

## **Chairman Ben S. Bernanke**

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### **Monitoring the Financial System**

We are now more than four years beyond the most intense phase of the financial crisis, but its legacy remains. Our economy has not yet fully regained the jobs lost in the recession that accompanied the financial near collapse. And our financial system--despite significant healing over the past four years--continues to struggle with the economic, legal, and reputational consequences of the events of 2007 to 2009.

The crisis also engendered major shifts in financial regulatory policy and practice. Not since the Great Depression have we seen such extensive changes in financial regulation as those codified in the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) in the United States and, internationally, in the Basel III Accord and a range of other initiatives. This new regulatory framework is still under construction, but the Federal Reserve has already made significant changes to how it conceptualizes and carries out both its regulatory and supervisory role and its responsibility to foster financial stability.

In my remarks today I will discuss the Federal Reserve's efforts in an area that typically gets less attention than the writing and implementation of new rules--namely, our ongoing monitoring of the financial system. Of course, the Fed has always paid close attention to financial markets, for both regulatory and monetary policy purposes. However, in recent years, we have both greatly increased the resources we devote to monitoring and taken a more systematic and intensive approach, led by our Office of Financial Stability Policy and Research and drawing on substantial resources from across the Federal Reserve System. This monitoring informs the policy decisions of both the Federal Reserve Board and the Federal Open Market Committee as well as our work with other agencies.

The step-up in our monitoring is motivated importantly by a shift in financial regulation and supervision toward a more macroprudential, or systemic, approach, supplementing our traditional microprudential perspective focused primarily on the health of individual institutions and markets. In the spirit of this more systemic approach to oversight, the Dodd-Frank Act created the Financial Stability Oversight Council (FSOC), which is comprised of the heads of a number of federal and state regulatory agencies. The FSOC has fostered greater interaction among financial regulatory agencies as well as a sense of common responsibility for overall financial stability. Council members regularly discuss risks to financial stability and produce an annual report, which reviews potential risks and recommends ways to mitigate them.<sup>1</sup> The Federal Reserve's broad-based

monitoring efforts have been essential for promoting a close and well-informed collaboration with other FSOC members.

## **A Focus on Vulnerabilities**

Ongoing monitoring of the financial system is vital to the macroprudential approach to regulation. Systemic risks can only be defused if they are first identified. That said, it is reasonable to ask whether systemic risks can in fact be reliably identified in advance; after all, neither the Federal Reserve nor economists in general predicted the past crisis. To respond to this point, I will distinguish, as I have elsewhere, between triggers and vulnerabilities.<sup>2</sup> The *triggers* of any crisis are the particular events that touch off the crisis--the proximate causes, if you will. For the 2007-09 crisis, a prominent trigger was the losses suffered by holders of subprime mortgages. In contrast, the *vulnerabilities* associated with a crisis are preexisting features of the financial system that amplify and propagate the initial shocks. Examples of vulnerabilities include high levels of leverage, maturity transformation, interconnectedness, and complexity, all of which have the potential to magnify shocks to the financial system. Absent vulnerabilities, triggers might produce sizable losses to certain firms, investors, or asset classes but would generally not lead to full-blown financial crises; the collapse of the relatively small market for subprime mortgages, for example, would not have been nearly as consequential without preexisting fragilities in securitization practices and short-term funding markets which greatly increased its impact. Of course, monitoring can and does attempt to identify potential triggers--indications of an asset bubble, for example--but shocks of one kind or another are inevitable, so identifying and addressing vulnerabilities is key to ensuring that the financial system overall is robust. Moreover, attempts to address specific vulnerabilities can be supplemented by broader measures--such as requiring banks to hold more capital and liquidity--that make the system more resilient to a range of shocks.

Two other related points motivate our increased monitoring. The first is that the financial system is dynamic and evolving not only because of innovation and the changing needs of the economy, but also because financial activities tend to migrate from more-regulated to less-regulated sectors. An innovative feature of the Dodd-Frank Act is that it includes mechanisms to permit the regulatory system, at least in some circumstances, to adapt to such changes. For example, the act gives the FSOC powers to designate systemically important institutions, market utilities, and activities for additional oversight. Such designation is essentially a determination that an institution or activity creates or exacerbates a vulnerability of the financial system, a determination that can only be made with comprehensive monitoring and analysis.

The second motivation for more intensive monitoring is the apparent tendency for financial market participants to take greater risks when macro conditions are relatively stable. Indeed, it may be that prolonged economic stability is a double-edged sword. To be sure, a favorable overall environment reduces credit risk and strengthens balance sheets, all else being equal, but it could also reduce

the incentives for market participants to take reasonable precautions, which may lead in turn to a buildup of financial vulnerabilities. Probably our best defense against complacency during extended periods of calm is careful monitoring for signs of emerging vulnerabilities and, where appropriate, the development of macroprudential and other policy tools that can be used to address them.

## **The Federal Reserve's Financial Stability Monitoring Program**

So, what specifically does the Federal Reserve monitor? In the remainder of my remarks, I'll highlight and discuss four components of the financial system that are among those we follow most closely: systemically important financial institutions (SIFIs), shadow banking, asset markets, and the nonfinancial sector.<sup>3</sup>

### ***Systemically Important Financial Institutions***

SIFIs are financial firms whose distress or failure has the potential to create broader financial instability sufficient to inflict meaningful damage on the real economy. SIFIs tend to be large, but size is not the only factor used to determine whether a firm is systemically important; other factors include the firm's interconnectedness with the rest of the financial system, the complexity and opacity of its operations, the nature and extent of its risk-taking, its use of leverage, its reliance on short-term wholesale funding, and the extent of its cross-border operations. Under the Dodd-Frank Act, the largest bank holding companies are treated as SIFIs; in addition, as I mentioned, the act gives the FSOC the power to designate individual nonbank financial companies as systemically important. This designation process is under way.

Dodd-Frank also establishes a framework for subjecting SIFIs to comprehensive supervisory oversight and enhanced prudential standards. For all such companies, the Federal Reserve will have access to confidential supervisory information and will monitor standard indicators such as regulatory capital, leverage, and funding mix. However, some of these measures, such as regulatory capital ratios, tend to be backward looking and thus may be slow to flag unexpected, rapid changes in the condition of a firm. Accordingly, we supplement the more standard measures with other types of information.

One valuable source of supplementary information is stress testing. Regular, comprehensive stress tests are an increasingly important component of the Federal Reserve's supervisory toolkit, having been used in our assessment of large bank holding companies since 2009.<sup>4</sup> To administer a stress test, supervisors first construct a hypothetical scenario that assumes a set of highly adverse economic and financial developments--for example, a deep recession combined with sharp declines in the prices of houses and other assets. The tested firms and their supervisors then independently estimate firms' projected losses, revenues, and capital under the hypothetical scenario, and the results are publicly disclosed. Firms are evaluated both on their post-stress capital levels and on their ability to analyze their exposures and capital needs.

Stress testing provides a number of advantages over more-standard approaches to assessing capital adequacy. First, measures of capital based on stress tests are both more forward looking and more robust to "tail risk"--that is, to extremely adverse developments of the sort most likely to foster broad-based financial instability. Second, because the Federal Reserve conducts stress tests simultaneously on the major institutions it supervises, the results can be used both for comparative analyses across firms and to judge the collective susceptibility of major financial institutions to certain types of shocks. Indeed, comparative reviews of large financial institutions have become an increasingly important part of the Federal Reserve's supervisory toolkit more generally. Third, the disclosure of stress-test results, which increased investor confidence during the crisis, can also strengthen market discipline in normal times. The stress tests thus provide critical information about key financial institutions while also forcing the firms to improve their ability to measure and manage their risk exposures.

Stress-testing techniques can also be used in more-focused assessments of the banking sector's vulnerability to specific risks not captured in the main scenario, such as liquidity risk or interest rate risk. Like comprehensive stress tests, such focused exercises are an important element of our supervision of SIFIs. For example, supervisors are collecting detailed data on liquidity that help them compare firms' susceptibilities to various types of funding stresses and to evaluate firms' strategies for managing their liquidity. Supervisors also are working with firms to assess how profitability and capital would fare under various stressful interest rate scenarios.

Federal Reserve staff members supplement supervisory and stress-test information with other measures. For example, though supervisors have long appreciated the value of market-based indicators in evaluating the conditions of systemically important firms (or, indeed, any publicly traded firm), our monitoring program uses market information to a much greater degree than in the past. Thus, in addition to standard indicators--such as stock prices and the prices of credit default swaps, which capture market views about individual firms--we use market-based measures of systemic stability derived from recent research. These measures use correlations of asset prices to capture the market's perception of a given firm's potential to destabilize the financial system at a time when the broader financial markets are stressed; other measures estimate the vulnerability of a given firm to disturbances emanating from elsewhere in the system.<sup>5</sup> The further development of market-based measures of systemic vulnerabilities and systemic risk is a lively area of research.

Network analysis, yet another promising tool under active development, has the potential to help us better monitor the interconnectedness of financial institutions and markets. Interconnectedness can arise from common holdings of assets or through the exposures of firms to their counterparties. Network measures rely on concepts used in engineering, communications, and neuroscience to map linkages among financial firms and market activities. The goals are to identify key nodes or clusters that could destabilize the system and to simulate how a shock, such as the sudden distress

of a firm, could be transmitted and amplified through the network. These tools can also be used to analyze the systemic stability effects of a change in the structure of a network. For example, margin rules affect the sensitivity of firms to the conditions of their counterparties; thus, margin rules affect the likelihood of financial contagion through various firms and markets.

### ***Shadow Banking***

Shadow banking, a second area we closely monitor, was an important source of instability during the crisis. Shadow banking comprises various markets and institutions that provide financial intermediation outside the traditional, regulated banking system. Shadow banking includes vehicles for credit intermediation, maturity transformation, liquidity provision, and risk sharing. Such vehicles are typically funded on a largely short-term basis from wholesale sources. In the run-up to the crisis, the shadow banking sector involved a high degree of maturity transformation and leverage. Illiquid loans to households and businesses were securitized, and the tranches of the securitizations with the highest credit ratings were funded by very short-term debt, such as asset-backed commercial paper and repurchase agreements (repos). The short-term funding was in turn provided by institutions, such as money market funds, whose investors expected payment in full on demand and had little tolerance for risk to principal.

As it turned out, the ultimate investors did not fully understand the quality of the assets they were financing. Investors were lulled by triple-A credit ratings and by expected support from sponsoring institutions--support that was, in fact, discretionary and not always provided. When investors lost confidence in the quality of the assets or in the institutions expected to provide support, they ran. Their flight created serious funding pressures throughout the financial system, threatened the solvency of many firms, and inflicted serious damage on the broader economy.

Securities broker-dealers play a central role in many aspects of shadow banking as facilitators of market-based intermediation. To finance their own and their clients' securities holdings, broker-dealers tend to rely on short-term collateralized funding, often in the form of repo agreements with highly risk-averse lenders. The crisis revealed that this funding is potentially quite fragile if lenders have limited capacity to analyze the collateral or counterparty risks associated with short-term secured lending, but rather look at these transactions as nearly risk free. As questions emerged about the nature and value of collateral, worried lenders either greatly increased margin requirements or, more commonly, pulled back entirely. Borrowers unable to meet margin calls and finance their asset holdings were forced to sell, driving down asset prices further and setting off a cycle of deleveraging and further asset liquidation.

To monitor intermediation by broker-dealers, the Federal Reserve in 2010 created a quarterly Senior Credit Officer Opinion Survey on Dealer Financing Terms, which asks dealers about the credit they provide.<sup>6</sup> Modeled on the long-established Senior Loan Officer Opinion Survey on Bank

Lending Practices sent to commercial banks, the survey of senior credit officers at dealers tracks conditions in markets such as those for securities financing, prime brokerage, and derivatives trading.<sup>7</sup> The credit officer survey is designed to monitor potential vulnerabilities stemming from the greater use of leverage by investors (particularly through lending backed by less-liquid collateral) or increased volumes of maturity transformation. Before the financial crisis, we had only very limited information regarding such trends.

We have other potential sources of information about shadow banking. The Treasury Department's Office of Financial Research and Federal Reserve staff are collaborating to construct data sets on triparty and bilateral repo transactions, which should facilitate the development of better monitoring metrics for repo activity and improve transparency in these markets. We also talk regularly to market participants about developments, paying particular attention to the creation of new financial vehicles that foster greater maturity transformation outside the regulated sector, provide funding for less-liquid assets, or transform risks from forms that are more easily measured to forms that are more opaque.

A fair summary is that, while the shadow banking sector is smaller today than before the crisis and some of its least stable components have either disappeared or been reformed, regulators and the private sector need to address remaining vulnerabilities. For example, although money market funds were strengthened by reforms undertaken by the Securities and Exchange Commission (SEC) in 2010, the possibility of a run on these funds remains--for instance, if a fund should "break the buck," or report a net asset value below 99.5 cents, as the Reserve Primary Fund did in 2008. The risk is increased by the fact that the Treasury no longer has the power to guarantee investors' holdings in money funds, an authority that was critical for stopping the 2008 run. In November 2012, the FSOC proposed for public comment some alternative approaches for the reform of money funds. The SEC is currently considering these and other possible steps.

With respect to the triparty repo platform, progress has been made in reducing the amount of intraday credit extended by the clearing banks in the course of the daily settlement process, and, as additional enhancements are made, the extension of such credit should be largely eliminated by the end of 2014. However, important risks remain in the short-term wholesale funding markets. One of the key risks is how the system would respond to the failure of a broker-dealer or other major borrower. The Dodd-Frank Act has provided important additional tools to deal with this vulnerability, notably the provisions that facilitate an orderly resolution of a broker-dealer or a broker-dealer holding company whose imminent failure poses a systemic risk. But, as highlighted in the FSOC's most recent annual report, more work is needed to better prepare investors and other market participants to deal with the potential consequences of a default by a large participant in the repo market.<sup>8</sup>

## ***Asset Markets***

Asset markets are a third area that we closely monitor. We follow developments in markets for a wide range of assets, including public and private fixed-income instruments, corporate equities, real estate, commodities, and structured credit products, among others. Foreign as well as domestic markets receive close attention, as do global linkages, such as the effects of the ongoing European fiscal and banking problems on U.S. markets.

Not surprisingly, we try to identify unusual patterns in valuations, such as historically high or low ratios of prices to earnings in equity markets. We use a variety of models and methods; for example, we use empirical models of default risk and risk premiums to analyze credit spreads in corporate bond markets. These assessments are complemented by other information, including measures of volumes, liquidity, and market functioning, as well as intelligence gleaned from market participants and outside analysts. In light of the current low interest rate environment, we are watching particularly closely for instances of "reaching for yield" and other forms of excessive risk-taking, which may affect asset prices and their relationships with fundamentals. It is worth emphasizing that looking for historically unusual patterns or relationships in asset prices can be useful even if you believe that asset markets are generally efficient in setting prices. For the purpose of safeguarding financial stability, we are less concerned about whether a given asset price is justified in some average sense than in the possibility of a sharp move. Asset prices that are far from historically normal levels would seem to be more susceptible to such destabilizing moves.

From a financial stability perspective, however, the assessment of asset valuations is only the first step of the analysis. Also to be considered are factors such as the leverage and degree of maturity mismatch being used by the holders of the asset, the liquidity of the asset, and the sensitivity of the asset's value to changes in broad financial conditions. Differences in these factors help explain why the correction in equity markets in 2000 and 2001 did not induce widespread systemic disruptions, while the collapse in house prices and in the quality of mortgage credit during the 2007-09 crisis had much more far-reaching effects: The losses from the stock market declines in 2000 and 2001 were widely diffused, while mortgage losses were concentrated--and, through various financial instruments, amplified--in critical parts of the financial system, resulting ultimately in panic, asset fire sales, and the collapse of credit markets.

## ***Nonfinancial Sector***

Our financial stability monitoring extends to the nonfinancial sector, including households and businesses. Research has identified excessive growth in credit and leverage in the private nonfinancial sector as potential indicators of systemic risk.<sup>9</sup> Highly leveraged or financially fragile households and businesses are less able to withstand adverse changes in income or wealth, including those brought about by deteriorating conditions in financial and credit markets. A highly leveraged economy is also more prone to so-called financial accelerator effects, as when financially

stressed firms are forced to lay off workers who, in turn, lacking financial reserves, sharply cut their own spending. Financial stress in the nonfinancial sector--for example, higher default rates on mortgages or corporate debt--can also damage financial institutions, creating a potential adverse feedback loop as they reduce the availability of credit and shed assets to conserve capital, thereby further weakening the financial positions of households and firms.



The vulnerabilities of the nonfinancial sector can potentially be captured by both stock measures (such as wealth and leverage) and flow measures (such as the ratio of debt service to income). Sector-wide data are available from a number of sources, importantly the Federal Reserve's flow of funds accounts, which is a set of aggregate integrated financial accounts that measures sources and uses of funds for major sectors as well as for the economy as a whole.<sup>10</sup> These accounts allow us to trace the flow of credit from its sources, such as banks or wholesale funding markets, to the household and business sectors that receive it.

The Federal Reserve also now monitors detailed consumer- and business-level data suited for picking up changes in the nature of borrowing and lending, as well as for tracking financial conditions of those most exposed to a cyclical downturn or a reversal of fortunes. For example, during the housing boom, the aggregate data accurately showed the outsized pace of home mortgage borrowing, but it could not reveal the pervasive deterioration in underwriting that implied a substantial increase in the underlying credit risk from that activity.<sup>11</sup> More recently, gains in household net worth have been concentrated among wealthier households, while many households in the middle or lower parts of the distribution have experienced declines in wealth since the crisis. Moreover, many homeowners remain "underwater," with their homes worth less than the principal balances on their mortgages. Thus, more detailed information clarifies that many households remain more financially fragile than might be inferred from the aggregate statistics alone.

## **Conclusion**

In closing, let me reiterate that while the effective regulation and supervision of individual financial institutions will always be crucial to ensuring a well-functioning financial system, the Federal Reserve is moving toward a more systemic approach that also pays close attention to the vulnerabilities of the financial system as a whole. Toward that end, we are pursuing an active program of financial monitoring, supported by expanded research and data collection, often undertaken in conjunction with other U.S. financial regulatory agencies. Our stepped-up monitoring and analysis is already providing important information for the Board and the Federal Open Market Committee as well as for the broader regulatory community. We will continue to work toward improving our ability to detect and address vulnerabilities in our financial system.



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1. For the most recent report, see U.S. Department of the Treasury, Financial Stability Oversight Council (2013), [2013 Annual Report](#) (Washington: Department of the Treasury). [Return to text](#)
  
  2. See Ben S. Bernanke (2010), "[Causes of the Recent Financial and Economic Crisis](#)," testimony before the Financial Crisis Inquiry Commission, Washington, September 2; and Ben S. Bernanke (2012), "[Some Reflections on the Crisis and the Policy Response](#)," speech delivered at "Rethinking Finance: Perspectives on the Crisis," a conference sponsored by the Russell Sage Foundation and The Century Foundation, New York, April 13. [Return to text](#)
  
  3. The remainder of my remarks draws heavily on Tobias Adrian, Daniel Covitz, and Nellie Liang (2013), "[Financial Stability Monitoring \(PDF\)](#)," Finance and Economics Discussion Series 2013-21 (Washington: Board of Governors of the Federal Reserve System, April). This paper provides more details on the Federal Reserve's financial stability monitoring program. I thank the authors for their assistance with these remarks. [Return to text](#)
  
  4. The Federal Reserve's stress-testing program is discussed in Ben S. Bernanke (2013), "[Stress Testing Banks: What Have We Learned?](#)" speech delivered at "Maintaining Financial Stability: Holding a Tiger by the Tail," a financial markets conference sponsored by the Federal Reserve Bank of Atlanta, held in Stone Mountain, Ga., April 8-10. More limited forms of stress testing were used by supervisors before 2009. [Return to text](#)
  
  5. For example, conditional value at risk provides an estimate of the systemic importance of a firm at a moment in time, based on how the firm's equity value and broader equity values co-vary when overall conditions are very adverse; see Tobias Adrian and Markus K. Brunnermeier (2008; revised September 2011), "[CoVaR \(PDF\)](#)," Staff Reports 348 (New York: Federal Reserve Bank of New York, September). The distressed insurance premium uses information from firms' credit default swap spreads and equity prices to measure the implied cost of insuring a given firm against broader financial distress--an indicator of the vulnerability of the firm to systemic instability; see Xin Huang, Hao Zhou, and Haibin Zhu (2009), "[A Framework for Assessing the Systemic Risk of Major Financial Institutions](#) , " *Journal of Banking and Finance*, vol. 33 (November), pp. 2036-49. The systemic expected shortfall uses firm equity prices, leverage, and volatility to measure the propensity of a firm to be undercapitalized given a marketwide decline in equity prices; see Viral V. Acharya, Lasse H. Pedersen, Thomas Philippon, and Matthew Richardson (2010), "[Measuring Systemic Risk \(PDF\)](#) , unpublished paper, New York University, Leonard Stern School of Business, May. [Return to text](#)
  
  6. The [Senior Credit Officer Opinion Survey on Dealer Financing Terms](#) is available on the Federal Reserve Board's website. [Return to text](#)

7. The [Senior Loan Officer Opinion Survey on Bank Lending Practices](#) is available on the Federal Reserve Board's website. [Return to text](#)

8. See Financial Stability Oversight Council, *2013 Annual Report*, in note 1. [Return to text](#)

9. See, for example, Mathias Drehmann, Claudio Borio, and Kostas Tsatsaronis (2011), "Anchoring Countercyclical Capital Buffers: The Role of Credit Aggregates," *International Journal of Central Banking*, vol. 7 (December), pp. 189-240; and Rochelle M. Edge and Ralf R. Meisenzahl (2011), "The Unreliability of Credit-to-GDP Ratio Gaps in Real Time: Implications for Countercyclical Capital Buffers," *International Journal of Central Banking*, vol. 7 (December), pp. 261-98. [Return to text](#)

10. The [flow of funds data](#) are available on the Federal Reserve Board's website. [Return to text](#)

11. See Matthew J. Eichner, Donald L. Kohn, and Michael G. Palumbo (2010), "[Financial Statistics for the United States and the Crisis: What Did They Get Right, What Did They Miss, and How Should They Change? \(PDF\)](#)" Finance and Economics Discussion Series 2010-20 (Washington: Board of Governors of the Federal Reserve System, April). [Return to text](#)