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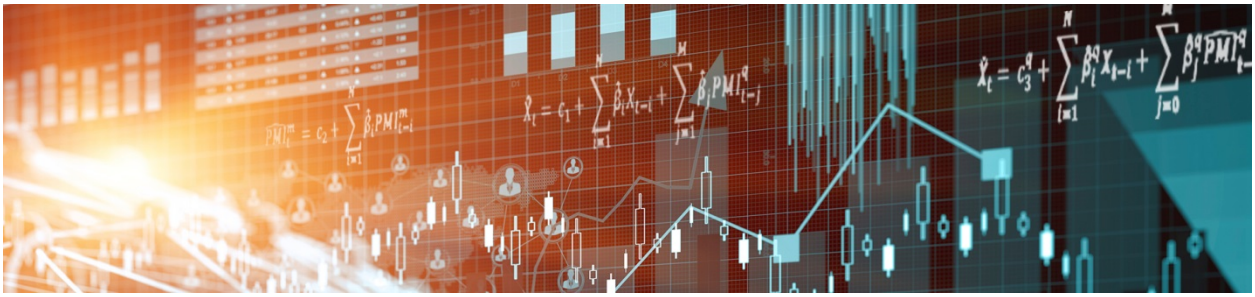
The Role of Central Banks in Promoting Financial Stability: An International Perspective



by Rose Cunningham and Christian Friedrich

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The Role of Central Banks in Promoting Financial Stability: An International Perspective

by

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Abstract

The 2007–09 global financial crisis has led policy-makers around the world, including central banks, to refocus their efforts to promote financial stability. As part of this process, central banks became quite active in supporting financial stability in a variety of ways, such as publicly sharing their assessments of financial system vulnerabilities and risks and helping to strengthen regulation, supervision and macroprudential measures. However, the use of monetary policy instruments for managing financial stability risks is more widely debated because central banks may face a trade-off between attaining their inflation targets in a timely manner and exacerbating financial stability risks. Recent research suggests that central banks that tend to have stronger financial stability mandates and less influence over regulatory and macroprudential tools are more likely to use monetary policy to address financial stability risks.

Bank topics: Financial stability; Financial system regulation and policies; International topics
JEL codes: E5, G01, G28

Résumé

La crise financière mondiale de 2007-2009 a amené les décideurs publics du monde entier, y compris les banques centrales, à réorienter les efforts déployés pour favoriser la stabilité financière. Dans le cadre de ce processus, les banques centrales se sont appliquées à soutenir la stabilité financière de diverses façons, notamment en communiquant publiquement leurs évaluations des vulnérabilités et des risques du système financier et en contribuant à renforcer la réglementation, la surveillance et les mesures macroprudentielles. Le recours à des mesures de politique monétaire dans le but de gérer les risques menaçant la stabilité du système financier est toutefois plus largement débattu, les banques centrales devant éventuellement trouver un arbitrage entre l'atteinte en temps voulu de leurs cibles en matière d'inflation et l'aggravation des risques liés à la stabilité financière. D'après des études récentes, les banques centrales qui tendent à accorder une place prépondérante à la stabilité financière au sein de leur mandat et à influer dans une moindre mesure sur les outils réglementaires et macroprudentiels sont plus susceptibles de se tourner vers les mesures de politique monétaire pour contrer les risques liés à la stabilité financière.

Sujets de la Banque : Stabilité financière; Réglementation et politiques relatives au système financier; Questions internationales

Codes JEL : E5, G01, G28

Section 1 | Introduction

The 2007–09 global financial crisis resulted in substantial costs to the global economy, including increased government debt, persistently high unemployment and prolonged periods of below-target inflation. It also clearly demonstrated that price stability does not necessarily translate into financial stability: a financial system's resilience in the face of adverse shocks that enables the continued smooth functioning of the financial intermediation process.[1] Efforts to promote financial stability have re-emerged as a high priority for policy-makers, including central bankers.

These efforts to promote financial stability have led to a comprehensive reform agenda designed to make the global financial system more resilient to shocks and reduce the risk of future financial crises. The reform agenda has included a series of international microprudential regulatory reforms (such as Basel III), an increase in the use of macroprudential tools and a re-examination of the role that monetary policy can play in supporting financial stability (Poloz 2015).

Schembri (2016) highlighted the important role that central banks can play in promoting financial stability by

- encouraging prudence on the part of borrowers and lenders and enhancing market discipline through increased transparency,[2]
- strengthening regulation and supervision of the financial sector,
- adopting macroprudential measures, and
- keeping the focus of monetary policy on the right objective.

In this paper, we use Schembri's framework to review the different ways that central banks contribute to the promotion of financial stability across 10 advanced economies.[3] Our findings are as follows:

- Most central banks regularly disseminate their independent analysis of financial system risks.
- Central banks play different roles in the formulation of microprudential and macroprudential polices across jurisdictions. Some central banks directly control these policies, while others play an advisory role.
- Experience with macroprudential controls is still fairly limited, and the literature has not yet reached a consensus on which policies are most

[1] As defined in the preface to the Bank of Canada *Financial System Review* (Bank of Canada 2015).

[2] The original speech treats these two elements as separate points.

[3] The advanced economies in our sample are Australia, Canada, European Union, Japan, New Zealand, Norway, Sweden, Switzerland, United Kingdom and the United States.

effective. However, there is some evidence that suggests that sector-specific policies (for example, targeting the housing sector) can significantly reduce credit growth.

- Monetary policy can be used to mitigate financial stability risks, but some evidence suggests a notable trade-off with macroeconomic and inflation stabilization.
- Some recent research suggests that central banks with stronger financial stability mandates and less influence over regulatory and macroprudential tools are more likely to use monetary policy to address financial stability risks.

The remainder of this note is organized along the lines of Schembri's framework. Section 2 discusses encouraging prudence and transparency, Sections 3 and 4 review measures to strengthen regulations and oversight of financial institutions as well as macroprudential policies. Section 5 explores the use of monetary policy to address financial stability concerns and Section 6 concludes.

Section 2 | Encouraging Prudence and Increasing Transparency

Central banks can inform households, firms, financial institutions and markets as well as regulators about the presence of financial vulnerabilities through the regular dissemination of publications on financial stability or through other forms of public communications, such as speeches by senior officials. By making their independent analyses and assessments public, central banks aim to increase awareness of the identified vulnerabilities. A central bank could, for example, encourage borrowers and lenders to account for the potential impact of higher future borrowing rates and provide information to agencies responsible for assessing consumer creditworthiness.

Table 1 shows that 9 out of 10 of the major central banks we surveyed publish reports on financial stability, like the Bank of Canada's *Financial System Review* (FSR). In all cases, these institutions began publishing their reports before the financial crisis. In some cases, these reports have become more frequent over time.[4]

[4] In Section 5 we discuss a quantitative analysis, which relies on information about publications on financial stability to assess how differences in monetary policy frameworks across central banks might affect the use of monetary policy to respond to elevated financial stability risks.

Table 1: Financial stability publications across central banks

Central Bank	Reserve Bank of Australia (RBA)	Bank of Canada (BoC)	European Central Bank (ECB)*	Bank of Japan (BoJ)	Reserve Bank of New Zealand (RBNZ)
Financial Stability Publication	Semi-annual since 2004Q1	Semi-annual since 2002Q4	Semi-annual since 2004Q4	Semi-annual since 2005	Semi-annual since October 2004

Central Bank *(Cont.)*	Norges Bank	Sveriges Riksbank	Swiss National Bank (SNB)	Bank of England (BoE)	US Federal Reserve
Financial Stability Publication	Published in *Economic Bulletin* since 1997; semi-annual separate report since 2000Q2; annual since 2013	Semi-annual since 1997Q4	Published in *Quarterly Bulletin* since 2003Q2; annual separate report since 2004	Semi-annual publication with the SIB** 1996–98, with the FSA** from 1998; semi-annual separate report since 2006Q2	Does not publish a financial stability publication directly. An annual report is published by FSOC** since 2011

* The ECB and EU central banks together perform the tasks of the European System of Central Banks
** Agency Abbreviations: SIB = Securities and Investments Board; FSA = Financial Services Authority; FSOC = Financial Stability Oversight Council

Section 3 | Strengthening Regulation and Supervision of Financial Institutions

Since the global financial crisis, international organizations, along with central banks, financial authorities and regulators, have strengthened the framework for regulation and supervision of financial institutions. Central banks contribute to developing and implementing global and national standards, such as the Basel III regulatory reforms, through international forums, such as the Financial Stability Board (FSB), the G20 and the Bank for International Settlements (BIS).

The allocation of supervisory and regulatory responsibilities varies considerably across countries. In some jurisdictions, such as the United Kingdom, New Zealand and Ireland, the central bank acts as the main prudential regulator and supervisor. Elsewhere, a separate body has primary responsibility for financial oversight and regulation but the central bank shares some of these duties (e.g., in the United States, the European Union and Switzerland). In other countries, including Canada, Sweden and Japan, the central bank provides analysis and advice to facilitate the development and implementation of appropriate policies.[5]

The current configuration of regulatory and supervisory responsibilities, in part, reflects concerns that complex regulatory systems could have gaps that lend themselves to arbitrage. Among the major advanced economies, some of the largest changes occurred in the United Kingdom and Europe. In 2012, the Prudential Regulation Authority was established as part of the Bank of England. It is responsible for prudential regulation and supervision of about 1,700 financial institutions. In Europe, the European Central Bank (ECB) and the national supervisory authorities created the Single Supervisory Mechanism as part of the European Union's banking union. This change allocated direct supervisory responsibility for the most significant banks in Europe (that hold more than 80 per cent of banking assets in the euro area) to the ECB, beginning in late 2014.

Section 4 | Adopting Macroprudential Policies

Regulation and oversight of financial institutions (also known as microprudential policies) can reduce risks to individual firms. However, to mitigate systemic risks, many countries have turned to macroprudential polices that aim to ensure the safety of the financial system as a whole. [6]

Macroprudential policies aim at preserving financial stability by directly targeting the systemic implications of different types of financial distortions and specific forms of excessive risk taking (e.g., see Kryvtsov, Molico and Tomlin 2015). These policies typically operate through adjustments in capital and liquidity requirements and in permissible terms of lending, affecting the cost of intermediation and the availability of credit.

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[5] Information on the regulatory tool kit used by central banks will be part of the quantitative analysis on the use of monetary policy to address financial stability risks in Section 5.

[6] While the term "macroprudential" has been used very prominently following the global financial crisis, the concept of "macroprudential policies" has been in use considerably longer. BIS (2010) notes that the term originated in October 2000, when BIS General Manager Andrew Crockett contrasted microprudential and macroprudential approaches to regulation and supervision.

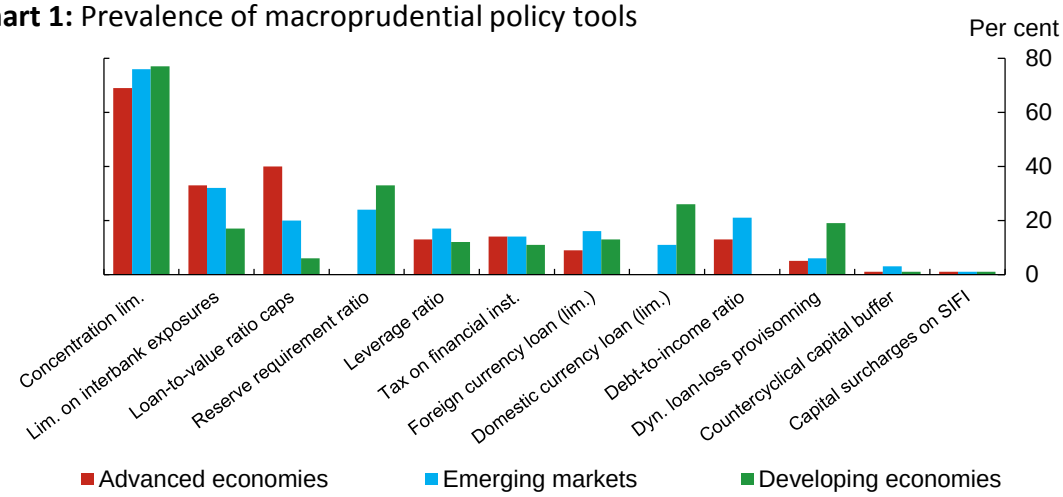
Some macroprudential measures, such as countercyclical buffers, countercyclical leverage ratios and time-varying rules on loan-to-value (LTV) ratios, are designed to increase the resilience of the system against cyclical vulnerabilities. These measures encourage financial institutions to build buffers to help absorb the impact of potential shocks or to lean against the financial cycle. Other macroprudential policies are aimed at structural vulnerabilities and may include applying more-stringent requirements and supervision to systemically important financial institutions.

In practice, there can be considerable overlap between the micro- and macroprudential tools, but the timing and rationale for the application of a particular policy instrument may differ depending on the objective. For example, consider bank capital ratios that may be used as both micro- and macroprudential tools. During an economic downturn, microprudential policies would encourage banks to increase their capital ratios, while macroprudential policies would encourage countercyclical lending to prevent adverse effects to the financial system from excessive deleveraging. To align the two objectives, bank capital ratios could be increased by raising capital levels (rather than reduced lending).[7]

Cerutti, Claessens and Laeven (2015) document the macroprudential policies used from 2000 to 2013 in 119 countries. They find that there has been increased use of macroprudential tools over this period in both advanced and emerging-market economies. **Chart 1** shows that concentration ratios and interbank exposure limits have been in place consistently across three country groupings. Advanced economies have made more use of LTV ratios, reflecting greater concern with risks related to the housing market. Emerging-market and developing economies have tended to use macroprudential tools more frequently than advanced economies. Similarly, Akinci and Olmstead-Rumsey (2015) build a data set drawing on both IMF survey data and BIS data on macroprudential policies. They find increased use of macroprudential tools in the past decade, most often tightening measures. The majority of these tightening policies have been measures related to the housing sector in advanced economies.

[7] See IMF, 2013, p. 32

Chart 1: Prevalence of macroprudential policy tools



Note: For each subgroup of countries, the frequency of use is the ratio of country-years using a given instrument to the total number of country-years using a macroprudential policy over the sample period, 2000--13. Abbreviations: Lim. = Limits; SIFI = Systemically Important Financial Institutions.

Source: Cerutti, Claessens and Laeven (2015)

While there is not yet a consensus in the literature on which policies are most effective, the available evidence suggests that macroprudential tools can increase the resilience of the financial system through both the buildup of buffers that absorb shocks and a reduction in structural vulnerabilities. There is mixed evidence, however, on the success of macroprudential policies in achieving a more ambitious goal of leaning against the financial cycle.[8]

Cerutti, Claessens and Laeven (2015) find that increases in an index of macroprudential tools are correlated with lower credit growth. Akinci and Olmstead-Rumsey (2015) find that sector-specific tools, especially those that target demand by borrowers (for example, limits on the loan-to-value ratios for mortgages), have been successful in significantly curbing credit growth and sometimes asset price growth. Less targeted tools appear to be less effective.

Macroprudential policies are often implemented within the context of a macroprudential framework, which consists of a system of rules, practices and processes that direct and control the policy. In **Table 2**, we briefly present the governance structures with respect to macroprudential policy of the 10 advanced economies in our sample.[9]

[8] See recent reviews of the literature by Kryvtsov, Molico and Tomlin (2015) and Akinci and Olmstead-Rumsey (2015).

[9] For a related discussion on macroprudential policy frameworks and monetary policy, see Jenkins and Longworth (2015).

Governance structures used to implement macroprudential policy frameworks differ substantially across jurisdictions, with the responsibility for implementing the macroprudential policy framework being vested in the ministry of finance, the prudential regulator, the central bank or a combination of these institutions. To exchange information, share technical expertise and facilitate decision making across institutions, countries have created committees, councils or task forces. These arrangements may involve other regulatory bodies and government institutions (such as the Financial Stability Oversight Council in the United States).

Table 2: Governance structures of macroprudential policy frameworks, an international comparison

	Australia	Canada	European Union	Japan	New Zealand	Norway	Sweden	Switzerland	United Kingdom	United States
Central bank	The Reserve Bank of Australia (RBA) chairs the Council of Financial Regulators (CFR), a forum for identifying issues and trends in the financial system. The RBA's Payments System Board (PSB) has regulatory authority for payments system stability.	The Bank of Canada (BoC) is a member of the Senior Advisory Council, (SAC), a non-statutory body which discusses macroprudential policy. The BoC also oversees financial market infra-structures and prominent payment systems.	The European Central Bank (ECB) and national central banks make up the majority of voting members in the European Systemic Risk Board (ESRB), which provides macroprudential oversight within the EU.	The Bank of Japan (BoJ) conducts on-site examinations and off-site monitoring of banks. The BoJ is also responsible for the operation and oversight of payment and settlement systems.	The Reserve Bank of New Zealand (RBNZ) is responsible for both prudential regulation and supervision and has authority over macroprudential measures.	The Bank of Norway (Norges Bank) shares macroprudential responsibilities with other institutions. It publicly issues advice to the Ministry of Finance on the use of the countercyclical capital buffer.	The Bank of Sweden (Riksbank) participates in the Financial Stability Council (FSC), a forum to discuss financial stability and financial imbalances. The Riksbank is responsible for promoting a safe and efficient payments system.	The Swiss National Bank (SNB) is responsible for proposing activation, modification or deactivation of the countercyclical capital buffer to the Federal Council.	The Bank of England (BoE) leads and hosts an independent committee, the Financial Policy Committee (FPC). The FPC gives directions on the use of macroprudential tools.	The US Federal Reserve is a member of the Financial Stability Oversight Council (FSOC), the macroprudential supervisory agency.
Ministry of finance	Participates in the CFR.	The Ministry of Finance is responsible for financial sector legislation and regulation, and these can have macro-financial implications. The Deputy Finance Minister chairs the SAC.	No equivalent at the European Union level.	The role of the Ministry of Finance in preserving financial stability has been limited since the establishment of the Financial Services Agency FSA. However, it plays an important role in crisis management.	A memorandum of understanding with the government established the RBNZ's authority over macroprudential measures. The RBNZ has to inform the Minister of Finance ahead of its decisions.	The Ministry of Finance sets the countercyclical capital buffer each quarter.	The Ministry of Finance is responsible for financial sector legislation and plays a role in crisis management. The Minister for Financial Markets (also the Deputy Minister of Finance) chairs the meetings of the FSC.	The Federal Council (which includes the ministry of finance) decides the stance of the countercyclical capital buffer.	The Treasury is a non-voting member in the FPC.	The FSOC is led by the US Treasury.
Prudential regulator	The Australian Prudential Regulation Authority (APRA) participates in the CFR and is responsible for the supervision of financial institutions and for the setting of (macro) prudential standards and instruments.	The Office of the Superintendent of Financial Institutions supervises and regulates federally registered banks, and other financial institutions. It sets the higher loss-absorbency requirement and the countercyclical capital buffer, informed by the SAC.	The ESRB can issue recommendations to national regulatory authorities.	The Japanese FSA serves as a regulatory authority for financial institutions. In June 2014, the BoJ and the FSA established a task force to exchange views on financial stability.	The Financial Markets Authority (FMA) is the agency responsible for financial/microprud ential regulation. It is responsible for regulating all financial market participants and exchanges and for setting and enforcing financial regulations.	The Financial Supervisory Authority of Norway (FSA; *Finanstilsynet*) is responsible for the supervision of banks and various other financial market participants.	The Swedish Financial Supervisory Authority (FSA; *Finansinspektionen*) is the macroprudential authority. The FSA participates in the FSC.	The Swiss Financial Market Supervisory Authority (FINMA) is consulted by the SNB and supervises the implementation of the countercyclical capital buffer at the individual bank level.	The Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA) are both represented in the FPC and receive directions on the use of specific macroprudential tools or instruments.	Federal regulators are represented in the FSOC.

Note: The Prudential Regulatory Authority (PRA), a subsidiary of the Bank of England, is responsible for the prudential regulation of banks. The Financial Conduct Authority (FCA) regulates financial firms providing services to consumers and maintains the integrity of financial markets in the United Kingdom.

Central banks play an important role in most of the macroprudential frameworks in these jurisdictions because of their unique, system-wide perspective that helps identify and assess systemic vulnerabilities and risks.

Section 5 | Using Monetary Policy to Address Financial Stability

The use of a central bank's monetary policy instruments is another policy option that could be considered for mitigating financial risks. Although the effect of monetary policy on borrowing costs, asset prices, the exchange rate and ultimately on economic activity and inflation are generally well understood, its effect on risk taking in the financial system and thus on financial stability is more debated.[10]

The objectives of financial stability and price stability are ultimately complementary. In some circumstances, however, central banks may face a trade-off between attaining their inflation target in a timely manner and exacerbating financial stability risks.[11] **Chart 2** illustrates the potential for such a trade-off by showing combinations of financial and economic gaps.[12] To illustrate, we chart these gaps in a pre-crisis year, 2006, and a post-crisis year, 2014.

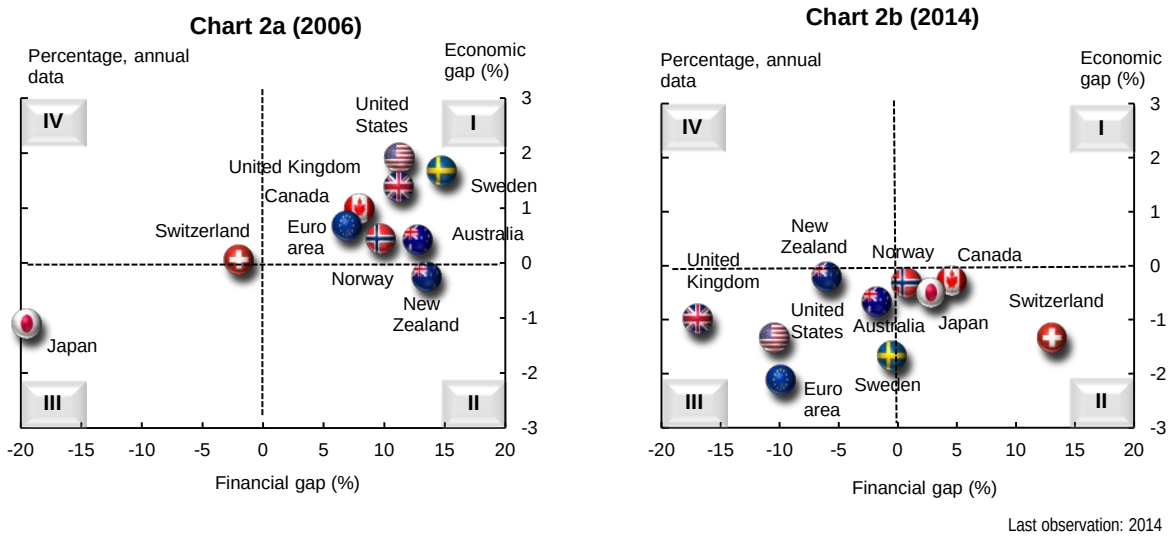
If inflation is above target and financial variables are above their long-run trends, both the economic and the financial gaps are positive, as was the case for many advanced economies in 2006 (**Chart 2a, Quadrant I**). Tighter monetary policy would reduce both inflationary pressures and financial vulnerabilities, so there is no trade-off. Similarly, if the economy is in excess supply, the financial system is deleveraging and financial variables are below trend, both gaps are negative. Again, there is no policy trade-off, since easing monetary policy helps to increase growth and inflation without markedly increasing financial vulnerabilities. For example, economies in the United States, the United Kingdom and the euro area were in this position in 2014 (**Chart 2b, Quadrant III**).

[10] See Smets (2014), for example, for a literature review on the effect of monetary policy on risk taking and financial stability.

[11] See Lane (2016) for a detailed discussion of this trade-off.

[12] This analysis is based on IMF (2014). The economic gap is the average of the output gap and the deviation of inflation from target. Financial gap is the average of the credit-to-GDP gap and the property price gap. The financial gap is closely related to the notion of the financial cycle. Positive financial gaps imply an increased probability of financial vulnerabilities. Other authors, such as Drehmann and Juselius (2013), find that the credit-to-GDP gap is the best early warning indicator for banking crises in the long run.

Chart 2: Trade-off between macroeconomic policy and financial stability risk



Note: Chart 2 follows Figure 4 in IMF (2014) using data on 10 central banks in advanced economies. For details on the trend and gap construction, see IMF (2014) and references therein. The economic gap is the average of the output gap and the deviation of actual inflation from target. Financial gap is the average of the credit-to-GDP gap and the property price gap.
Sources: International Monetary Fund, Organisation for Economic Co-operation and Development, Bank for International Settlements and authors' calculations.

A potential trade-off may arise between the two objectives when there is a large and persistent negative economic gap and a large positive financial gap, as in **Quadrants II** of **Chart 2.** A highly persistent adverse foreign demand shock, for example, could cause the economy to contract while the domestic financial system remains unimpaired.[13] In this case, inflation targeting calls for monetary policy easing. However, a lower policy rate would affect interest-sensitive sectors disproportionately and encourage a buildup of indebtedness and possibly other financial vulnerabilities. Alternatively, monetary policy-makers could try to avoid exacerbating financial stability risks by easing monetary policy less aggressively than would otherwise be called for by taking longer to return inflation to target. This would result in weaker economic growth and lower inflation than would otherwise be the case. Similarly, pursuing a tighter monetary policy on an ongoing basis to address financial stability concerns (**Quadrants IV of Chart 2**) would not be optimal because it would move the economy increasingly further from its inflation target.

Recent research generally supports the existence of such trade-offs, but it remains an active area of debate (see Smets 2014). Several studies find that raising interest rates to tackle financial stability risks is likely to have materially adverse effects on macroeconomic activity, with limited financial stability benefits (e.g., IMF 2015; Kryvtsov, Molico and Tomlin 2015). Caruana (2011) argues that adverse macroeconomic effects from potential policy trade-offs

[13] Higher unemployment might impair the ability of firms and households to service their debts and thus adversely affect the stability of the financial system over the medium-term.

could be dealt with by lengthening horizon over which inflation is brought back to target. However, others argue that there is no trade-off because monetary policy may have an adverse effect on financial vulnerabilities (Svensson 2014)[14] or because of the close link between price, financial and fiscal stabilities (Brunnermeier and Sannikov 2014).

To examine the influence of financial stability risks on monetary policy decisions Friedrich, Hess and Cunningham (2015) consider data from 10 advanced economies (**Box 1**).[15] The authors classify central banks according to the extent to which financial stability concerns influence their monetary policy decisions. Financial stability concerns impinge more on monetary policy actions when the central banks have mandates for financial stability and when they have little control over regulatory and macroprudential tools. Analysis of panel data finds that when central banks have a strong financial stability orientation in their monetary policy decision,[16] they raise their policy rates in times of large credit booms—measured by a credit-to-GDP gap of 8 percentage points or higher—by 0.3 percentage points more, on average, than central banks that do not have such an orientation. The corresponding measure of a large credit boom relates closely to the presence of a positive financial gap. The authors' estimates further suggest that when central banks have a high financial stability orientation, they respond less to inflation or output gaps, compared with those with a low financial stability orientation. This second result provides some empirical evidence that is consistent with the existence of a perceived trade-off, for central banks with a high financial stability orientation.

[14] The underlying argument is that higher policy rates affect the denominator of the household debt-to-income ratio more negatively, i.e., reducing household incomes because of slower economic activity, than it affects the numerator positively, i.e., reducing household debt as a consequence of higher interest rates. However, many of the research results draw on model simulations, and there are some limitations to these kinds of models because they cannot fully account for an unsustainable buildup of debt, the occasional occurrence of crises and periods of significant deleveraging.

[15] The country sample corresponds to the 10 advanced economies listed above at the beginning of this paper.

[16] Central banks that have "a strong financial stability orientation in their monetary policy decision" are those that have a mandate to promote financial stability but lack control over the macroprudential tools. The authors test empirically whether financial stability concerns affect these central banks' rate setting behaviour.

Box 1: The Impact of Institutional Frameworks on the Monetary Policy-Making Process

Friedrich, Hess and Cunningham (2015) create a time-varying index to measure the financial stability orientation (FSO) of monetary policy decisions and apply it to the central banks of 10 major advanced economies for the period from 2000Q1 to 2014Q4. This index measures the extent to which the banks' institutional framework incorporates financial stability objectives into the monetary policy decision, based on three dimensions:[1]

Statutory: Having a legal mandate to address financial stability risks suggests that a central bank would be more likely to use the policy rate to address financial stability concerns. Consequently, a higher value is assigned in the FSO index when the mandate includes a financial stability clause or when the central bank interprets its mandate as such (we use the publication of a report on financial stability as a proxy for the interpretation of a mandate with respect to financial stability).

Regulatory: As discussed above, the degree to which a central bank has authority over the micro- or macroprudential regulatory tools varies across jurisdictions. We therefore classify each central bank's regulatory and macroprudential authority as either "primary," "shared" or "supporting," where "primary" indicates the highest degree of direct control and "supporting" is the least (usually the authority rests with another institution). If a central bank has sole authority or shared control over the more targeted prudential regulatory tools, it has less need to resort to using the monetary policy rate to address financial stability concerns.[2] Therefore we assume that more control over the prudential regulatory tools reduces the value of the FSO index since the central bank would likely prefer to use those more targeted tools rather than the policy rate to mitigate financial sector risks.

Discretionary: If a central bank exercises discretion and uses the policy rate to address financial stability risks, its monetary policy statements would likely often discuss financial stability topics. This dimension is measured by the frequency with which financial stability terms appear in such statements relative to those about inflation or output. An increase in the ratio of statements about financial stability to those about inflation or output translates into a higher value of the FSO index.

Values of these dimensions are summed to form the aggregated FSO index, which ranges from 0 to 3. However, the authors find that most of the results are driven by the first two dimensions.

An example, using the United Kingdom and Sweden in 2014Q4, illustrates how the index is constructed. The Bank of England's mandate contains an explicit financial stability clause, but the Bank of Sweden's does not. Since both central banks regularly publish a report on financial stability, the respective scores in the statutory dimension are 1 for the United Kingdom and 0.5 for Sweden. Further, the Bank of England is the primary macroprudential and regulatory authority, while Sweden's central bank has a supporting role. Thus, the corresponding scores

for the regulatory dimension, which are inversely assigned, are 0 for the United Kingdom and 1 for Sweden. The values for the discretionary dimension in both countries are (coincidentally) identical in 2014Q4 and amount to approximately 0.05 for each country—a value at the lower end of the cross-country spectrum. The sum of the three dimensions gives the aggregate FSO index value for 2014Q4 of 1.05 for the United Kingdom and 1.55 for Sweden, suggesting that Sweden's monetary policy is more likely to be influenced by financial stability concerns than that of the United Kingdom is.

The authors then use data for the period from the 2000Q1 to 2014Q4 to estimate an augmented Taylor rule, which includes their FSO index and an indicator variable for large credit booms (to capture elevated financial stability risks), as follows:

$$i_{i,t} = \mu + \mu_t + \mu_i + \alpha_1 \cdot InfExpGap_{i,t} + \beta_1 \cdot OutputGap_{i,t} + \gamma_1 \cdot D\_CreditBoom_{i,t-1}$$
$$+ \delta \cdot FSOIndex_{i,t} + \gamma_2 \cdot D\_CreditBoom_{i,t-1} \times FSOIndex_{i,t} + \varepsilon_{i,t}$$

where $i_{i,t} =$ the central bank's policy interest rate; $\mu, \mu_t, \mu_i =$ regression constant and time and country fixed effects; $InfExpGap_{i,t} =$ inflation expectations gap; $OutputGap_{i,t} =$ output gap; $D\_CreditBoom_{i,t} =$ a binary indicator variable for large credit booms;[3] $FSOIndex_{i,t} =$ FSO index (with higher values for central banks more prone to having financial stability concerns affect their monetary policy decisions); and $\varepsilon_{i,t} =$ error term.

[1] To convert qualitative information into a quantitative index, one has to focus on a subset of important factors and abstract from generally less important ones. However, for individual countries, some of these excluded factors could potentially still play an important role in the policy-making process. It is also important to note that the assessment above relies only on observable characteristics. It is not possible to capture the informal channels through which the central bank might exercise an influence on prudential regulation using the regulatory dimension as an example.

[2] This interpretation is in line with the following remark by Lael Brainard, who is a member of Board of Governors at the Fed, in 2014: "If, in the future, the United States did face a similar dilemma, where financial imbalances are growing rapidly against a backdrop of subpar economic conditions, the Federal Reserve may consider monetary policy for financial stability purposes more readily than some foreign peers because our regulatory perimeter is narrower, [...], and the macroprudential toolkit is not as extensive." (See Brainard 2014).

[3] The indicator variable for large credit booms takes the value of one if the smoothed credit-to-GDP ratio is more than 8 percentage points above its long-run trend, which is estimated since 1975 (and zero otherwise).

The interactions between monetary policy and financial stability objectives can be complex. Some recent research, including analysis at the Bank of Canada, e.g., Friedrich, Hess and Cunningham (2015), suggests that there are at least some potential trade-offs in using monetary policy to meet price stability objectives and to address financial stability concerns. Moreover, if monetary policy is tightened to reduce the buildup of vulnerabilities (e.g., by decreasing household debt levels) it could also trigger a risk event (e.g., by inducing a recession). Hence, the use of monetary policy to address financial stability concerns needs to be weighed carefully.

Section 6 | Conclusion

This paper draws on the recent literature and international experience to assess the role of central banks in mitigating financial stability risks. The reaction to the global financial crisis, has demonstrated that promoting financial stability is a high priority for policy-makers, including central bankers. Surveying the recent experience of 10 central banks, we find that most publicly share their independent analysis about the potential vulnerabilities and risks in the financial system. Institutional arrangements for micro- and macroprudential policy vary considerably across jurisdictions, with central banks playing different roles. In some countries central banks directly control micro- and macroprudential policies, while in others they have an advisory role. The use of monetary policy to mitigate financial stability risks appears to be an additional tool for central banks. However, the available evidence suggests that potential trade-offs with macroeconomic objectives can arise and the policy response needs to be carefully considered. In practice, central banks that tend to have stronger financial stability mandates and less influence over regulatory and macroprudential tools are more likely to use monetary policy to address financial stability risks.

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