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**REMARKS OF OFFICE OF FINANCIAL RESEARCH (OFR) DIRECTOR RICHARD
BERNER AT THE JOINT CONFERENCE OF THE FEDERAL RESERVE BANK OF
CLEVELAND AND OFFICE OF FINANCIAL RESEARCH, "FINANCIAL STABILITY
ANALYSIS: USING THE TOOLS, FINDING THE DATA"**

As prepared for delivery

WASHINGTON - Good afternoon and thank you again for participating in this conference.

We and the Cleveland Fed conceived the conference to advance our understanding of the tools and data we need to analyze and measure threats to financial stability, and to learn how we should reduce vulnerabilities in the financial system.

This conference underscores how much we have learned in the wake of the recent crisis about financial stability and about threats to it. Equally apparent, however, is that significant gaps remain in our knowledge—both analytically and empirically—about the origins, transmission, and amplification of those threats and how to mitigate them. We as analysts, policymakers, and supervisors face many challenges—and that is what I would like to discuss in detail today.

My list includes five challenges. Importantly, three of the five involve the need to improve the quality and scope of our financial data. They are:

- (1) Improving financial stability analysis and monitoring
- (2) Prioritizing and meeting data needs for analysis and monitoring
- (3) Developing standards to improve the quality and utility of financial data
- (4) Balancing confidentiality with data sharing, and
- (5) Developing the macroprudential toolkit

These are challenges we all face. In my remaining time, I will outline each of them and discuss how we at the OFR are trying to help meet them.

The first challenge is analytical: Improving financial stability analysis and monitoring.

Financial stability analysis and monitoring are not new. Indeed, the Annual Report of the Bank for International Settlements, the Global Financial Stability Report of the International Monetary Fund and the Financial Stability Report of the Bank of England have been with us for nearly two decades. But both the analytical framework and monitoring have evolved rapidly since the crisis. We know that the framework must include and explain defaults, runs, and fire sales. We know that it must look across the entire financial system to explain how threats that originate in one part can be transmitted to others. We know that it must explain the incentives to take on risk, for example, by increasing leverage.

It is especially gratifying that the first session of this conference was devoted to improving financial stability indicators, and to assess their merit as early warning indicators of threats to financial stability, or at least to monitor those developments. Such indicators were the subject of the OFR's first Working Paper, and it is worth noting that significant progress has been made in the 18 months since the paper was published.¹

More formally, the OFR's 2012 Annual Report describes a framework for financial stability analysis and monitoring. The report goes back to basics to understand the functioning of the financial system by identifying six fundamental services the financial system provides.² They are:

1. Credit allocation,
2. Maturity transformation,
3. Risk transfer,
4. Price discovery,
5. Liquidity provision, and
6. Facilitation of payments

Threats to these basic services may or may not spread across the financial system. They may emerge either within the financial system or externally to it. In addition, they may surface in a credit or economic cycle; they may result from structural weaknesses or vulnerabilities of institutions or markets; or they may result from combinations of these.

The framework in the Annual Report of the Financial Stability Oversight Council, or Council, is similar, emphasizing how shocks might expose vulnerabilities in the financial system and interfere with the provision of those fundamental services. This framework is well articulated

¹ Bisias, Dimitrios, Mark D. Flood, Andrew W. Lo, and Stavros Valavanis, 2012, "A Survey of Systemic Risk Analytics," OFR Working Paper #0001, January.

http://www.treasury.gov/initiatives/wsr/ofr/Documents/OFRwp0001_BisiaFloodLoValavanis_ASurveyOfSystemicRiskAnalytics.pdf

² Office of Financial Research (OFR), 2012, Annual Report to Congress. Pp. 1-2.

<http://www.treasury.gov/initiatives/ofr/about/Pages/2012-OFR-Annual-Report-to-Congress.aspx>

both in policy research by Fed staff economists and in Fed Chairman Bernanke's speech in Chicago this month.³ The analysis and monitoring focus on how vulnerabilities may develop in the activities of large complex financial institutions, in shadow banking activities, in asset markets, and in the nonfinancial sector.

In all these frameworks, the trigger or shock disrupting these services, such as a significant default by a large financial institution or the loss of confidence in a major asset class, is only part of the story. The vulnerabilities in the financial system that can amplify and propagate such initial shocks are also critical features. These include the risk of a run or fire sale in the chain of market-based intermediation that relies on money market mutual funds and the triparty repo market. Our analysis of potential vulnerabilities thus must consider the dynamics of how the system acts under stress and how financial shocks are amplified and transmitted. At the OFR, we have taken a special interest in these dynamics, evidenced by recent working papers on financial networks⁴ and agent-based models.⁵ Other aspects of market dynamics, such as herding, crowded trades, interconnectedness, and complexity, are also part of the research challenge.

Today's market setting underscores a key aspect of the analytical challenge. Current signals from financial markets are relatively benign. Periods of low market volatility and rising risk appetite like this one may simply reflect recovery. Low volatility, interest rate spreads, credit default swap spreads, and repo haircuts are all traditionally viewed as signs of low financial market risks. However, just the opposite may be true. They may be signals of rising market risks, because they give investors and risk managers incentives and wherewithal to take on leverage. Traditionally, analysts view such indicators as *exogenous* barometers of risk. However, they may in fact be *endogenous* indicators of risk appetite and investor sentiment.

Market participants have long recognized such dynamics, yet recognition in either academic or policy analysis is only starting to appear. For example, a recent paper by Danielson, Shin, and Zigrand argues that leverage and volatility are endogenously co-determined, and that low volatility promotes increased leverage and risk.⁶ Similarly, Fed Governor Jeremy Stein recently observed that low volatility gives market participants incentives to write deep, out-of-the-money

³ Tobias Adrian, Dan Covitz and Nellie Liang, 2013, "Financial Stability Monitoring," Federal Reserve Bank of New York Staff Report 601, February, http://www.newyorkfed.org/research/staff_reports/sr601.pdf
 "Monitoring the Financial System," Remarks by Fed Chairman Ben Bernanke at the 49th Annual Conference on Bank Structure and Competition sponsored by the Federal Reserve Bank of Chicago, Chicago, Illinois, May 10, 2013. <http://www.federalreserve.gov/newsevents/speech/bernanke20130510a.pdf>

⁴ Glasserman, Paul, and H. Peyton Young, 2013, "How Likely is Contagion in Financial Networks?" Department of Economics Discussion Paper #642, U. of Oxford, February.
<http://www.economics.ox.ac.uk/materials/papers/12619/paper642.pdf>

⁵ Bookstaber, Richard, 2012, "Using Agent-Based Models for Analyzing Threats to Financial Stability," OFR Working Paper #0003, December.
http://www.treasury.gov/initiatives/ofr/research/Documents/OFR_Working_Paper_No3_ABM_Bookstaber_Final.pdf

⁶ Jon Danielsson, Hyun Song Shin and Jean-Pierre Zigrand, "Procylical Leverage and Endogenous Risk," October 2012.

puts to enhance returns, and in ways that hide risk.⁷ That's because one can, and I quote, "beat the benchmark simply by holding [it] and stealthily writing puts against it, since this put-writing both raises the mean and lowers the *measured* variance of the portfolio." By "stealthily," Governor Stein means that generally our measurement systems don't adequately capture the low-probability future risks that such strategies introduce. Those lapses at the firm level are multiplied many times across the financial system.

This reality should change our thinking about early warning indicators, asset allocation, and our macroprudential toolkit. It should also change our thinking about risk management. As my colleague Rick Bookstaber puts it, treating such indicators as exogenous means that "higher leverage and risk taking in general will be apparently justified by the lower volatility of the market and by the greater ability to diversify as indicated by the lower correlations."⁸

Since the crisis, supervisors are significantly expanding their stress-testing infrastructure. A key role for stress testing is to model losses at institutions exposed to an unpredictable variety of shocks to calibrate their needs for capital and liquidity. Stress tests have well-known limitations and part of the challenge is to assess the benefits of improving these tools, including the use of reverse stress tests. The OFR is researching the frontiers of stress testing, evidenced by two recent working papers⁹ and an all-day research workshop at the Treasury last year.

That brings me to the second key challenge, which is empirical: How should we prioritize and meet data needs for analysis and monitoring?

We can't analyze what we can't measure. The financial crisis revealed that the data available to monitor the financial system were too aggregated, too limited in scope, too out of date, or otherwise incomplete. Six years after the onset of the crisis, some pieces of the financial stability data mosaic are now in place. But many more key pieces are missing.

As a result, regulators and policymakers do not have a clear view of the patterns, elements, and relationships in the system. To conduct effective and comprehensive financial stability analysis, we need more high quality, standardized data. And macroprudential data, like macroprudential analysis and tools, should look across the entire financial system. We all agree now that our data perspective, like our tools, should explore shadow banking activities and the markets that support them. For example, efforts to model counterparty networks and the effect of systemic

⁷ "Overheating in Credit Markets: Origins, Measurement, and Policy Responses," at the "Restoring Household Financial Stability after the Great Recession: Why Household Balance Sheets Matter" research symposium sponsored by the Federal Reserve Bank of St. Louis, St. Louis, Missouri, February 7, 2013.

⁸ "The Volatility Paradox," December 12, 2011.

⁹ Paul Glasserman, Chulmin Kang, and Wanmo Kang, 2013, "Stress Scenario Selection by Empirical Likelihood," OFR Working Paper #0007, April.

http://www.treasury.gov/initiatives/ofr/research/Documents/OFRwp0007_GlassermanKangKang_StressScenarioSelectionbyEmpiricalLikelihood.pdf

Flood, Mark D., and George G. Korenko, 2013, "Systematic Scenario Selection," OFR Working Paper #0005, February.

http://www.treasury.gov/initiatives/ofr/research/Documents/OFRwp0005_FloodKorenko_SystematicScenarioSelection.pdf.pdf

interconnectedness point to the need for data on contractual exposures among major participants in the financial system.

The OFR Annual Report outlined our three-step process for filling these data gaps: identifying data needs, taking stock of available data, and prioritizing data collections and acquisitions.¹⁰ The OFR has created and is updating a comprehensive inventory of purchased and collected data across Council member organizations. We are identifying data gaps to be filled and prioritizing among the gaps, which involves judgment calls about the importance of the gaps and the difficulty in filling them.

For example, the OFR is collaborating with the Federal Reserve staff to improve the quality and scope of data in repo markets. Because repo markets represent critical sources of funding for securitization, their impairment during the crisis had adverse consequences for the entire financial system. The drying up of some types of repo financing magnified the impact and scope of the crisis in unforeseen ways.¹¹ Yet detailed repo data were scarce in 2007 and 2008, leaving regulators unsure about how alternative policy responses might affect financial markets. Although the quality and quantity of repo data collected by the New York Fed have expanded considerably since the crisis, both remain insufficient to understand when and how repo financing conditions are changing in ways that might affect financial stability.

The third challenge is to develop standards to improve the quality and utility of financial data.

Data that are standardized are critical for analysis. Without standards, we cannot aggregate. Without standards, we cannot compare. We need data that can be aggregated and linked with other data sets for analytical comparisons.

Data standards help us collect more and better data, while reducing the reporting burden for industry. They enable us to aggregate and to compare data on an apples-to-apples basis. They provide regulators and policymakers with a more accurate view of the financial system, including the interconnections between companies and markets.

Although standards entail up-front implementation costs for industry, the benefits over time promise to dwarf those costs by enabling firms to report the same data to us as they use to manage risks and run their management information systems. Standards also reduce industry costs for collecting, cleaning, and aggregating data.

The financial crisis highlighted the need for data standards. When Lehman Brothers collapsed in 2008, many market participants were unaware of their total exposures to Lehman because that name did not appear on all of their contracts.

¹⁰ Office of Financial Research (OFR), 2012, Annual Report to Congress. Pp. 83-106.

<http://www.treasury.gov/initiatives/ofr/about/Pages/2012-OFR-Annual-Report-to-Congress.aspx>

¹¹ Copeland, Adam M., Antoine Martin, and Michael Walker, 2010, "The Tri-Party Repo Market Before the 2010 Reforms," Federal Reserve Bank of New York Working Paper #477, November.

Gorton, Gary, and Andrew Metrick, 2012, "Securitized Banking and the Run on Repo," Journal of Financial Economics 104:3, 425–451, June.

The global legal entity identifier, or LEI, offers a solution for this problem.

The LEI, a 20-digit, alpha-numeric code that connects to basic business card information to clearly and uniquely identify companies participating in global financial markets, promises to provide major benefits to financial market participants and government regulators worldwide.

Thanks to the efforts of the global community in the public and private sectors, the LEI system is beginning to take hold. Organizations in several countries are issuing “pre-LEIs,” which are designed to be compatible with the LEI system once local registration authorities are in place. To date, more than 50,000 pre-LEIs are in use.

We are proud to have contributed to that effort and to have helped shape the LEI governing structure. In fact, the OFR’s Chief Counsel chairs the LEI Regulatory Oversight Committee.

With the LEI system well on track, we are contemplating the next step in data standards. We plan to extend our efforts by developing best practices for the hierarchies that map the relationships among entities or products. For example, legal entity hierarchies define the relationships, such as ownership and control, among legal entities engaged in financial transactions.

Filling data gaps and standardizing data are important. The fourth challenge also matters: Balancing confidentiality with data sharing.

This challenge is one that begins inside the regulatory community but affects users of financial data inside and outside that perimeter. The challenge is to share financial data appropriately across the regulatory community.

No single regulator possesses all of the data needed to form a complete picture of threats to the financial system; indeed, even if we put all of our data together, significant gaps would remain in coverage and utility.

We will greatly improve our prospects for filling those gaps if the financial regulatory community, both in the United States and abroad, finds more and better ways to appropriately share financial data.

We can think of three levels of concentric circles for data sharing.

The innermost circle entails data sharing among ourselves and includes the related agreements, safeguards, and protocols.

The middle circle represents data sharing with academic researchers under protocols that balance the need for access with heightened safeguards to protect confidential data.

The third, outermost circle involves sharing data with the public, again with the most stringent safeguards, but for the benefit of market participants and to provide transparency, accountability, and communication about our work.

I believe that we policymakers should start at the core of those three circles and make our first priority the expansion of data sharing among ourselves. The costs and obstacles are significant, but the benefits dwarf the impediments.

I see three major obstacles to data sharing, but also remedies for each.

The first obstacle is the critical need to maintain the security of confidential data. Highly sensitive data simply cannot fall into the wrong hands. The government organizations that collect and maintain these data have well-established and time-tested security measures in place. Taking the data outside the sphere of these protective measures holds the potential for introducing grave risks.

A related obstacle involves the comfort level of the financial institutions that have provided data to their supervisors, often over many years or decades. Supervisors are understandably concerned that sharing such data could make institutions reluctant to cooperate.

The remedy for these obstacles is that data sharing must occur with controls and safeguards every bit as rigorous as the controls and safeguards that the sources of the data have employed and refined over time. At the OFR, we are committed to protocols and procedures for collecting, storing, and appropriately sharing data that meet or exceed the strict standards of our data-sharing partners. In fact, the OFR has defined and adopted such a data classification scheme and matching controls to assure secure data handling.

In addition, we hope that work under way on data classification by the Council's Data Committee will lead to concordances among classification schemes, will help assure supervisors that the right controls will apply to shared data, and will develop into a common, uniform approach across the Council. We can fulfill our shared financial stability mandate only if we act in concert.

I am pleased that a session of this conference explores new technologies to make data more secure.

The third obstacle to data sharing involves the quality and suitability of much of the data for assessing threats to financial stability. Data collected by supervisors of financial institutions or markets are often limited in scope, lacking in uniformity, gathered under time pressure, and aimed at responding to particular supervisory issues that differ among agencies. Taken out of context, these data could be misinterpreted.

However, we see common interests and incentives to collaborate. Supervisors could realize significant benefits from systematic improvement in these data, while macroprudential policymakers could benefit from high-quality, granular information that sheds light on counterparty exposures and interconnectedness among market participants.

The good news: We are beginning to work together to determine what data to share and what controls are needed to protect them. Much more is needed.

Developing the macroprudential toolkit is the fifth challenge.

Ultimately, our objective is to strengthen the financial system so it can reliably provide the fundamental financial services I mentioned earlier. The final challenge, then, is to develop the macroprudential toolkit to help us accomplish this goal.

The macroprudential toolkit is the collection of policy instruments available to financial policymakers and supervisors to address system-wide vulnerabilities early and to respond to stress events as they occur.

Importantly, we are beginning to turn from a bank-centric discussion of prudential tools to one that is truly macroprudential. The framework to guide our efforts is outlined in recent research papers¹², underscored in the OFR's inaugural research conference in December 2011, and discussed in our first Annual Report last year. We must focus simultaneously on the specific channels—across institutions, activities and markets—through which threats to financial stability typically surface, such as defaults, runs, and fire sales. And we must seek policy instruments with the potential to reduce or neutralize these threats, such as capital requirements, liquidity requirements, and minimum haircuts. In that regard, I am heartened by Fed Governor Tarullo's support for further investigation of minimum haircuts as a potentially important policy tool.¹³

The toolkit should have a distinct tool to address each threat or channel of transmission. We must select the right tool for the job, while being mindful of the interplay among the tools and with other policy tools. Some, like capital requirements, may be stated in terms of quantities; others, like Pigouvian taxes, may be stated in terms of prices or spreads.

Fundamental uncertainties are the hallmark of threats to financial stability, and the financial system is vast, complex, and evolving. The goal of fully capturing every threat with our analysis will always elude us. But we will keep on trying. Better data, research, and analysis can help us improve market discipline, regulation, and the shock absorbers and guardrails needed to make the financial system more resilient. All of us—together—are only at the beginning of this venture. This conference is just one piece of evidence of our desire to succeed and—together—we will.

Thank you again for being here today. I would be happy to respond to your questions and hear your suggestions.

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¹² Kashyap A., R. Berner, and C. Goodhart., 2011, "The Macroprudential Toolkit," IMF Economic Review, 59, 145-161. Hanson, Samuel G., Anil K. Kashyap, and Jeremy C. Stein, 2011, "A Macroprudential Approach to Financial Regulation," Journal of Economic Perspectives, 25(1), Winter, 3-28.

<http://www.aeaweb.org/articles.php?doi=10.1257/jep.25.1.3>

¹³ "Evaluating Progress in Regulatory Reforms to Promote Financial Stability," May 3, 2013, remarks at the Peterson Institute for International Economics, Washington, D.C.