

CoVaR

By TOBIAS ADRIAN AND MARKUS K. BRUNNERMEIER *

We propose a measure of systemic risk, ΔCoVaR , defined as the change in the value at risk of the financial system conditional on an institution being under distress relative to its median state. Our estimates show that characteristics such as leverage, size, maturity mismatch, and asset price booms significantly predict ΔCoVaR . We also provide out-of-sample forecasts of a counter-cyclical, forward-looking measure of systemic risk, and show that the 2006Q4 value of this measure would have predicted more than one third of realized ΔCoVaR during the 2007-09 financial crisis.

JEL: G01, G10, G18, G20, G28, G32, G38

Keywords: Value at Risk, Systemic Risk, Risk Spillovers, Financial Architecture

In times of financial crisis, losses spread across financial institutions, threatening the financial system as a whole.¹ The spreading of distress gives rise to systemic risk—the risk that the capacity of the entire financial system is impaired, with potentially adverse consequences for the real economy. Spillovers across institutions can occur directly due to direct contractual links and heightened counterparty credit risk or indirectly through price effects and liquidity spirals. As a result of these spillovers, the measured comovement of institutions’ assets and liabilities tends to rise above and beyond levels purely justified by fundamentals. Systemic risk measures gauge the increase in tail comovement that can arise due to the spreading of financial distress across institutions.

The most common measure of risk used by financial institutions—the value

* Adrian: Federal Reserve Bank of New York, Capital Markets Function, Research and Statistics Group, 33 Liberty Street, New York, NY 10045 (e-mail: tobias.adrian@ny.frb.org); Brunnermeier: Princeton University, Bendheim Center for Finance, Department of Economics, Princeton, NJ 08540-5296, NBER, CEPR, CESifo (e-mail: markus@princeton.edu). Special thanks go to Evan Friedman, Daniel Green, Sam Langfield, Hoai-Luu Nguyen, Daniel Stackman, Christian Wolf, and Xiaoyang Dong for outstanding research assistance. The authors also thank Paolo Angelini, Gadi Barlevy, René Carmona, Stephen Brown, Robert Engle, Mark Flannery, Xavier Gabaix, Paul Glasserman, Beverly Hirtle, Jon Danielson, John Kambhu, Arvind Krishnamurthy, Burton Malkiel, Ulrich Müller, Maureen O’Hara, Andrew Patton, Matt Pritsker, Matt Richardson, Jean-Charles Rochet, José Scheinkman, Jeremy Stein, Kevin Stroh, René Stulz, and Skander Van den Heuvel for feedback, as well as participants at numerous conferences and university, and central bank seminars. We are grateful for support from the Institute for Quantitative Investment Research Europe. Brunnermeier acknowledges financial support from the Alfred P. Sloan Foundation. The paper first appeared as Federal Reserve Bank of New York Staff Report 348 on September 5, 2008. The views expressed in this paper are those of the authors and do not necessarily represent those of the Federal Reserve Bank of New York or the Federal Reserve System.

¹Examples include the 1987 equity market crash, which was started by portfolio hedging of pension funds and led to substantial losses of investment banks; the 1998 crisis, which was started by losses of hedge funds and spilled over to the trading floors of commercial and investment banks; and the 2007-09 crisis, which spread from SIVs to commercial banks and on to investment banks and hedge funds. See e.g. Nicholas F. Brady (1988), Robert E. Rubin, Alan Greenspan, Arthur Levitt and Brooksley Born (1999), Markus K. Brunnermeier (2009), and T. Adrian and H.S. Shin (2010a).