

Implementing Macroprudential Policies

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Conference on Financial Stability Analysis: Using the Tools, Finding the Data
Federal Reserve Bank of Cleveland and Office of Financial Research
May 31, 2013

Today, I will discuss a framework for implementing macroprudential policies. Implementing policies requires, first, that weaknesses in the system that leave the financial system vulnerable to crises are identified. Identifying weaknesses requires a structured and disciplined monitoring approach. Second, implementing policies requires an understanding of the effectiveness of available tools. Some tools are designed to address structural flaws in the system, like incentives for investors to run from short-term debt. Others are designed to offset the build-up of imbalances when current conditions are favorable, and market participants become complacent about risk-taking. I will then turn to macro stress tests, specifically the Board's proposed approach to designing macroeconomic scenarios. Stress tests are a way to both measure risks in the banking system and a policy tool to address weaknesses. Finally, I will conclude with areas for additional research.

Financial stability monitoring framework

The goal of macroprudential policies is to increase the stability of the financial system, thereby reducing the frequency and severity of financial crises. To do so, financial stability authorities need to be able to measure when and where systemic risk is more likely to arise. In my view, systemic risk is more likely to arise when there are weaknesses, or vulnerabilities, in the financial system, which can amplify or propagate shocks.²

This framework is motivated by a body of research that evaluates how an entity's distress could impose externalities on others through fire sales, contagion, or adverse feedback loops. This research points to several key vulnerabilities: high leverage, maturity transformation, interconnectedness, and complexity, all of which have the potential to magnify shocks to the system. Absent these features, shocks or triggers might not lead to a financial crisis; for example, the bursting of the tech bubble had a more limited effect on the economy than the house price bubble, because the initial shock was not amplified to the same extent by excessive short-term funding, leverage, and complex structures. Monitoring can attempt to identify potential shocks or triggers, which are inevitable, but shocks are varied and hard to predict. So the identification of vulnerabilities is the primary focus of efforts to foster financial stability.³

¹ Director, Office of Financial Stability Policy and Research, Federal Reserve Board, Washington, DC. My remarks today reflect my views, and not the views of the staff or the Board. My remarks benefitted greatly from comments from Rochelle Edge, Luca Guerrieri, Diana Hancock, Michael Kiley, Andreas Lehnert, Jae Sim, and Skander van den Heuvel.

² Adrian, Tobias, Daniel Covitz, and Nellie Liang (2013), "Financial Stability Monitoring" Finance and Economics Discussion Series 2013-21. <http://www.federalreserve.gov/pubs/feds/2013/201321/201321pap.pdf>

³ Distinctions between shocks and vulnerabilities are not as stark as suggested here. Shocks may be more likely to arise from vulnerable parts – a default is more likely to arise if the banking system is highly levered.

This emphasis on vulnerabilities achieves two important objectives. First, by trying to assess how a number of possible shocks could get amplified, the focus of analysis is shifted from assessing the likelihood of a shock to the consequences to the system if a shock were to occur. That is, less time is spent on debating whether or not there is an asset bubble, and more time is spent on the consequences of what would happen if it were a bubble and it were to burst. Second, this emphasis on vulnerabilities helps to avoid a natural tendency to assess the current situation rather than to look at the prospects of a future crisis. In this way, measures of systemic risk from this framework could differ from some financial stress indexes, which generally are not used for prediction.⁴ Many of these indexes are valuable for characterizing current regimes. They could be used, for example, to determine when to release countercyclical buffers rather than when to turn them on.

In the past few years, new regulations have been proposed to address important structural vulnerabilities revealed by the financial crisis. These include, among others, enhanced capital and liquidity requirements for large banking firms, establishing an orderly liquidation authority, increased centralized clearing for derivatives, and recently, ways to address the incentive to run in money market mutual funds. A natural question arises – if regulations are written to fix the structural weaknesses, why would we need to monitor? There are two reasons, as Chairman Bernanke said in a recent speech.⁵ First, the U.S. financial system is very dynamic. While this dynamism can lead to new products and practices that can improve the efficiency of intermediation, others can obscure risks and move them beyond the boundaries of the more regulated parts of the financial system. A second reason is the potential for cyclical vulnerabilities to arise. Monitoring is an important way to track risk-taking behavior of lenders and borrowers, which can increase with extended periods of high returns and low volatility, and can introduce pro-cyclicality into the financial system.

This framework highlights a policy tradeoff for macropudential policies: policies that are implemented to make the system more robust and to reduce the likelihood of crises will do so by raising the costs of financial intermediation in “normal times” when shocks are small. By pre-emptively raising costs to reduce vulnerabilities, such as by raising capital requirements, the system becomes more resilient and able to absorb larger shocks. Some recent research has focused on how large shocks, interacted with vulnerabilities, can lead to nonlinear outcomes like a financial crisis (see e.g., Adrian and Boyarchenko, 2012; He and Krishnamurthy, 2012).⁶

⁴ Aramonte, Sirio, Samuel Rosen, and John Schindler (2013), “Assessing and Combining Financial Conditions Indexes,” Finance and Economics Discussion Series 2013-39.
<http://www.federalreserve.gov/pubs/feds/2013/201339/201339abs.html>

⁵ “Monitoring the Financial System” at the 49th Annual Conference on Bank Structure and Competition sponsored by the Federal Reserve Bank of Chicago, Chicago IL, May 10, 2013.
<http://www.federalreserve.gov/newsevents/speech/bernanke20130510a.htm>

⁶ Adrian, Tobias and Nina Boyarchenko, 2012, “Intermediary Leverage Cycles and Financial Stability,” Federal Reserve Bank of New York Staff Report No. 567, and He, Zhiguo and Arvind Krishnamurthy (2012), “A Model of Capital and Crises,” Review of Economic Studies, Vol. 79 (2), 735-777.

The implications of these papers is that to avoid these adverse outcomes, policies should be pre-emptive; in a crisis, policy choices are rarely good and can exacerbate moral hazard. In addition, since policies raise costs in normal times, they should be targeted to limit costs.

In terms of types of policies, some are designed to fix structural vulnerabilities that arise from weak business models or regulatory gaps, and which may require new regulations and rulemakings. Others can be aimed at cyclical vulnerabilities and can be adjusted as the price of risk in financial markets decline and risk-taking increases. Such policies are designed to lean against the wind, to try to prevent, for example, credit-fueled asset bubbles that can unwind in destabilizing ways, but also to strengthen the resilience of financial institutions to a build-up of imbalances.

Our experience with policies to address cyclical vulnerabilities is fairly limited. A recent working paper documents that until about 1980 or so, the United States routinely used a wide variety of macroprudential tools to target credit growth, including underwriting standards, margin rules, and deposit rate ceilings (Feldberg, Elliott, Lehnert, 2013). They found that some of these tools did indeed appear to constrain credit growth, although their contribution to overall financial stability is more difficult to judge.⁷ More recently, the tool we have the most practical experience with is a stress test of the banking system, which was first used in 2009 in the SCAP. I will now turn to some of the macroprudential elements of stress tests.

Macro stress tests and scenario design

The Dodd-Frank Act made macro stress tests an annual requirement for the largest banking firms. Macro stress tests are both a tool to measure the risks of banking firms and a policy tool to address weaknesses in the financial system. They are used regularly to measure whether a banking firm has sufficient capital to support its operations throughout a stressful period. Stress tests involve specifying a macroeconomic and financial scenario that represents stressful conditions over a time horizon. Based on detailed confidential firm-specific information, supervisors (and separately firms) assess risks and project losses and income, and thus a pro-forma (hypothetical) path for capital over the horizon of the scenario. In this way, stress tests are a quantitative forward-looking measure of the strength of each firm, and are a complement to current regulatory capital ratios.

At the same time, stress tests address a structural weakness in the financial system, namely that current regulatory ratios may be a lagging indicator of strength if financial and economic conditions are deteriorating quickly. In the 2007-09 crisis, investor and counterparty confidence in the capitalization of financial institutions eroded rapidly, which imperiled firms' access to funding, and thus their ability to function as intermediaries. This loss of confidence occurred even though banks' regulatory capital ratios remained above the required minimums. Regular stress tests, which provide incentives for firms to be more forward looking in their risk

⁷ Elliott, Douglas, Greg Feldberg, and Andreas Lehnert (2013), "The History of Cyclical Macroprudential Policy in the United States," Finance and Economic Discussion Series, 2013-29.
<http://www.federalreserve.gov/pubs/feds/2013/201329/201329abs.html>

management, combined with new capital requirements, should help to reduce concerns that investors may have.

Selecting appropriate scenarios is an important consideration in evaluating the sufficiency of capital to withstand a stressful environment. More severe scenarios, all else equal, generally translate into larger projected declines in a company's capital, and would require a company to have more capital today to keep its pro-forma capital above regulatory minimums. Furthermore, scenarios not viewed as sufficiently severe might not serve to bolster investor confidence.

In addition to strengthening microprudential supervision, stress tests also serve macroprudential goals. The Fed's stress tests are conducted simultaneously for the largest banking firms, which combined, account for 68 percent, the majority, of banking sector assets in the U.S. The combined projected losses in the stress tests are a forward-looking measure of risks in the overall banking system, and an important input to assessing the systemic risk that could arise from the banking system. For example, projected losses have the potential to reveal the common build-ups of risks or common modeling errors that might not be available when analysis is performed for individual firms on their own. In addition, firms' projections of loan growth in the stress scenario could signal an adverse feedback loop, in which a weakening economy leads to credit losses at banks, which in turn leads to a curtailment of credit, further restraining economic activity.

The success of stress tests as a macroprudential tool also depends importantly on discipline in scenario design. This discipline requires avoiding adding yet more pro-cyclicality when designing macro scenarios, by recognizing that market participants tend to require less compensation for risk after several years of strong growth and low losses. It may also involve incorporating particularly salient risks, such as a house price bubble.

For the Dodd-Frank stress tests, supervisors are required to provide three scenarios to firms each year, a baseline, an adverse, and a severely adverse. The stress test results under the severely adverse scenario are tied directly to proposed capital actions by firms, as part of the broader capital planning evaluation process, known as the Comprehensive Capital Analysis and Review. We issued a policy statement on scenario design in November 2012 and are now in the process of reviewing the comments.⁸

In a nutshell, our proposal was to use so a so-called "recession" approach to develop the severely adverse scenario. Our analysis indicates that conditions that typically occur in recessions, such as rising unemployment, falling asset prices, and contracting loan demand, can put significant stress on banks' balance sheets. In the recession approach, the future path of variables in the scenario will reflect conditions that characterize the last nine post-WWII U.S. recessions. Of course, recessions have varied across a number of dimensions (see Table 1). For

⁸ Policy Statement on the Scenario Design Framework for Stress Testing
<http://www.federalreserve.gov/bankinfo/bcreg20121115a4.pdf>

example, the decline in GDP has varied in depth and duration, as has the speed of recovery. Financial market conditions also have varied, with some accompanied by severe asset price declines and banking sector weakness. But the most common features of the recessions are the increases in the unemployment rate and contractions in aggregate activity. Thus the unemployment rate is a key factor in the specification of a severely adverse scenario. The paths for the other variables would be set to conform, in broad terms, with the path specified for the unemployment rate.

Still, differences in previous recessions mean that some judgment is required in designing the appropriate scenario. Our proposal bases the severely adverse scenario on the severe—rather than moderate or mild—recessions. Of the last nine post-war recessions, four of them are characterized as severe – those starting in 1957, 1973, 1981, and 2007 -- which lasted an average of six quarters. Across these, the unemployment rate increased between 3.2 and 5.1 percentage points, and reached a level between 9 and 11 percent in the most recent three recessions.

An alternative to the “recession approach” is a “probabilistic approach.” This alternative would specify a severe scenario by an adverse extreme tail outcome relative to a baseline scenario. While this approach is intuitive, it may not work well in practice. Put simply, a probabilistic approach could deliver a stress scenario that doesn’t even have an increase in the unemployment rate. As shown in Figure 1, the stressed path for the unemployment rate would depend on the baseline path, which could be declining over the projection horizon. A recession approach obviously avoids this problem. However, by requiring a recession at times when the economy is already unusually weak, this approach, if not employed carefully, has the potential to exacerbate the procyclicality of the financial system.

Our proposal limits this procyclicality by setting a floor under the peak level of the unemployment rate. That is, the unemployment rate would be projected to rise 3 to 5 percentage points—as is typical in severe recessions—unless this rise left the peak unemployment rate below 10 percent. In such cases, the rate would rise enough to hit 10 percent. As a result, in periods such as the early stage of a recovery when the unemployment rate is still lingering at a high level, the scenario would involve a change as large as what has occurred in past severe recessions. However, in periods such as in a long expansion, when the unemployment rate is low, the scenario would include an increase in the unemployment rate to a level as what has been seen in past severe recessions. Setting a floor recognizes the fact that cyclical systemic risks can build up at financial firms during robust expansions, and that such risks can be easily obscured in those periods.

One reason for why cyclical systemic risks could build in a buoyant economy is because underwriting standards tend to deteriorate following sustained periods of growth, low volatility, and low defaults. Scenarios that incorporate the possibility that defaults and projected losses will be higher in the future should result in higher required capital. This higher capital would increase the resilience of each firm. At the same time, if firms internalize the costs of higher capital associated with higher future defaults, stress tests may reduce or offset

the pace of deterioration. In this way, variations in the scenario may help to reduce the build-up of systemic risks.

There may be situations when the Board may want to look beyond past recessions and typical historical relationships between variables. A scenario may also include specific risks to the economic and financial outlook, which we call salient risks. The deterioration of the condition of some European banks in the past few years is an example, and the severely adverse scenario for 2012 reflected a weakening in international conditions that were larger than what typically occurs in U.S. recessions.

While the scenarios selected are unlikely to replicate exactly how a future crisis might unfold – and clearly scenario design is not intended to do that – the degree of severity chosen is designed to require an amount of capital needed in order to maintain confidence under a variety of adverse situations. Thus, the capital required today for a specific plausible but unlikely scenario should make banking firms resilient to a number of additional outcomes. Moreover, with the discretion to add salient risk factors to the scenario, that may or may not behave as in past episodes, banks should be robust to even more situations. This flexibility also guards against a concern that firms will adjust their practices to be robust to a certain pre-specified set of macro risks, and leave themselves open to other types of risks.⁹

While the sophistication of the design and implementation of the stress tests has increased enormously since 2009, there still are many areas to improve. For example, to facilitate macroprudential goals, more work is being done to evaluate the aggregate effect of shocks to bank capital on credit provision. While scenarios that are provided are intended to capture the full amplification effects of losses at banks to unemployment through less lending and lower asset prices, currently we do not disentangle the shock from the amplifier. That is, the scenario shows the full effect of the unemployment increase from an initial shock with a potential negative feedback loop with real economic activity. Relatedly, stress tests can add to our understanding of the importance of different vulnerabilities as an amplification mechanism. It could be useful to trace how the distress of a large banking firm could harm the broader system, and whether externalities arose through direct exposures to other large firms, common exposures at all firms, or complexity or opacity that could lead to contagion and a widespread investor pullback in funding. Another area is to more fully incorporate into our design the fact that stress tests are applied only to large bank holding companies. But a large share of credit intermediation in the U.S. is provided by capital markets, and the experience of the past financial crisis suggests that its breakdown had severe consequences for aggregate credit flows. While many parts of the shadow banking system turned out to be tied to the largest banking firms and these activities flowed back to their balance sheets, (and in other cases, surviving large investment banks became BHCs,) shadow banking may evolve differently in the future differently, and we need to continue to develop ways to capture those risks in our stress tests.

⁹ Moreover, currently stress tests cover credit and market risks, i.e, the risk of mark-to-market losses of a firm's trading and counterparty positions. Other risks, such as operational or liquidity, are evaluated in separate supervisory exercises.

Macroprudential Policy Tools

As I said at the outset, an aim of macroprudential policies is to reduce the frequency and severity of crisis. One could also envision an aim to be to reduce the amplitude of financial and credit cycles, because downturns increase the possibility of nonlinear events. As discussed, stress tests contain some elements that serve both aims, because they have elements that are time-varying. This time variation places them between the distinct ends of the policy spectrum: at one end, there are regulatory policies, which are rarely changed, to fix structural weaknesses, and at the other, there is monetary policy that is adjusted frequently to affect economic and financial conditions. Other supervisory actions also vary over time. For example, if authorities were concerned about rising prices and deteriorating underwriting standards for a particular sector, supervisors could develop guidelines for banks and conduct exams to promote safety and soundness.

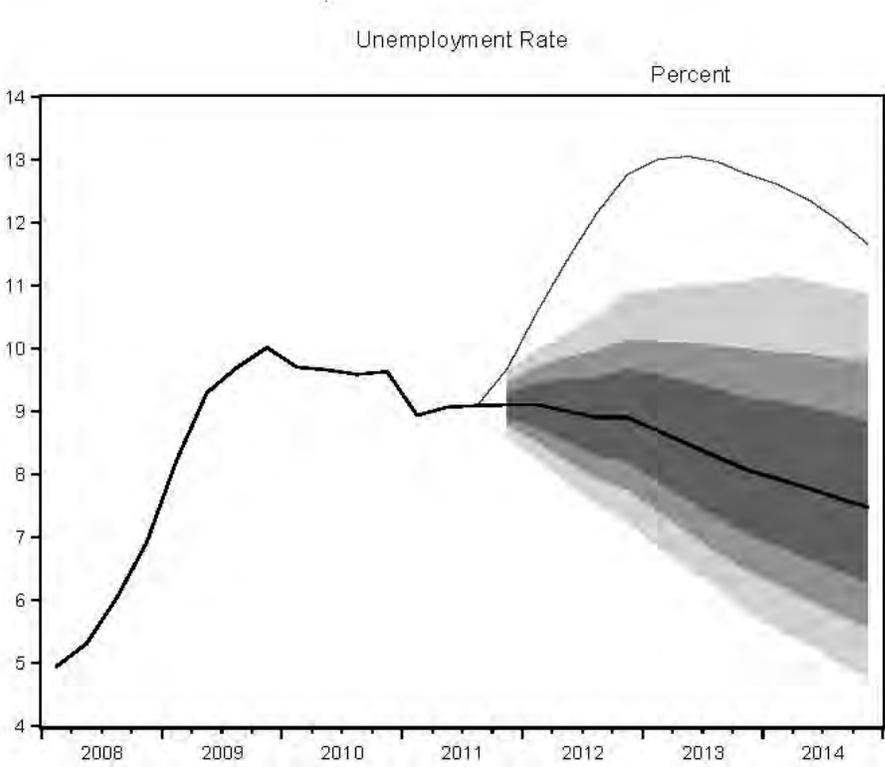
However, the use of other time-varying tools in the modern era is still fairly new. The countercyclical capital buffer is a part of the new Basel III standards. This tool would presumably raise the average costs of lending, and thus could offset building risks, and also increase the resilience of the banking sector. Switzerland formally activated a countercyclical capital buffer in February of this year to address its ongoing housing boom. The UK has authorized the use of varying risk weights, which is conceptually similar to the countercyclical capital buffer. Adjusting loan-to-value and borrower debt-to-income ratios has been done in other countries to help counter rising real estate prices. It seems fair to say that the use is new, and a broad consensus regarding their effectiveness and efficiency has not yet emerged. Moreover, there are many implementation hurdles, such as when to act, with what force, how to explain them to the general public, how to coordinate globally when needed, and how to unwind them.

In terms of further research needed to implement macroprudential policies, I would note three areas. First, how vulnerabilities can amplify shocks – through fire sales or contagion or other channels--and how amplification varies over time is critically important to understanding the causes of financial crises. How the channels operate is vital to determining which tools can be most effective at promoting financial stability. Second, it will be important to be able to characterize the benefits of macroprudential policies. While it is clear that financial crises are immensely costly to the real economy, pre-emptive macroprudential policies are also costly. If policies are in fact successful at preventing crises, there is a real risk that some will come to view them as unnecessary. Third, the richest experiences we have with time-varying policies is with monetary policy, and while it is a broad tool, not a targeted one, we should draw on the decades of research on adjusting its stance as underlying conditions evolve. Some researchers have made progress on integrating financial stability into macro models, and expressing the costs and benefits of financial stability in terms of bank capital or credit flows and its propagation effects on economic activity. Further research on these channels and the interaction of monetary policy and macroprudential policies could be especially valuable.

Table 1. U.S. recession periods

Peak	Trough	Severity	Duration (quarters)	Real GDP Growth	Change in Unemp. Rate During Recession	Total Change in Unemp. Rate
1957Q3	1958Q2	Severe	4 (Medium)	-3.1	3.2	3.2
1960Q2	1961Q1	Moderate	4 (Medium)	-0.5	1.6	1.8
1969Q4	1970Q4	Moderate	5 (Medium)	-0.1	2.3	2.4
1973Q4	1975Q1	Severe	6 (Long)	-3.1	3.4	4.1
1980Q1	1980Q3	Moderate	3 (Short)	-2.2	1.4	1.4
1981Q3	1982Q4	Severe	6 (Long)	-2.6	3.3	3.3
1990Q3	1991Q1	Mild	3 (Short)	-1.3	0.9	1.9
2001Q1	2001Q4	Mild	4 (Medium)	0.7	1.3	2.0
2007Q4	2009Q2	Severe	7 (Long)	-4.7	4.5	5.1
Average		Severe	6	-3.8	3.7	3.9
Average		Moderate	4	-1.0	1.8	1.8
Average		Mild	3	-0.3	1.1	1.9

Figure 1. The Probabilistic Approach



The chart shows the path of the unemployment rate in the CCAR 2012 baseline and stress scenarios. The 70th, 90th, and 98th confidence intervals are from the FRB-US macro model.