

Systemic Risk and the Macroeconomy

Giglio, Kelly and Pruitt (2015)

Handout prepared by: David Zarruk

Systemic risk has been a focal point of research and policy, and many different ways to measure it have been proposed in the literature. The paper has three objectives. The first one is to provide a description of 19 measures of systemic risk used in the US, and 10 used in the UK. To build these indexes, the authors use long data sets, some of which span throughout all of the postwar era. The second objective is to evaluate the existing measures according to how well does each measure forecasts changes in the distribution of future macroeconomic shocks. This evaluation is done using quantile regression, since in this way they can capture asymmetries and nonlinearities between systemic risk and the macroeconomy. In particular, theory predicts that financial distress can amplify adverse shocks and generate downturns in the macroeconomic variables, while lack of distress does not necessarily lead to economic booms. The third goal is to determine if statistical dimension reduction helps to detect a relation between the existing measures of systemic risk and the macroeconomy. To pursue this, they propose two dimension reduction estimators: a principal components quantile regression (PCQR), and the partial quantile regression (PQR). The authors find that there is a positive, robust relationship between systemic risk and the probability of downturns in the economy, and systemic risk measures are more informative about the lower tail of the macroeconomic shocks' distribution, than about the center of the distribution. In particular, financial sector equity volatility has a strong power to predict outcomes in the lower tails of the macroeconomic variables, while equity volatility related to the non-financial sector does not seem to have any predictive

power. Finally, the empirical analysis finds a predictive power of systemic risk measures on policy decisions, such as movements in the Federal Funds rate. Given this, their results that show a positive relation between systemic risk and macroeconomic downturns must be interpreted as the effect of systemic risk on macroeconomic variables after the intervention of policy makers.

The systemic risk measures are grouped into four different categories. The first category is composed by indexes that measure *institution-specific risk*. These try to quantify the individual financial firm's contribution to economy-wide systemic risk. The second category are the measures of *comovement and contagion*, that quantify dependence among financial institution equity returns. The third category are two *volatility and instability* measures: the average equity volatility of the 20 largest financial institutions, and aggregate book and market leverage for these institutions. The fourth category measures *liquidity and credit* conditions in the financial market.

The correlation between many of the systemic risk measures is nonexistent or even negative, which seems to imply that the indexes are measuring different kinds of systemic risk, or have substantial noise. Moreover, some indicators seem to be *leading* while others are *lagging*. The authors identify the indexes on these categories, according to Granger causality tests among them.

To test the predictive power of the indicators, the authors use different out-of-sample data for the US, UK and Europe (industrial production growth and Chicago Fed National Activity Index). It turns out that only a few of the indicators are statistically significant at explaining the events on the 20th percentile. The authors assume that all the indexes are noisy measures of a common underlying factor, f , which they estimate using PCQR and PQR. The authors prove, under certain assumptions, that the PCQR and PQR algorithms provide consistent forecasts of the quantiles of macroeconomic variables.

Three stylized facts emerge from the empirical analysis. First, PQR has a significant out-of-sample prediction of lower tail events. Also, neither PCQR nor PQR explain the events in the central part of the

distribution. To test this, the authors test the hypothesis that the 20th percentile and the median percentile coefficients are equal, and they find out that most of them are different from zero. Second, equity return volatility variables are the most informative predictors of macroeconomic downturns. Third, financial market distress usually precedes monetary policy response.