Netherlands	3	2005q2, 2012q2, 2015q1
New Zealand	2	2007q2, 2009q1
Norway	5	2005q4, 2009q2, 2010q2, 2012q1, 2016q3
Poland	6	2009q1, 2010q2, 2011q3, 2013q2, 2014q2, 2015q2
Portugal	4	2005q2, 2009q2, 2010q4, 2012q4
Singapore	9	2008q4, 2009q3, 2014q3, 2015q2, 2015q4, 2016q2, 2017q2, 2017q4, 2018q2
South Africa	2	2008q1, 2016q1
Spain	1	2007q2
Sweden	6	2009q3, 2012q1, 2012q3, 2013q2, 2014q1, 2015q1
Switzerland	4	2010q1, 2012q4, 2013q4, 2018q1
Turkey	7	2006q2, 2008q2, 2011q2, 2013q3, 2015q3, 2016q4, 2018q3
United Kingdom	4	2006q3, 2008q4, 2009q3, 2010q1

Table A.2: Financial stability governance frameworks and the predictive power of financial stability communications for turning points in the financial cycle. Alternative FSS indexes

This table reports the results for the following probit specification:

$$Pr[TP_{i,t+4} = 1] = \Phi[X_{i,t}\beta],$$

where $TP_{i,t}$ is a dummy that takes the value of 1 when there is a turning point in the credit-to-GDP gap followed by a decrease in the gap over at least the next 4 quarters and $X_{i,t}$ contains one of the following alternative (demeaned) financial stability sentiment index measures: the negativity index, in panel A, which is calculated as the proportion of negative to total words in financial stability reports, and the summary index, in panel B, which is calculated using only the text in the summaries of FSRs. For each governance framework characteristic, we split the sample into central banks with that characteristic ("Yes") and those without it ("No"). *,**, and *** represent 10%, 5%, and 1% significance levels, respectively.

Panel A. FSS negativity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Committee		Official commitee		Committee with powers		Supervisory oversight	
	Yes	No	Yes	No	Yes	No	Yes	No
FSS negativity	0.08	0.24*	-0.19	0.24**	-0.97**	0.20*	-0.13	0.31***
	(0.13)	(0.12)	(0.18)	(0.09)	(0.35)	(0.09)	(0.17)	(0.07)
R^2	0.00	0.01	0.01	0.01	0.09	0.01	0.00	0.02
N	672	659	410	921	80	1,251	671	660

Panel B. FSS summary

FSS summary	0.06	0.14***	0.02	0.13***	-0.43***	0.13***	-0.01	0.19***
	(0.07)	(0.04)	(0.12)	(0.03)	(0.05)	(0.03)	(0.08)	(0.04)
R^2	0.00	0.03	0.00	0.02	0.13	0.02	0.00	0.04
N	629	607	367	869	80	1,156	576	660

Table A.3: Financial stability governance frameworks and the predictive power of financial stability communications for turning points in the financial cycle. Adding control variables

This table reports the results for the following probit specification:

$$Pr[TP_{i,t+4} = 1] = \Phi[X_{i,t}\beta],$$

where $TP_{i,t}$ is a dummy that takes the value of 1 when there is a turning point in the credit-to-GDP gap followed by a decrease in the gap over at least the next 4 quarters and $X_{i,t}$ contains the demeaned financial stability sentiment index calculated using the text in financial stability reports, $FSS_{i,t}$, the credit-to-GDP gap, CGDP gap, and the debt-service ratio, DSR. For each governance framework characteristic, we split the sample into central banks with that characteristic ("Yes") and those without it ("No"). *,**, and *** represent 10%, 5%, and 1% significance levels, respectively. Because the DSR is only available for a reduced number of countries (see table 4), this robustness test can only be done for some subsamples of countries with certain governance characteristics. We only report the results for central banks in interagency committees and with an oversight role.

	(1)	(2)	(3)	(4)
	Committee		Supervisory oversight	
	Yes	No	Yes	No
FSS	0.17***	0.25**	0.18	0.25***
	(0.05)	(0.08)	(0.12)	(0.06)
CGDP gap	0.03***	0.02**	0.03**	0.02***
	(0.01)	(0.01)	(0.01)	(0.00)
DSR	-0.03**	0.01	-0.01	-0.02**
	(0.01)	(0.01)	(0.02)	(0.01)
R^2	0.08	0.07	0.09	0.05
N	547	447	427	567