Macroeconomics

Measuring Systemic Risk

April 23, 2010

Stern School of Business Working Paper

Financial regulations seek to limit each institution's risk. Unless the external costs of systemic risk are internalized by each financial institution, institutions will have the incentive to take risks that are borne by all. An illustration of this is the current crisis in which financial institutions had levered up on similar large portfolios of securities and loans which faced little idiosyncratic risk, but large amounts of systematic risk.

In this paper, we argue that financial regulation should be focused on limiting systemic risk, that is, the risk of a crisis in the financial sector and its spillover to the economy at large. We present a simple model of systemic risk and show that each financial institution's contribution to systemic risk can be measured as its systemic expected shortfall (SES) — that is, its propensity to be undercapitalized when the system as a whole is undercapitalized.

SES increases with an institution's leverage and its expected loss in the tail of the system's loss distribution. Institutions internalize their externality if they are "taxed" based on their SES. We demonstrate empirically the ability of SES to predict emerging risks during the financial crisis of 2007-2009, in particular, (i) the outcome of stress tests performed by regulators; (ii) the decline in equity valuations of large financial firms in the crisis; and, (iii) the widening of their credit default swap spreads.

This document is not intended to, and does not relate specifically to any investment strategy or product that AQR offers. It is being provided merely to provide a framework to assist in the implementation of an investor's own analysis and an investor's own view on the topic discussed herein.

This document has been provided to you solely for information purposes and does not constitute an offer or solicitation of an offer or any advice or recommendation to purchase any securities or other financial instruments and may not be construed as such. The factual information set forth herein has been obtained or derived from sources believed by the author and AQR Capital Management, LLC ("AQR") to be reliable but it is not necessarily all-inclusive and is not guaranteed as to its accuracy and is not to be regarded as a representation or warranty, express or implied, as to the information's accuracy or completeness, nor should the attached information serve as the basis of any investment decision. This document is not to be reproduced or redistributed to any other person. The information set forth herein has been provided to you as secondary information and should not be the primary source for any investment or allocation decision. Past performance is not a guarantee of future performance. Diversification does not eliminate the risk of experiencing investment losses.

This material is not research and should not be treated as research. This paper does not represent valuation judgments with respect to any financial instrument, issuer, security or sector that may be described or referenced herein and does not represent a formal or official view of AQR. The views expressed reflect the current views as of the date hereof and neither the author nor AQR undertakes to advise you of any changes in the views expressed herein.

The information contained herein is only as current as of the date indicated, and may be superseded by subsequent market events or for other reasons. Charts and graphs provided herein are for illustrative purposes only. The information in this presentation has been developed internally and/or obtained from sources believed to be reliable; however, neither AQR nor the author guarantees the accuracy, adequacy or completeness of such information. Nothing contained herein constitutes investment, legal, tax or other advice nor is it to

be relied on in making an investment or other decision. There can be no assurance that an investment strategy will be successful. Historic market trends are not reliable indicators of actual future market behavior or future performance of any particular investment which may differ materially, and should not be relied upon as such. Diversification does not eliminate the risk of experiencing investment losses.

The information in this paper may contain projections or other forward-looking statements regarding future events, targets, forecasts or expectations regarding the strategies described herein, and is only current as of the date indicated. There is no assurance that such events or targets will be achieved, and may be significantly different from that shown here. The information in this document, including statements concerning financial market trends, is based on current market conditions, which will fluctuate and may be superseded by subsequent market events or for other reasons.