OFR
OFFICE OF FINANCIAL RESEARCH

Financial Research Advisory Committee Meeting
July 20, 2017

Discussion Topic: The OFR Financial Stability Monitor

The OFR is mandated to to develop and maintain metrics and reporting systems for risks to financial stability. As part of that mandate, in 2013 we developed the Financial Stability Monitor, a heat map of key data on financial stability risks updated and published twice each year. The heat map provides a quarterly view of vulnerabilities in the U.S. financial system using 62 indicators. Currently, it addresses five functional areas of risk: macroeconomic, market, credit, funding and liquidity, and contagion.

After several years of use and feedback from the Advisory Committee and other stakeholders, we propose a set of improvements to the Financial Stability Monitor. The improved monitor answers the following questions:
- Where do the data signal potential vulnerabilities in the U.S. financial system?
- How do today's vulnerability levels compare to their historical range?

Why a Heat Map?

We developed the heat map as a tool to summarize and visualize key data on financial stability risk. Monitoring risks across the system requires a large body of data. The heat map summarizes 62 key indicators of financial stability risk. It color-codes each data point based on its position within its historical range. The color-coding draws the user to those areas where the data signals that risks are high relative to history or that are increasing.

The Financial Stability Monitor heat map serves as a starting point for systemwide monitoring. However, it cannot measure structural vulnerabilities, which do not vary sufficiently over time, or vulnerabilities for which data are scarce or new. It also cannot provide final conclusions about the level of vulnerability. Such conclusions require careful interpretation of the data, qualitative information, and expert judgment.

Why Change the Heat Map?

We have identified changes that can improve the tool and better address stakeholder needs.

Purpose

We propose to focus the tool exclusively on measuring vulnerabilities. The current heat map combines measures of vulnerability and stress, which tend to co-move negatively. Focusing on vulnerabilities will give the tool greater early warning power. We have separately developed the Financial Stress Index for measuring and monitoring stress in the system.

We propose to describe the revised heat map as follows: "*a tool to provide early warning signals of potential financial system vulnerabilities that merit investigation. The tool is based on data, not the OFR's assessment, and it does not comprehensively measure risks or provide conclusions about financial stability. The OFR provides such conclusions in its annual Financial Stability Report.*"

Categories

The heat map currently has five categories of risk indicators: macroeconomic, market, credit, funding and liquidity, and contagion. We propose adding a sixth category covering solvency and leverage risk in financial institutions. Indicators of solvency and leverage risk are currently included among credit risk indicators. In the revised heat map, the category for credit risk would focus on the nonfinancial private sector.

Indicators

We propose a new set of indicators, documented in Appendix A. The indicators were selected based on the following criteria:
1. Measures a U.S. financial system vulnerability (including vulnerabilities to the United States that emanate from abroad)
2. Sufficient data to establish a multi-cycle distribution
3. Stationary mean or trend
4. Timeliness of signal
5. Coverage of six risk categories and key subcategories identified in the academic literature
6. Coverage of major components of the U.S. financial system

Scoring and Aggregation Methodologies

We considered a variety of scoring and aggregation methodologies. We found several approaches to strongly improve heat map results, and selected among them based on the following criteria: timely warning of past instability; sufficient variation over time to make warning signals credible; and ease of interpretation.

Frequency of Updates

We propose to update and release the heat map quarterly. Many key indicators of financial system vulnerability used in the heat map are released quarterly.

Initial Results

The initial results of our proposed improvements are positive. Appendix B shows the new results for each category, which provide timely signals of escalating vulnerabilities prior to the financial crisis. For comparison, Appendix B also shows the category scores of the original Financial Stability Monitor. Overall, we find that the proposed changes improve the early warning power of this tool.

Questions for Discussion

(1) Does the stated purpose of the proposed heat map clarify the scope and limitations of this kind of tool?

(2) Guided by the indicator criteria above, do committee members recommend any additional indicators or data?

Appendix A: Proposed Indicators - Macroeconomic Risk

Subcategory/Indicator	Notes	Data Frequency
Inflation risk		
U.S. core PCE inflation	Measured as absolute distance from 2 percent.	monthly
U.S. 5y consumer inflation expectations	Consumer-expected average rate over next five years, measured as absolute distance from 2 percent.	monthly
Fiscal risk		
U.S. federal government fiscal balance/GDP		quarterly
U.S. federal government debt/GDP		quarterly
U.S. federal government interest/revenues		quarterly
External balance risk		
U.S. current account balance/GDP		quarterly
U.S. net international investment position/GDP		quarterly
U.S. gross international investment liabilities/GDP		quarterly

Appendix A: Proposed Indicators - Market Risk

Subcategory/Indicator	Notes	Data Frequency
Valuations/risk premiums		
U.S. equity valuations: S&P500 CAPE	CAPE is the ratio of the monthly S&P 500 price level to trailing ten-year average earnings (inflation adjusted).	monthly
U.S. Treasury ten-year term premium (ACM model)	Adrian-Crump- Moench model	daily
U.S. corporate bond option-adjusted spread		daily
U.S. municipal bond option-adjusted spread (A-rated index)		daily
Fannie Mae/Freddie Mac 30-year MBS option-adjusted spread		daily
U.S. house price/rent ratio		quarterly
U.S. house price/income ratio		quarterly
U.S. CRE capitalization rate (weighted average)	Weighted average of CRE capitalization rates for the multifamily, industrial, office, retail, and hotel markets. Weighted by market capitalization.	monthly
Financial risk taking/appetite		
North America Investor Confidence Index (State Street)		monthly
U.S. bond investor duration proxy (Barclays Aggregate)		daily
U.S. equity market option-implied volatility (VIX)		daily
U.S. Treasury option-implied volatility (MOVE)		daily

Appendix A: Proposed Indicators - Credit Risk

Subcategory/Indicator	Notes	Data Frequency
Household credit risk		
U.S. consumer debt/disposable income (aggregate)	Consumer debt is non-mortgage household debt.	quarterly
U.S. consumer debt/GDP growth (aggregate)	Consumer debt is non-mortgage household debt.	quarterly
U.S. consumer debt service ratio (aggregate)	Consumer debt is non-mortgage household debt.	quarterly
U.S. residential mortgage debt/disposable income (aggregate)		quarterly
U.S. residential mortgage debt/GDP growth (aggregate)		quarterly
U.S. residential mortgage debt service ratio (aggregate)		quarterly
Nonfinancial business credit risk		
U.S. nonfinancial business debt/GDP (aggregate)		quarterly
U.S. nonfinancial business debt/GDP growth (aggregate)		quarterly
U.S. nonfinancial business gross debt/assets ratio (median)	Four-quarter moving average.	quarterly
U.S. nonfinancial business gross debt/earnings ratio (median)	Four-quarter moving average. Earnings measured as EBITDA.	quarterly
U.S. nonfinancial business interest coverage ratio (median)	Four-quarter moving average. Earnings measured as EBITDA.	quarterly
Real economy borrowing levels and terms		
U.S. real economy credit/GDP gap	Measured as gap from observed nonfinancial private debt/GDP to estimated long-term trend in that ratio.	quarterly
U.S. household net borrowing rate (aggregate)	Net borrowing is net investment less net saving.	quarterly
U.S. nonfinancial business net borrowing rate (aggregate)	Net borrowing calculated as net investment less net saving.	quarterly
Share of U.S. banks tightening business lending standards	As reported in Senior Loan Officer Opinion Survey. Business lending is defined as commercial and industrial loans.	quarterly

Appendix A: Proposed Indicators - Credit Risk

Subcategory/Indicator	Notes	Data Frequency
Average FICO score of new residential mortgages		quarterly

Appendix A: Proposed Indicators - Solvency/Leverage Risk

Subcategory/Indicator	Notes	Data Frequency
Financial institution solvency		
U.S. bank holding company risk-based capital (median)	Tier 1 capital divided by risk-weighted assets.	quarterly
U.S. bank holding company risk-based capital (aggregate)	Tier 1 capital divided by risk-weighted assets.	quarterly
U.S. commercial bank risk-based capital (median)	Tier 1 capital divided by risk-weighted assets.	quarterly
U.S. commercial bank risk-based capital (aggregate)	Tier 1 capital divided by risk-weighted assets.	quarterly
Financial institution leverage		
U.S. bank holding company tangible equity/tangible assets (median)	Tangible equity divided by tangible assets.	quarterly
U.S. bank holding company tangible equity/tangible assets (aggregate)	Tangible equity divided by tangible assets.	quarterly
U.S. commercial bank tangible equity/tangible assets (median)	Tangible equity divided by tangible assets.	quarterly
U.S. commercial bank tangible equity/tangible assets (aggregate)	Tangible equity divided by tangible assets.	quarterly
U.S. life insurer assets/equity (median)	Includes only publicly traded insurers, GAAP accounting.	quarterly
U.S. non-life insurer assets/equity (median)	Includes only publicly traded insurers, GAAP accounting.	quarterly

Appendix A: Proposed Indicators - Funding/Liquidity Risk

Subcategory/Indicator	Notes	Data Frequency
Funding risk		
Three-month Ted Spread	Spread between three-month U.S. dollar LIBOR and three-month U.S. Treasury bills.	daily
Three-month financial CP spread to three-month Treasury Bill rate	Spread between 90-day financial firm commercial paper rate and three-month U.S. Treasury bill rate.	daily
Cross-currency basis swap spreads (EUR-USD, JPY-USD)	Average absolute value of one-year swaps: EUR-USD, JPY-USD)	daily
Trading liquidity risk		
Net dealer position in U.S. Treasuries/U.S. Treasuries held by public		quarterly
Net dealer position in U.S. agency-backed bonds/U.S. agency-backed bonds outstanding		quarterly
U.S. Treasury bond trading turnover (average)	Turnover measures trading volume/tradeable securities outstanding.	quarterly
U.S. equity trading turnover (average)	Turnover measures trading volume/tradeable securities outstanding.	quarterly
Financial institution liquidity risk		
U.S. commercial bank loans/deposits (median)		quarterly
U.S. commercial bank loans/deposits (aggregate)		quarterly
U.S. bank holding company wholesale funding (median)	Nondeposit Liabilities/Total Liabilities	quarterly
U.S. bank holding company wholesale funding (aggregate)	Nondeposit Liabilities/Total Liabilities	quarterly
U.S. bank holding company net stable funding ratio proxy (median)	Measure derived from *Fire-Sale Spillovers and Systemic Risk, Fernando Duarte and Thomas M. Eisenbach, Federal Reserve Bank of New York Staff Reports, no. 645 October 2013* and *How Useful Is Basel III's Liquidity Coverage Ratio? Evidence From US Bank Holding Companies, Brian Du, California State University, European Financial Management.*	quarterly

Appendix A: Proposed Indicators - Funding/Liquidity Risk

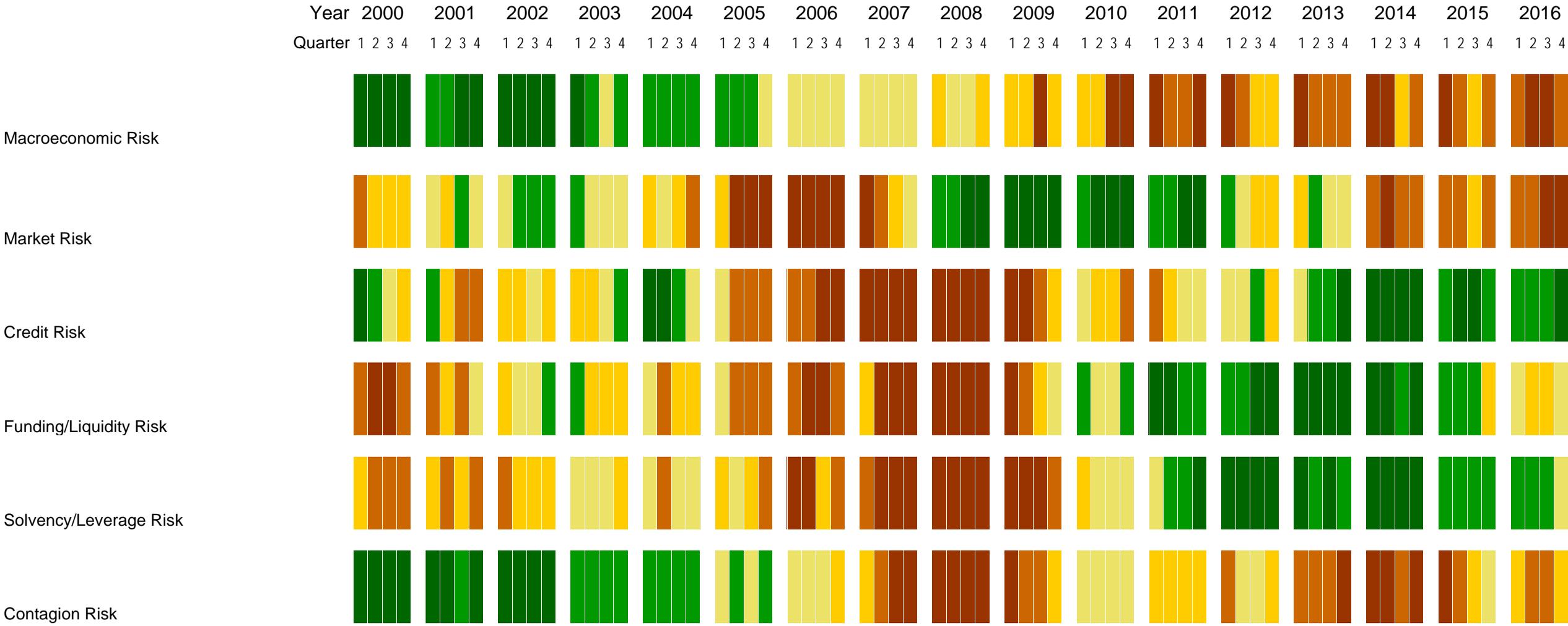| Subcategory/Indicator	Notes	Data Frequency
U.S. bank holding company net stable funding ratio proxy (aggregate)	Measure derived from *Fire-Sale Spillovers and Systemic Risk, Fernando Duarte and Thomas M. Eisenbach, Federal Reserve Bank of New York Staff Reports, no. 645 October 2013* and *How Useful Is Basel III's Liquidity Coverage Ratio? Evidence From US Bank Holding Companies, Brian Du, California State University, European Financial Management.*	quarterly

Appendix A: Proposed Indicators - Contagion Risk

Subcategory/Indicator	Notes	Data Frequency
Cross-institution contagion risk		
Asset fire sale risk in top 100 U.S. BHCs	Estimates the share of equity capital lost due to fire sale spillovers following for an indicative one percent decline in all asset prices. Aggregate for largest 100 U.S. bank holding companies, by assets. Measure derived from *Fire-Sale Spillovers and Systemic Risk, Fernando Duarte and Thomas M. Eisenbach, Federal Reserve Bank of New York Staff Reports, no. 645 October 2013.*	quarterly
Systemic risk contribution of top 175 U.S. financial institutions (SRISK)	Series reports the sum of positive SRISK values for top 175 U.S. financial institutions.	monthly
Financial sector concentration risk		
Bank holding company concentration (Herfindahl Index)		quarterly
Life insurance industry concentration (Herfindahl Index)		quarterly
Mutual fund industry concentration (Herfindahl Index)		quarterly
Transmission risk to real economy		
Total U.S. private financial liabilities/GDP		quarterly
Narrow U.S. private financial liabilities/GDP	Narrow financial liabilities includes deposits, money market fund shares, and debt obligations.	quarterly
Cross-border contagion risk		
U.S. gross international investment assets/GDP		quarterly
U.S. bank cross-border claims/GDP	Total cross-border claims. Immediate counterparty basis.	quarterly

Appendix B: New Results

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Quarter	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Macroeconomic Risk

Market Risk

Credit Risk

Funding/Liquidity Risk

Solvency/Leverage Risk

Contagion Risk

Lower Risk ▮▮▮▮▮ *Higher Risk*

Appendix B: Original Financial Stability Monitor Results

	Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	Quarter	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4

Macroeconomic Risk

Market Risk

Credit Risk

Funding/Liquidity Risk

Contagion Risk

Lower Risk   *Higher Risk*