

Financial Stability Considerations and Monetary Policy?

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Abstract: The Federal Reserve faces a dilemma with respect to financial stability. On the one hand, the simplest interpretation of its mandate gives the Federal Reserve a limited role in addressing financial stability risks. On the other, the fact that the Fed now publishes a detailed financial stability report suggests that it sees financial stability to be of critical importance, and there is no part of the U.S. government that can mitigate all of the threats identified by the Fed. Furthermore, unconventional monetary policy tools can interact with financial stability considerations. Hence, the Federal Reserve has strong incentives to ensure that risk are not only identified but also addressed. We argue that Congress should evaluate the effectiveness of the post-crisis regulatory reforms, including whether authorities have sufficient flexibility to react to new vulnerabilities.

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Introduction

“The Board of Governors of the Federal Reserve System and the Federal Open Market Committee shall maintain long run growth of the monetary and credit aggregates commensurate with the economy's long run potential to increase production, so as to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates” Monetary Policy Objectives, Federal Reserve Act

A plain reading of the Federal Reserve Act’s instructions regarding monetary policy objectives makes no reference to financial stability considerations. So it might seem odd to have a paper on financial stability commissioned for a conference organized to assist the Fed in assessing its review “of the monetary policy strategies, tools, and communication practices”. We suspect the reason for including the paper is two-fold. First, financial instability was a central feature of the last recession. That recession was very costly and in the course of battling it, the Fed and other central banks were forced to resort to unconventional and at the time untested monetary policy tools. Second, it is widely believed that some of these policies will become part of the standard toolkit and that, unless accompanied by appropriate macroprudential safeguards, they could have the potential to contribute to instability. Both of these factors suggest that there are important interdependencies between monetary policy and financial stability.

Echoing Dudley (2015) and Fischer (2015), we argue that the U.S. does not currently have a fully effective framework for managing financial stability risk. The Financial Stability Oversight Council (FSOC) has a limited set of tools and powers that would not be sufficient to prevent a replay of the last crisis. It also has a limited ability to attend to financial stability risks that the Federal Reserve currently is concerned about.

These considerations put the Federal Open Market Committee (FOMC) in a difficult position. The most natural interpretation of its mandate might be for the FOMC to ignore financial stability risks, and focus on a narrow interpretation of mandate. However, given the important interactions between monetary policy and financial stability risks, this option does not seem credible. This leaves three options. The Fed could hope that Congress will reorganize the FSOC to expand its toolkit and powers. A second option is that Congress amends the Federal Reserve Act to give the Federal Reserve an explicit financial stability objective and the additional powers necessary to achieve that objective. A third possibility is the FOMC could conclude that financial stability is a necessary condition for maximum sustainable employment and stable prices. Hence, it could begin to incorporate financial stability considerations into its deliberations over monetary policy.

The remainder of the paper has four parts. First, we discuss the Federal Reserve’s approach to identifying financial stability risks as laid out in its recently-launched Financial Stability Report. By publishing a high-quality analytical Financial Stability Report, the Federal

Reserve demonstrates that it takes financial stability risks seriously and sees them to be an important risk to the economic outlook.

Next, we consider two sets of financial stability risks that authorities might need to address at some point in the future. Drawing heavily on Aikman et al (2019), we review the events leading up to the last crisis and explain what types of policy interventions would be necessary if we found ourselves faced with similar vulnerabilities. To consider a timelier example, we also consider which interventions might be necessary if the vulnerabilities identified in the Federal Reserve's recent FSRs were to persist and intensify. In both cases, we find that the FSO (as the authority formally in charge of financial stability) and its members would not have all of the necessary powers to mitigate these threats.

In a third section we argue that the Federal Reserve should take this regulatory underlap seriously: a future financial crisis would make it difficult for the Federal Reserve to achieve its dual mandate of price stability and full employment, given low equilibrium interest rates and potentially more limited monetary policy space; the regulatory underlap means that it cannot rely on other authorities to offset any unintended consequences that its monetary policy stance might have for financial stability.

The final section considers the options mentioned above for attending to future financial vulnerabilities. Each of these options has costs and benefits, so we do not see one dominant option. However, we think our analysis suggests that doing nothing and accepting the status quo arrangements is unwise. There is a strong case for Congress convening a Commission to review the effectiveness of the post-crisis regulatory reforms, including whether authorities have sufficient flexibility to react to new vulnerabilities. The fact that financial stability policy and monetary policy are not always separable from each other means that it should also be in the Federal Reserve's interest to make sure that financial stability risks are not only identified but also effectively addressed.

1. The Federal Reserve's Financial Stability Report and its role in identifying financial stability risks

Despite lacking an explicit financial stability objective that extends beyond its supervisory responsibilities, in November 2018 the Federal Reserve launched a biannual *Financial Stability Report* (FSR, Board of Governors of the Federal Reserve (2018)). In May 2019 it published the second edition of this report. The FSRs begin by stating that the report “*summarizes the Federal Reserve Board's framework for assessing the resilience of the U.S. financial system and presents the Board's current assessment.*” The decision to publish an FSR despite not being explicitly responsible for financial stability suggests that the Federal Reserve considers financial stability risks to be of critical importance for the country's overall economic outlook.

The FSR is a high-quality, analytic document that is filled with detailed commentary about the financial vulnerabilities facing the United States. It groups vulnerabilities into four categories: elevated asset valuations, excessive borrowing by businesses and household, excessive leverage within the financial system, and short-term funding risks. For each of these categories the FSR includes a wide range of data and useful charts that help the reader form a top-down view on current financial stability risks. The grouping itself, especially if we recognize that some of these factors are connected and interact, encompasses pretty much every plausible channel through which financial instability could arise. So the FSR casts a wide net in assessing risks that the Federal Reserve Board considers most important.

However, there are aspects of the way the FSR analysis is organized, and issues that are omitted, that are striking. First, while the FSR contains an overview section that describes the Federal Reserve's view on each of the various risk categories, it offers no summary measure of financial vulnerabilities. Even within each of the four categories that the FSR considers, it presents multiple indicators and leaves it to the reader to reconcile various pieces of countervailing information with the overall assessment of the risks.

Absent any agreed upon summary indicators, different policymakers are free to cherry-pick their own preferred indicators of vulnerabilities, which makes reaching a consensus on the size of the vulnerabilities difficult; and having a consensus position on the risks the system is facing is presumably a necessary precursor to agreeing on any actions to address these risks. Imagine trying to achieve a dual mandate of stable prices and maximum employment without having agreed on any price or labor market statistics to discipline the discussion.

A second, related issue is that the FSR stops short of discussing potential policy interventions or recommending that relevant authorities take action. This may simply reflect the Federal Reserve's assessment that the current risk environment does not require any policy action; but it may also reflect the fact that the Federal Reserve is not explicitly tasked with addressing financial stability risks, and may prefer to leave it to other authorities to draw the necessary conclusions.

A third issue is the way in which debt vulnerabilities are analyzed. The experience in the global financial crisis suggests that *who* ends up owing the debt can be much more important than the aggregate level of household debt. Most theories of deleveraging risk also point to the importance of focusing on the condition of the most highly indebted borrowers and the possibility that these borrowers could be forced to cut spending in a downturn. Kashyap (2019) explains why, for households, the distribution of the debt service to income ratio (DSR) merits special attention. Essentially, he argues that when the right hand tail of that distribution rises, it signals that the number of at-risk households has risen and deleveraging risk is higher. Yet, the FSR shows no data on the distribution of debt service ratios for households. The analysis of corporate indebtedness is more granular, but is largely restricted to large, listed companies.

Analyzing the distribution of debt servicing ratios can be challenging, as it requires detailed loan-level data. The Federal Reserve would appear to be in a good position to look at some of these issues. It already runs a detailed Survey of Consumer Finance that provides insights into the debt burdens of the most highly indebted borrowers. And the Home Mortgage Disclosure Act requires the vast majority of mortgage lenders to report their mortgage origination activity to the Federal Financial Institutions Examination Council. However, the data is subject to limitations which make it difficult to get a complete picture of household DSRs.¹ For corporate borrowers, the Federal Reserve can rely on the financial statements of publically listed firms or data on leveraged loan markets to provide some break-down of debt levels by borrower types. But data availability can still be an issue when assessing the distribution of debt amongst smaller, privately-held companies.

2. Addressing financial stability risks

Having argued that by publishing a comprehensive Financial Stability Report, the Federal Reserve acknowledges that financial stability is an important determinant of economic performance, we next consider whether the Federal Reserve can rely on others to address any risks that it might identify in its FSR. In particular, we will focus on whether the FSOC as the authority formally responsible for US financial stability could be reasonably expected to address all identified vulnerabilities.

We take two perspectives on this question. First, we will draw on the analysis in Aikman et al (2019) to identify the vulnerabilities that led to the global financial crisis, and consider the actions that authorities would have had to take to address these vulnerabilities. Second, we consider the main vulnerabilities identified in the Federal Reserve's November 2018 and May 2019 FSRs and consider the types of interventions that might be necessary if these vulnerabilities were judged to require policy action.

2.1 Addressing vulnerabilities that developed in the run-up to the financial crisis

Aikman et al (2019) argue that the financial system prior to the global financial crisis was vulnerable because of three considerations. First, in the run-up to the financial crisis, the overall financial system was undercapitalized relative to the risks it was exposed to. Leverage in the traditional commercial banking system had remained largely the same, however certain nonbank financial institutions (most notably broker-dealers) that were outside of the regulatory perimeter had grown substantially. These entities have always

¹ For instance, the data reported as part of the Home Mortgage Disclosure Act includes second liens mortgages separately, which makes it difficult to look at households' combined DSRs. It also does not include other debts, such as auto loans and student loans. And while it contains data on borrowers' income and the size and interest rate of the loan, it does not include data on the term of the loan. This means that amortization cost and DSRs have to be estimated based on average mortgage terms (see Butta, Popper, and Ringo (2015)).

relied on high leverage, and had largely funded this growth by issuing more debt. They were hence much less able to absorb losses than commercial banks. One striking fact is that between 2001 and 2007, nonbank financials accounted for over 70 percent of the total growth in home mortgage credit. Table 1 shows the leverage across different parts of the financial system.

Table 1: Size and structure of the leveraged financial system

Size, leverage, and liquidity risk of leveraged financial institutions								
	2001Q4				2007Q4			
	Assets (\$bn)	Leverage	Liquid assets	Short-term funding	Assets (\$bn)	Leverage	Liquid assets	Short-term funding
Commercial banks	6,552	11.0	6.6%	26.5%	11,182	9.8	4.6%	33.2%
Savings Inst.	1,317	11.6	3.0%	18.2%	1,852	9.1	2.3%	22.6%
Broker-dealers	2,376	28	2.4%	57.3%	4,686	45	0.4%	63.4%
GSEs	1,417	42.3	0.2%		1,677	23.7	0.7%	
Total	12,657				19,397			

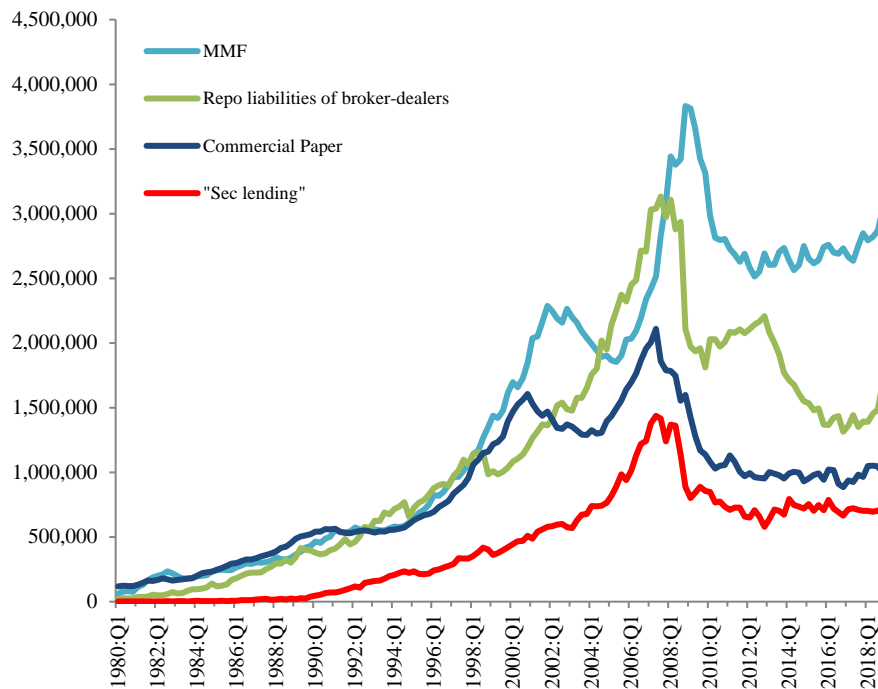
Notes: “Leverage” is defined as total assets divided by (book) equity. “Liquid assets” refers to the ratio of cash and Treasury securities to total assets. For brokers, “short-term funding” refers to repo funding relative to total assets. For deposit-takers, it refers to (estimated) uninsured domestic deposits and foreign deposits relative to total assets. While deposits are typically short-term liabilities, many types of deposits, including insured deposits in particular, are ‘behaviorally stable’ and were not withdrawn during the crisis (see Martin et al. (2018)). Government-sponsored enterprises (GSEs) include Fannie Mae and Freddie Mac. *Source:* Aikman et al, 2019.

The Table also shows clearly the second important vulnerability: the nonbanks were particularly reliant on short-term debt funding that could be withdrawn quickly in the event of stress. For example, the repo liabilities of broker-dealers increased from \$1.4 trillion in 2001 to \$3.0 trillion in 2007 (see Figure 1).

The third important risk was the unprecedented surge in US household debt (Table 2). Mortgage debt doubled in the six years before the crisis, and by 2007 reached 72 percent of GDP. That boom was accompanied and reinforced by soaring property prices, which rose by two-thirds in the five years to their peak in early 2006.

The aggregate loan-to-value ratio on the stock of US housing remained broadly flat during this period, meaning that for each 1 percent increase in house values, homeowners also increased their mortgage debt by around 1 percent. In part, this reflected the fact that existing homeowners extracted housing equity by taking out additional debt. More importantly, new homeowners took out larger mortgages in order to purchase more expensive homes.

Figure 1: Increase in short-term liabilities in the financial system in \$ million



Source: Financial Accounts of the United States, based on Adrian, de Fontnouvelle, Yang, and Zlate (2017). The size of money-market funds is measured as outstanding money market fund shares (liabilities) in table L.121. Commercial paper refers to commercial paper (liabilities) issued by any sector (table L.2019), which includes asset-backed commercial paper. Repo liabilities of broker-dealers are based on security repurchase agreements (liabilities) in table L.130. Securities lending captures net securities loaned by funding corporations in table L.132.

As a result, affordability metrics for a tail of highly indebted households become increasingly stretched. The share of the stock of mortgagors with debt of over four times their income more than doubled between 2001 and 2007 from 6 percent to 13 percent. The number of new subprime mortgages nearly doubled between 2003 and 2005, and 80 percent of these mortgages were made with short-term “teaser” interest rates (Mayer, Pence, and Sherlund (2009)).

Financial fragility and household debt affected the depth of the subsequent downturn in two separate but related ways. The fragilities in the financial system meant that lenders had to cut back lending as they struggled to absorb losses and saw funding withdrawn, which led to a credit crunch that reduced investment and employment. As households also struggled to deal with excessive debt, they cut spending, amplifying the downturn further. This effect is typically referred to as the “aggregate demand externality”.²

² See Kashyap and Lorenzoni (2019) for a model that captures stability risks from both borrower and lender vulnerabilities and can be used to study when separate tools are needed for attending to both.

Table 2: U.S. household debt and its characteristics

PANEL A: Household debt and house price boom					
	2001Q4	2004Q4	2007Q4	2017Q4	
Level of indebtedness: \$ trn; (% GDP in parenthesis)					
Household debt	\$7.9 (73.4%)	\$10.9 (86.4%)	\$14.3 (97.1%)	\$15.1 (76.6%)	
of which: Mortgage debt	\$5.3 (49.7%)	\$7.9 (62.5%)	\$10.6 (72.4%)	\$10.1 (51%)	
House prices					
Annual growth	6.7%	13.7%	-5.3%	6.2%	
Loan to value ratio (Mortgage debt / Housing assets)					
Household sector	35.8%	37.6%	45.7%	36.1%	
PANEL B: The heavily-indebted tail and marginal borrowers					
	2001Q4	2004Q4	2006Q4	2007Q4	2017Q4
Heavily-indebted tail	2001	2004	-	2007	2016
LTV > 90%	9.5%	9.4%	-	9.4%	10.6%
Debt to income >4x	6%	11%	-	13.2%	10.7%
DSR > 40%	16.9%	17.3%	-	20.2%	13.9%
Marginal borrowers	2003	2004	2005	2006	2007H1
Subprime					
Originations (# million)	1.1	1.7	1.9	1.4	0.2
Median combined LTV (%)	90%	95%	100%	100%	100%
Proportion on “teaser” rates (%)	68%	77%	81%	77%	68%
“Near-prime:” Alt-A pools					
Originations (# million)	0.3	0.7	1.1	0.9	0.3
Median combined LTV (%)	90%	90%	90%	95%	95%
Proportion interest only (%)	16%	37%	40%	44%	52%

Sources: see Aikman et al (2019).

Possible Interventions

Based on a range of studies, Aikman et al (2019) find that each of these two channels can explain between one third and one half of the depth of the crisis. So in order to make a meaningful difference to the severity of the crisis, authorities would have had to address both financial fragilities and household indebtedness. Aikman et al (2019) estimate that policy interventions to significantly reduce both of these vulnerabilities would not have been prohibitively expensive, but would have required an activist approach to macroprudential regulation.

However, the authority nominally in charge of financial stability, the FSOC, lacks the powers that would have been necessary to fully address the vulnerabilities that developed in the run-up to the crisis. In particular, the FSOC has no authority that would allow it to limit household debt build-ups. It could have issued a “comply or explain” recommendation to the predecessor of the Federal Housing Finance Agency or relevant banking regulators to restrict

the availability of mortgage financing. But it is not clear that these agencies would have had the authority to intervene on the grounds of financial stability concerns.³ And while many macroprudential authorities rely on issuing non-binding recommendations, the FSOC's attempts to issue recommendations have in the past received push-back from the relevant primary regulators.⁴ In the context of money market mutual funds the FSOC never finalized the draft recommendation that it had consulted on, even as the Securities and Exchange Commission decided to implement reforms that were more limited in scope.

The FSOC's ability to move unregulated entities into the regulatory perimeter is also limited. The FSOC's primary tool is the ability to designate nonbanks for enhanced supervision by the Federal Reserve, and for higher capital requirements. However, this process is limited to designating a small number of systemically important institutions, and some designations have been challenged and overturned by the courts. The FSOC can also issue "comply or explain" recommendations to recommend imposing new or heightened standards for all firms conducting certain activities to relevant primary regulators. But this relies on activities already being regulated. There is no clear process (such as a regular public review) for asking Congress to expand the regulatory perimeter to other, currently unregulated, activities.⁵

The Federal Reserve's new post-crisis toolkit would likely have allowed it to address some of the vulnerabilities in the financial system. For example, it could have uncovered and addressed leverage and maturity mismatches in nonbank affiliates of bank holding companies (including broker-dealers) via its annual stress tests, increased countercyclical capital buffers for bank holding companies, and set minimum margin requirements. But the Fed's powers are also limited. The Fed also lacks a clear, well-defined process for asking Congress to expand the scope of its supervisory powers to also apply to new types of financial companies that might pose risks. And it has no tools that can be used to tackle household debt vulnerabilities. A June 2015 "war game" exercise conducted by four Reserve Bank presidents concluded that it might instead have to resort to using monetary policy in order to lean against a build-up of risks outside of the core financial system (Adrian, de Fournouville, Yang, and Zlate (2017)).

Overall, this analysis suggests that if the same events that preceded the last crisis were to occur, the FSOC at best could have tried to address them by appealing to other authorities.

³ Problems might not have been limited to the formal mandate of the primary regulators. In addition, there may have been issues in relation to regulators' expertise and culture. Keep in mind that the predecessor agency to the Federal Home Financing Agency, the Office of Federal Housing Enterprise Oversight (OFHEO), ran a stress test in the first quarter of 2008 and concluded that Fannie Mae and Freddie Mac were capitalized sufficiently to withstand a 10 year period of housing market stress. Both Fannie and Freddie were deemed insolvent by September of 2008. Based on this track record, it seems doubtful to us that that OFHEO would have been inclined to follow any guidance in this area.

⁴ Edge and Liang (2019) document that out of 47 financial stability committees they survey, only four have powers to take direct actions themselves. In this sense the FSOC may be the rule rather than the exception internationally.

⁵ In principle, the FSOC could recommend changes in the scope of regulation to Congress as part of the annual testimony on the FSOC's risk assessment. But we are sceptical if this would catalyse action unless it was part of a regular statutory process, such as an annual review of the regulatory perimeter.

Even this case, there would have been holes in the system, so that the FSOC would have needed a process for expanding the scope of prudential regulation, and would have needed tools to address risks related to borrower resilience. We suspect both the general public and Congress would be surprised to learn this and likely would not be comforted by it.

Of course, the initial conditions now would be different. The banking system is better capitalized and broker-dealers have either disappeared or been brought into the scope of prudential regulation. So perhaps a more relevant consideration is whether actual financial stability concerns now being raised could be well managed by the FSOC.

2.2 Addressing vulnerabilities identified in the last two FSRs

The commentary in the Federal Reserve's first two FSRs suggests that currently the Federal Reserve's concerns focus around vulnerabilities in the area of asset valuations and corporate debt. Conversely, it strikes a more sanguine tone with respect to financial system leverage, funding risks, and household debt.

Asset Valuations

Within the broad area of asset valuations, the November 2018 FSR opens by discussing risks related to the high valuation of long-term Treasuries. It suggests that high valuations are in part driven by historically low term premia - the difference between the yield investors require for holding longer-term Treasuries and the expected yield from rolling over shorter-dated ones. By May 2019 the yields on long-term Treasuries had fallen further, driven by a further compression in term premia as well as lower interest rate expectations. The May 2019 FSR also provides evidence that low Treasury yields appear to be reflected in elevated prices of a range of other assets, such as corporate bonds or commercial real estate (CRE).

Stretched asset valuations matter for financial stability because any sharp downward adjustment in prices can expose investors to losses and may threaten their solvency or liquidity.⁶ However, the consequences of such a sharp downward adjustment depend on the asset classes that are affected. For instance, falls in equity prices need not constitute risks to the real economy. To take just one example of why this might not be a concern, equity prices briefly fell by 20% towards the end of 2018, and yet the real economy has continued to perform well. Similarly, while sharp falls in equity prices at the end of the "dot com bubble" coincided with a recession, this recession was short and generally considered benign by historical standards. Conversely, the falls in house prices and the value of mortgage-backed securities in 2007 triggered a global financial crisis. This difference appears to be driven in part by the fact that equities tend to be held by less high-leveraged real money investors who find it easier to absorb losses, while "safe" debt is more likely to be held by highly leveraged investors.

⁶ Losses on certain derivative positions can trigger significant margin calls, which can expose some non-banks to liquidity risk even if there are no concerns regarding their solvency (see e.g. Bank of England (2018))

One specific asset class that the FSR focuses on is corporate debt, and leveraged loans in particular. The November FSR presented evidence that high valuations in this sector are not fully explained by the low level of risk-free rates, and that the valuations appear particularly stretched for more risky assets (e.g. leveraged loans rated BB or lower). The May 2019 FSR shows that the temporary increase in leveraged loan spreads around the end of 2018 did not fundamentally change this. As part of a detailed discussion of ways in which leveraged loans could pose risks to financial stability the May FSR further shows that traditional financial institutions appear to be resilient to any sharp fall in asset prices, and that risks are more likely to be driven by the behavior of highly indebted borrowers (see below). However, sharp falls in asset prices may also pose risks to non-banks that invest in the collateralized loan obligations (CLOs) that are often used to securitize leveraged loans. This includes structured credit funds, CLO managers, and hedge-funds. Indeed, Bank of England (2018) shows that the majority of CLOs are held by non-banks.

Borrowing by businesses

High valuations of corporate debt tend to translate into accommodative conditions for new corporate borrowing, and into a build-up in corporate leverage. The FSR provides evidence that the current environment is no exception, and shows that the business credit-to-GDP ratio has grown significantly in the past five years. By May 2019 it has reached a historical high level. The ratio of debt to assets for publicly traded nonfinancial firms is also at one of the highest levels in recent history. Detailed analysis of balance sheet data suggests that within that, the most highly leveraged firms have increased their debt load the most. However, total debt service costs for these risky firms are being held down by low interest rates and are still at the low end of their historical range.

While the May FSR argues that losses on corporate loans are unlikely to pose risks to leveraged financial institutions that hold these loans, it does highlight risks related to the behavior of borrowers. In particular, any reassessment of risks in the corporate sector and the resulting tightening in financial conditions could have an impact on investment and employment by highly indebted corporates. This could have significant macroeconomic consequences and make any future downturn worse, including due to aggregate demand externalities similar to the ones discussed above.

Possible Interventions

Given the lack of summary indicators, it is unclear whether the Federal Reserve believes the vulnerabilities identified in its FSRs warrant policy actions. Instead, we focus on discussing potential policy options *assuming the risks warranted a meaningful policy response*.

The ability to mitigate threats from misaligned asset prices depends in part of the perceived reasons for any mispricing and the asset classes that are affected. Part of the elevated asset valuations appear to be driven by compressed term premia, which affect a wide range of asset classes. This makes it difficult to use macroprudential measures to target asset valuations at

source. Instead, it may be appropriate to build resilience to potential price corrections by strengthening capital and liquidity requirements across the entire financial system. However, doing so is difficult, not least because large parts of the financial system are not currently subject to prudential requirements, and the FSOC and its member organizations have limited powers to impose such requirements.

In addition to compressed term premia, there appear to be sector-specific factors that result in high valuations of corporate debt. The entities that may be most exposed to risks from corporate debt such as structured credit funds, CLO managers, and hedge-funds could in theory be subjected to targeted prudential requirements to address the risk of a sharp adjustment in corporate debt valuations. However, these entities do not currently tend to be within the regulatory perimeter.

Asset price booms that are limited to a specific sector could also be addressed by limiting the amount of additional capital flowing into the sector. Regulators could for example impose limits on banks' ability to originate loans that would result in the borrower's total debt exceeding a multiple of its earnings. Such an intervention would be similar to the non-binding 2013 "Interagency Guidance on Leveraged Lending" published by US banking regulators. Applying such rules at the origination stage means that they are effective even if the loans are not retained on banks' balance sheets.

Limiting the amount of new capital that can be made available to fund corporate debt would also address the vulnerabilities associated with corporate indebtedness by reducing borrowers' ability to take on additional debt, and making them less likely to contribute to aggregate demand externalities in a downturn. However, the FSOC does not have any binding powers in this area. And while the Federal Reserve and other FSOC members might be able to take action, banking regulators have recently clarified that their existing non-binding guidance in this area should be read as ensuring the resilience of banks rather than leaning against a build-up in corporate indebtedness. The head of the Office of the Comptroller of the Currency for example noted in February 2018 that "*institutions should have the right to do the leveraged lending they want, as long as they have the capital and personnel to manage that and it doesn't impact their safety and soundness*".⁷

These observations lead us to three important conclusions. First, both in the run-up to the global financial crises and in a hypothetical scenario in which the vulnerabilities identified in the current FSR intensify, an effective policy interventions would involve changes to the regulatory perimeter as well as actions targeted at borrower indebtedness. Second, both historically and currently the Federal Reserve is not well positioned to manage all of these vulnerabilities using its supervisory tools. Third, the FSOC also lacks the authority and tools to fully attend to these risks. This assessment is consistent with concerns voiced by Fischer (2015) and Dudley (2015) that the migration of activities outside of the regulatory perimeter,

⁷ See Forbes (2018): <https://www.forbes.com/sites/debtwire/2018/02/28/new-occ-head-disowns-post-crisis-lending-guidelines-expects-leverage-to-increase/#30c27a3a54db>

lack of time-varying tools, and the fragmentation of the regulatory landscape leave the U.S. without a fully effective macroprudential framework.

3. Monetary policy and financial stability risks

The last section demonstrated that the Federal Reserve cannot reasonably expect other authorities to address all of the financial vulnerabilities that may develop. To the extent that the Fed's mandate of ensuring price stability and full employment was orthogonal to financial stability this might not be an issue. But below, we argue that there are a number of ways in which monetary policy and financial stability affect each other.

Impact of financial instability on monetary policy

Financial instability can have important implications for the ability of monetary policymakers to achieve their objectives.

The most obvious way in which financial stability can affect the objectives of a monetary policymaker is by contributing to high unemployment, and by causing deflationary pressures that monetary policy may find difficult to offset.

The latter is particularly relevant in a world characterized by low equilibrium interest rates ("r*"). The combination of a persistent slow-down in economic growth and shifting demographics mean that the neutral nominal rate of interest is currently estimated to be in the region of 2.5%, less than half its level in the late 1980s.⁸

The structural shifts that caused this decline in equilibrium interest rates are beyond the control of monetary policymakers. However, they are relevant for the conduct of monetary policy as they may restrict the Federal Reserve's ability to react to adverse shocks by lowering the Fed funds rate. Historically, even standard recessions were typically associated with a roughly 5-6pp reduction in the Fed funds rate; and a modified Taylor rule suggests that if it hadn't been for the effective lower bound, it would have been appropriate to cut interest rates by 9pp during the last financial crisis.⁹ So the Federal Reserve may be stuck at the effective lower bound more frequently, and this would be especially likely following another severe financial crisis.

If low equilibrium interest rates restrict the Federal Reserve's ability to react to future shocks in a way that allows the Federal Reserve to continue meeting its inflation target, then the Federal Reserve should have an interest in ensuring that such shocks are as rare as possible. It has clear incentives to speak up if there are gaps in the framework to address financial stability risks in the U.S.

⁸ See e.g. Holston, Laubach, and Williams (2017). 2.5% is based on a predicted real rate of 0.5% and an assumed inflation rate of 2%.

⁹ See Rosengren (2019), and Bernanke (2015).

Impact of monetary policy on financial stability

Importantly, the connections between monetary policy and financial stability run in both directions. In the May 2019 FSR, over 50% of market participants cited Fed policy risks as a risk to U.S. financial stability. There are a number of ways in which discretionary monetary policy decisions could have an impact on financial stability.

We focus on the impact that monetary policy might have on the vulnerabilities described in the May 2019 FSR. This task is made more difficult by the fact that the FSR itself is largely silent on how monetary policy and financial stability risks may interact.

Moreover, we focus on the impact of unconventional monetary policy tools on these vulnerabilities. Following the global financial crisis the Federal Reserve has taken unprecedented actions to contribute to a slow but steady economic recovery, and has prevented much greater pain being inflicted on the economy. These actions included reducing short-term interest rates to their effective lower bound, providing extensive liquidity support, providing forward guidance, and conducting large-scale asset purchase programs (“quantitative easing”) that provided monetary stimulus while also helping to jump-start frozen asset markets. The decline in equilibrium interest rates that we have observed over the past decades creates challenges for traditional policy levers and may mean that policies like quantitative easing become a much more regular component of monetary policy-makers’ toolkit.

Unless accompanied by appropriate macroprudential measures, the more regular use of unconventional monetary policy tools could intensify the vulnerabilities identified in the FSR. In order to have confidence that its monetary policy stance does not have unintended consequences, the Federal Reserve may hence want to ensure that any such financial stability risks are being addressed effectively.¹⁰

Impact of unconventional monetary policy on asset valuations

There is extensive evidence that the large-scale asset purchases that central banks conducted in the wake of the global financial crisis reduced Treasury yields not just by lowering future expected policy rates, but also by compressing term premia (see e.g. Gagnon et al, 2011; D’Amico et al, 2012, Li and Wei, 2013; Hanson and Stein, 2015; Abrahams et al, 2016; Kaminska and Zinna, 2019; and Krishnamurthy and Vissing-Jorgensen, 2011). Moreover, a range of studies show that large-scale asset purchases also affected the prices of other assets such as corporate bonds (see e.g. Joyce et al 2012; Krishnamurthy and Vissing-Jorgensen, 2011; and Swanson, 2015).

The fact that unconventional monetary policy affects term premia is hardly surprising. Asset purchases can not only contain a signal about future monetary policy but also have a

¹⁰ A similar logic led the UK’s Monetary Policy Committee to include a financial stability knock-out criterion in its 2013 forward guidance. This criterion stated that the MPC would abandon its forward guidance if “*the Financial Policy Committee (FPC) judges that the stance of monetary policy poses a significant threat to financial stability that cannot be contained by regulatory actions*”.

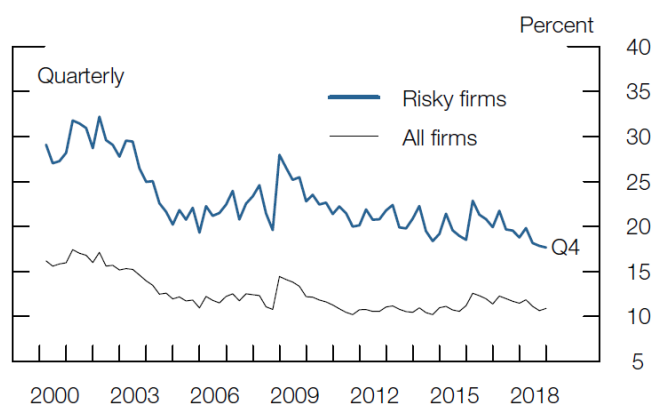
mechanical impact on the balance between supply and demand for long-term bonds. The latter factor is one of the key distinguishing features between quantitative easing and other monetary policy tools. Indeed, reducing term premia was one of the key objectives of the Federal Reserve’s large-scale asset purchases (see e.g. Kohn, 2009).

Low levels of term premia are one of the key drivers of asset valuations highlighted in the May FSR. Stretched asset valuations are always a source of risk, but they may be of particular concern if they are driven by compressed term premia. A compression in term premia means that investors receive less compensation for the risk that inflation or short-term interest rates may surprise on the upside. This leaves the prices of long-term Treasuries, and the investors who hold them, not only vulnerable to a snap-back of interest rates to previous levels, but also to small deviations from their new expected path.

Impact of unconventional monetary policy on corporate indebtedness

If monetary policy reduces the yield that investors expect to earn on corporate bonds, then this should also make it cheaper for corporates to roll over existing debt once it falls due. In the short-term, this is good news from a financial stability perspective, as it reduces the burden of servicing an existing stock of debt. But in the longer term, financially constrained corporates may be tempted to use the additional breathing space that loose monetary policy affords them to increase the amount of debt funding. This is consistent with the fact that despite significant falls in interest rates, interest expense ratios for US public nonfinancial corporates have remained broadly stable since 2005 (see Figure 2).

Figure 2: Interest expense ratio for Public Nonfinancial Corporations



Source: May 2019 FSR. The interest expense ratio is defined as the ratio of total interest expenses to earnings before interest, depreciation, and taxes.

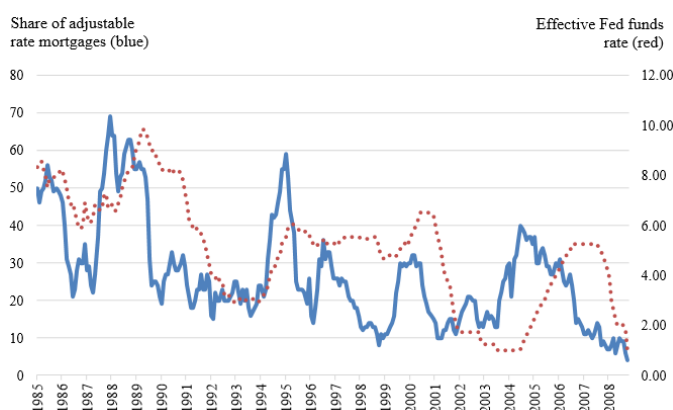
The risks associated with such corporate “re-leveraging” may materialize if interest rates rise again in the medium-run, which might make some corporate borrowers’ interest expense ratios unsustainable. Interest rates would appear to be most at risk if monetary policy rates are

significantly below the long-term equilibrium rate of interest, or if unconventional monetary policy has led to a temporary compression in term premia.¹¹

The risks associated with such re-leveraging are not confined to corporates. Internationally policymakers tend to be at least as worried about the risks associated with household indebtedness, which might also be triggered by a snap-back in term premia (or interest rates more generally). However, the average initial fixed period for mortgages in the U.S. (the by far biggest liability of U.S. households) is currently more than 25 years. More than 4 out of 5 new mortgages that have been taken out have had interest rates that are fixed for 30 years (Pradhan (2018)). These choices mean that U.S. households are currently relatively insulated from rate movements so that any interest rate risk is likely to be borne by lenders.¹²

There are two important caveats to this relatively sanguine assessment of risks stemming from the interaction between monetary policy and household indebtedness. First, the shares of mortgages with long fixed terms vary regionally. In particular, more expensive areas tend to feature a larger share of adjustable rate mortgages, which may appear more affordable. In particularly expensive areas such as Silicon Valley the share of adjustable rate mortgages is twice the national average. So there might be some regional variation in the impact of an interest rate snap back. More importantly, the share of new mortgages that have adjustable rate tends to increase as interest rates rise and ‘locking in’ low rates by taking out a fixed rate mortgage seems less attractive.¹³ For instance, towards the end of 1994, the share of new mortgages that had adjustable rates was above 50% (see Figure 4) and the rate surged again in the subsequent tightening cycles. So the relatively benign current conditions for household exposure to interest rate movements are not guaranteed to persist.

Figure 4: Correlation between the share of adjustable rate mortgages and interest rates



Source: Federal Reserve and Federal Housing Finance Agency Monthly Interest Rate Survey

¹¹ This illustrates that a *tightening* in monetary policy can lead to the *crystallisation* of vulnerabilities that have previously built up. However, our discussion focusses on the impact of monetary policy on the build-up of future vulnerabilities.

¹² A corollary of this is that lenders will need to hold enough capital to be able to absorb any interest rate risk without having to deleverage.

¹³ See Moench, Vickery, and Aragon (2010) for a more detailed analysis of how the share of adjustable rate mortgages depends on (the term structure of) interest rates.

Empirical Evidence for the relationship between term premia and financial stability

To explore the empirical significance of term premia for financial stability, we can turn to the emerging literature on GDP-at-risk (see e.g., Adrian et al. (2018), Adrian et al (2019), IMF (2018a) and Aikman et al. (forthcoming).) Standard regression analysis seeks to explain the mean of the distribution of the variable of interest. The GDP-at-risk framework instead investigates the relationship between different indicators and the left tail of the future distribution of GDP. Roughly speaking, by looking at the determinants of the 10th percentile of the future GDP distribution we can check how a current vulnerability affects the severity of a one-in-ten year downturn at different horizons. While not all downside risk to future GDP is driven by financial conditions, we would certainly expect material financial vulnerabilities to affect this downside risk.

Our GDP-at-risk calculations summarize the relationship between the 10th percentile of the GDP distribution at various forecast horizons $t+k$ as a function of vulnerabilities X today (time t) and a set of control variables Z at time t :

$$GDP_{t+k}^{10\%} = \beta X_t + \gamma Z_t$$

Drawing on the methodology in Aikman et al. (forthcoming) and data on 16 advanced economy countries running from 1995 to 2017 we find a subtle relationship between a compression in term premia and the 10th percentile of future GDP. While a one standard deviation compression in term premia seems to make relatively bad GDP outturns less bad in the short-run, the net effect of a compression in term premia turns significantly negative in the longer-run (see Figure 5).

While the evidence is only indicative and should not be interpreted as establishing a causal relationship, it is consistent with a story where a compression in term premia improves the short-term outlook by supporting asset prices and reducing households' and corporates' debt servicing costs, but contributes to risks building up over time. Figure 6 provides some indicative evidence that this effect might operate through the impact of term premia on debt servicing ratios (DSRs) and subsequent "re-leveraging" decisions. The chart demonstrates that GDP-at-risk is strongly correlated with the overall level of DSRs, and that higher DSRs are associated with larger downside risks to GDP growth over the entire horizon (see Figure 5).¹⁴

¹⁴ Hofmann and Peersman (2017) provide separate, confirming evidence on this effect by demonstrating that monetary tightening leads to an initial increase in DSRs, which is partially offset by lower debt levels in the long-run. While this evidence looks at changes in the policy rate we would expect similar effects for an increase in term premia.

Figure 5: Impact of a one std. deviation compression in term premia on the 10th percentile of GDP (in percentage points)

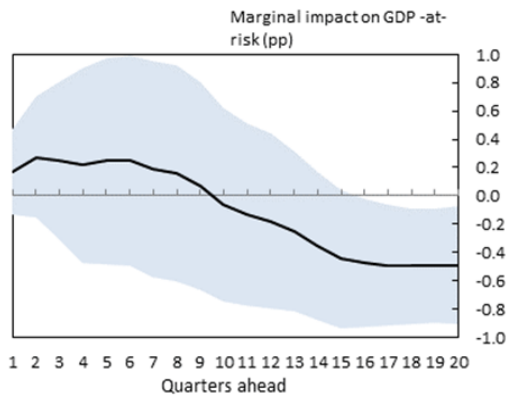
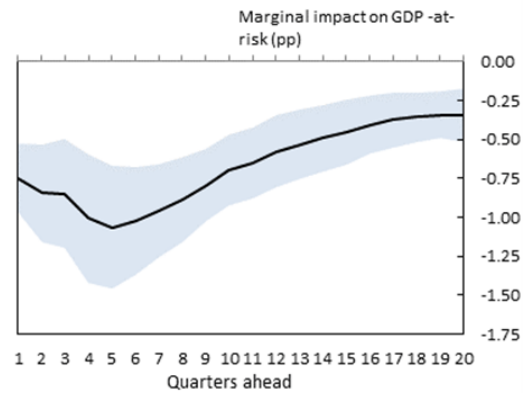


Figure 6: Impact of a one std. deviation increase in DSRs on the 10th percentile of GDP (in percentage points)



Notes: See Aikman et al (forthcoming) for details on the methodology and data. Changes in GDP are measured as the change in the average annual rate of grow at each horizon. Blue swaths indicated a two standard deviations range. DSR data is taken from the BIS database for debt service ratios. The measure of DSRs that we use capture the debt service ratios of both households and non-financial corporations. Data on DSRs is only available from 1999, so Figure 3 is based on a shorter sample. All regressions control for lagged GDP growth to control of general macroeconomic conditions.

4. Where does this leave us?

The foregoing sections can be summarized as making two arguments. First, the Federal Reserve cannot reasonably expect the FSOC or any of its other member organizations to take action to address all of the vulnerabilities that may emerge in the future. Second, there are important interdependencies between price stability and financial stability that the Federal Reserve ought to take into account. If monetary policy can affect financial stability risks, then the Federal Reserve should have an interest in ensuring that somebody is unambiguously responsible for, and empowered to, address these risks. That kind of separation in responsibilities would allow the Federal Open Market Committee (FOMC) to set aside financial stability risks when deciding on its monetary policy stance. However, given the remaining gaps in the regulatory architecture that option does not really exist. This leaves three alternatives to address the void.

First, the Federal Reserve could encourage Congress to redesign the FSOC and expand its powers to effectively manage financial stability risk. In particular, the FSOC would need to have a more extensive and active role in publically reviewing and – where necessary – recommending to expand the regulatory perimeter, and would need to have powers to address borrower resilience. This is important because the FSOC cannot rely on its members to be the front-line responders for dealing with these vulnerabilities. The member agencies do not have the relevant powers either, and as Kohn (2014) has emphasized, not all the members even have an explicit financial stability objective.

Expanding the toolkit of the FSOC would appear to be the most natural approach, as it would build on the exiting macroprudential framework that the U.S. has put in place following the crisis. It would also ensure that financial stability decisions are taken by an authority that is used to focusing on tail risks rather than the central outlook of the economic (as e.g. monetary policy makers are). Given that the Chairman of the Federal Reserve is a member of the FSOC, such an arrangement could also ensure effective coordination between monetary policy and macroprudential policy.¹⁵

However, there is a wide-spread belief that the post-crisis overhaul of the regulatory framework has been completed, and whether an initiative to revisit the FSOC's powers would be successful is therefore doubtful. The experience of the Office of Financial Research (OFR) casts doubt whether there is much appetite in either the Treasury or the Congress for having a much more activist FSOC.¹⁶ The OFR has been starved for resources and encountered various challenges when it tried to promote discussions of financial stability risks.

Moreover, this approach would double down on the current structure of the FSOC. This structure is centered on the Treasury Secretary, who chairs the Council and has numerous responsibilities, while the independent staffing available to support the FSOC is limited. The fact that the FSOC is chaired by a member of the administration can make it difficult for the committee to consistently abstract from short-term political considerations.

In practice, it seems that the committee's activities and actions have oscillated with the changes in the chairs. For example, in 2016 the chair appealed a ruling that MetLife was not to be designated as systemically important by the FSOC. Under a new chair, the FSOC supported dismissing this appeal in 2018, and published new designation guidelines that were publically criticized by the two previous FSOC and Federal Reserve chairs.¹⁷

One last consideration is that if the responsibilities of the FSOC were to be re-opened, it seems inevitable that each of the member agencies would need to be consulted regarding changes. Given the different orientations and objectives of the different agencies, this sort of consultation is unlikely to result in the members speaking in unison.

¹⁵ By "coordination" we do not mean that macroprudential policy and monetary policy should always be tightened or loosened at the same time. Our discussion above has illustrated that it can be optimal to tighten macroprudential policy precisely when monetary policy is optimally loose. Instead, we mean that the relevant policymakers are aware of each other's views and – where relevant – intended actions.

¹⁶ As a matter of disclosure, Kashyap was on the Federal Research Advisory Council to the OFR and these views are our own and we have not discussed this with any current or former members of the OFR leadership or the US Treasury.

¹⁷ The authors of the comment stated "*We caution against taking the steps outlined in the proposed guidance. We believe that these steps – in design and in practice – would neuter the designation authority. Though framed as procedural changes, these amendments amount to a substantial weakening of the post-crisis reforms. These changes would make it impossible to prevent the build-up of risk in financial institutions whose failure would threaten the stability of the system as a whole.*" See Geithner, Lew, Bernanke and Yellen (2019): <https://int.nyt.com/data/documenthelper/887-bernanke-geithner-lew-yellen-letter/a22621b202dfcb0fe06e/optimized/full.pdf#page=1>

As a second option, the Federal Reserve could ask Congress to amend the Federal Reserve Act to give the Federal Reserve an explicit financial stability objective, and to expand the Federal Reserve's toolkit beyond its existing supervisory powers to allow it to achieve this objective. Again, the powers that the Federal Reserve would require are likely to include powers to address excessive borrower indebtedness, as well as a process for publically reviewing the regulatory perimeter and recommending any necessary changes to Congress. Such an option might seem attractive as it would be most likely to ensure the effective coordination of monetary policy and macroprudential policy. This coordination is one of the reasons why the UK decided to set up its macroprudential authority as a committee within the central bank. However, in order to address financial stability risks in a targeted and effective manner, the Federal Reserve would still require additional powers. Otherwise the Federal Reserve may find itself in the same position that the FSOC is in today.

Unless there is a broad consensus that the current arrangements for managing financial stability are inadequate, it is hard to imagine that Congress would make a surgical, target technocratic change to include financial stability authority. We include suggestions for an evidence-based review of the effectiveness of the current regulatory framework below.

A third approach could be for the Federal Reserve to conclude that financial stability is a necessary condition for achieving maximum sustainable employment and stable prices, and try to take actions to address financial stability risk even without Congress having made any changes to the Federal Reserve Act. However, unless the Federal Reserve Act is being reopened to amend the Federal Reserve's objectives, it seems doubtful that the Federal Reserve would receive any of the additional powers that are necessary to address financial stability risks in a targeted way.

Instead, the Federal Reserve might have to incorporate financial stability considerations into its deliberations over the setting of monetary policy and use monetary policy to "lean against the wind". A number of authors have argued that doing so may be optimal if the macroprudential toolkit is incomplete (see, e.g., Gourio et al. (2018), Caballero and Simsek (2019)). However, monetary policy is a crude tool and is unlikely to be the most effective way of addressing financial stability risks (see e.g. Korinek and Simsek, 2016; and Farhi and Werning, 2016). Convincing Congress to amend the Federal Reserve's objectives may hence be a price worth paying to be granted powers that allow the Federal Reserve to achieve those objectives.

5. Conclusion

Given that we have just passed the 10 year mark since the Global Financial Crisis, there have been many conferences devoted to looking at the lessons from the crisis. In the course these discussions, there have been many calls to reconsider whether the Dodd Frank Act went too

far in regulating various aspects of the financial system. The current administration is in the process of rolling back some parts of Dodd Frank. This kind of reconsideration seems appropriate. Dodd Frank was enacted right after the crisis, and Congress has not so yet undertaken a systematic review this far-reaching piece of legislation in light of new research on the causes and consequences of the crisis, as well as in light of structural changes in the financial system.

However, it seems equally appropriate to step back and ask whether there are financial stability risks that Dodd Frank did not fully mitigate. Our analysis strongly suggests that there are two gaps in the current macroprudential landscape in the U.S. One is the absence of any regulator having sufficient authority to extend the regulatory perimeter to account for risks that continue to appear outside the banking system. The fact that the Federal Reserve identifies leverage lending as a source for concern and that a large fraction of leveraged lending exposures are held by investors that reside outside of the regulatory perimeter is a great example of why authorities need the flexibility to adjust the regulatory perimeter. A second gap is the absence of tools that regulators have for dealing with borrower resilience.

One constructive suggestion is for Congress to establish an expert commission to take a systematic look not only at whether there are areas in which post-crisis reforms have unnecessarily restricted the provision of financial services to the real economy, but also whether there are important regulatory gaps in the current architecture. This commission could survey international best practices for how financial stability risks have been addressed elsewhere and consider what might be suitable for the U.S. It could also draw on detailed work that the Financial Stability Board has been doing at an international level to evaluate the effectiveness of post-crisis reforms and to identify new, emerging vulnerabilities. While the appetite to make any far-reaching changes to the U.S. framework may be limited, we believe our analysis suggests that there is a strong case for examining whether the current regulatory framework gives authorities enough flexibility to address emerging risks.

The recent experience of the U.S. Commission on Evidence Based Policymaking provides some insights into how this might be done. That commission was a bipartisan effort that was set up to address challenges that existed across multiple government agencies. It was sponsored by members of Congress who strongly believed in the mission of the commission and selected members based on technical expertise. The commission was given a clear deadline for when to issue a final report, and members apparently worked hard on arriving at recommendations that had unanimous support. Many of their recommendations were included in the Foundations for Evidence-Based Policymaking Act of 2018 that was signed into law. Upon completion of its work, some members of the commission continued to work through a think tank to support the implementation of the steps that had been agreed.

One further advantage of starting with a commission to address these issues is that it allows experts to agree on a small set of tangible changes before putting its proposals to Congress.

This would help focus the discussion on holes in the macroprudential toolkit that a group of experts identifies as most relevant, rather than debating a full rewrite of the FSOC's mandate or Federal Reserve's responsibilities.

The Federal Reserve also has a key role to play in seeing the issues we have raised to be resolved: by publishing a comprehensive and insightful FSR, the Federal Reserve has already demonstrated that it takes financial stability very seriously. And the fact that financial stability policy and monetary policy are not always separable from each other means that it should be in the Federal Reserve's interest to make sure that financial stability risks are not only identified, but that there is also somebody minding the shop and ensuring that identified risks are being addressed.

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