Discussion of “Measuring Systemic Risk*”

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These views represent the personal views of the discussant and do not reflect the official views of the FDIC.


This discussion reflects ongoing research with Levent Guntay (FDIC).
Overall

• Important topic

• Policy relevant

• Methods & data readily available to produce recommended measures of firm systemic risk

• But does the proposed systemic risk measure really measure systemic risk?
What is Systemic Risk?

“I wish I had an answer to that because I'm tired of answering that question”

Yogi Berra

Equation 1 of the Acharya, Engle, Richardson (1/2/12) paper:

Real systemic risk of a firm = Real social costs of a crisis per dollar of capital shortage
× Probability of a crisis (i.e., an aggregate capital shortfall)
× Expected capital shortfall of the firm in a crisis

The paper(s) methodology and analysis is focused on the expected capital shortfall component of the “real systemic risk equation”
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The most important SIFFI issue is measuring the social costs of a financial firm’s distress

…and the methodology has little to say about this issue
Measuring Systemic Risk

• Recently proposed systemic risk measures focus on financial firm’s potential stress losses estimated from prices of traded securities
  
  – *MES/SES/SRISK* (Acharya, Pedersen, Philippon, Richardson, Engle)
    
    » Financial firm stock prices
  
  – CoVar (Adrian and Brunnermeier)
    
    » Financial firm stock prices
  
  – Price of Insurance against SIFI liability “tail-risk” losses (Huang, Zhou, Zhu)
    
    » Financial firm CDS prices
What about the real economy?

• Systemic risk arises when financial sector losses create *externalities for the real economy*

• Banks suffer large losses → intermediation drops…
  • Some bank-dependent agents fail because they lose access to credit
  • Others investments are restricted to internally-generated cash flow

• Reduced intermediation generates real sector “costs”
  – Real sector costs are the manifestation of systemic risk
    • *Lower GDP growth*

“If you don’t know where you’re going, you might end up some place else.”

Yogi Berra
Policy Prescriptions (2)

V. Acharya, L. Pedersen, T. Philippon, M. Richardson, & R. Engle (APPRE) and Acharya, Engle and Richardson (1/2/12)

- Tax large financial firms in proportion to their contribution to systemic risk (May 2010)

\[ \text{Systemic risk tax bank } i = \]
\[ + A \times \text{expected loss on bank } i \text{'s government insured liabilities} + B \times \text{Expected loss on bank } i \text{'s equity when the financial system is undercapitalized} + C \]

- Set bank capital requirements to cover bank expected losses in a set of stress scenarios
  - all scenarios in which the stock market return distribution is less than a given low return (e.g. < -2%)
SES/SRISK

• Central to both policies is a measure of the financial firms contribution to “systemic risk”
  – Expected capital shortfall for firm i conditional on a financial sector crisis

• Financial sector is in crisis when total losses to financial sector stocks exceed the capital of the financial sector
  – Make this idea operational using MES
Marginal Expected Shortfall (MES)

• MES = Expected loss on a financial institution’s shares conditional on the market portfolio having dropped a lot
  – Expected equity loss on days when financial institutions’ VaRs are exceeded
MES

• There are not very many days (thankfully) when the market drops 20%, so we need to measure MES at lower loss levels and extrapolate...
  – APPRE measure MES as the expected return on days in which the market is in the lowest 5% of all return realizations
    • and in newer version, when market drops by more than 2 percent
  – APPRE: extreme value theory/ flexible distribution can be used to extrapolate this measure farther into the loss tail of the market return distribution
    • Unclear if the additional statistical complexity adds value to the MES measure
Does MES/SES Measure Systemic Risk?

1. Large financial sector losses trigger systemic risk…
   But systemic risk is unlikely to be measured by “tail” losses in financial equity return distributions
   • Systemic risk externality impacts non-financials
   • Systemic risk externalities “kick in” well before financial sector losses exhaust financial sector equity capital

1. If large potential financial sector losses are a measure of systemic risk
   Why ignore losses on bank liabilities?
   • Stock returns provides little/no information on LGD
     ➢ MES does not measure LGD on financial sector liabilities
Why ignore SIFI liabilities?

- Systemic risk literature points to deleveraging/fire-sale/liquidity feedback loop for financial institutions
  - A story about financial institution holding of debt instruments
  - Bank equity prices & volatility provide information about bank PD
  - Bank equity prices do not provide accurate information about the potential LGD on bank liabilities
    - Must use equity prices and bond prices or CDS spreads or impose strong structural assumptions to recover LGD information
- SIFIs will risk shift—benefiting shareholders but increasing the risk of potential loss (LGD) for bank creditors
  - This shift is an important manifestation of systemic risk that is not measured by MES
- It has yet to be demonstrated that bank equity prices convey useful information about the potential for a bank (or the system) to experience a liquidity squeeze or the losses that might be triggered by a deleveraging spiral…. 
What does MES measure?

1. Our analysis suggests that, for the most part, MES measures systematic risk
   • MES is a linear function of market model $\beta$
     – If one regresses MES for a cross section of financial firms on a constant and each firm’s market model beta
     – the regression has an $R^2$ of about 95%
   • Systemic Risk $\neq$ Systematic Risk
MES Issues and Interpretation

• MES is a linear function of market model beta

\[ \tilde{R}_{it} = \alpha_i + \beta_i \tilde{R}_{Mt} + \tilde{e}_{it} \]

\[ \text{Cov}(\tilde{R}_{Mt}, \tilde{e}_{it}) = 0 \]

Consequently

\[ E(\tilde{R}_{it} | \tilde{R}_{Mt} \in I_{5\%}) = \alpha_i + \beta_i E(\tilde{R}_{Mt} | \tilde{R}_{Mt} \in I_{5\%}) \]

\[ \text{MES}_{it} (I_{5\%}) = \alpha_i + \beta_i \text{ES}(\tilde{R}_{Mt}, I_{5\%}) \]

So if we regress MES_{it} on \beta_i in a cross section

\[ \text{MES}_{it} = a_o + a_1 \hat{\beta}_i + \hat{\varepsilon}_i \]

The predicted coefficient estimates are:

\[ \hat{a}_o = \bar{\alpha} \]

\[ \hat{a}_1 = \text{ES}(\tilde{R}_{MT}, I_{5\%}) \]

\[ \hat{\varepsilon}_i = (\alpha_i - \bar{\alpha}) \]
MES measures *systematic* risk

When we run the regression using data from the NYU systemic risk ranking web site:

<table>
<thead>
<tr>
<th></th>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t Stat</th>
</tr>
</thead>
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<tr>
<td>Intercept</td>
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<td>0.10</td>
<td>0.75</td>
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<tr>
<td>X Variable 1</td>
<td>-2.54</td>
<td>0.07</td>
<td>-34.64</td>
</tr>
</tbody>
</table>

R Square 0.942
Observations 76

MES is a linear function of Beta
MES and Firm Size

• Size is the *most important* feature in BIS and Dodd-Frank SIFI designation schemes

• Do larger financial firms have larger MESs?
  – We find no reliable relationship between size and MES
High Beta—High MES

Small firms with large betas have the highest MESs.
MES & systemic risk tax?

- High beta financial stocks have high MES’s
- One can calculate MES for non-financials….
  - High beta non-financial stocks have high MES
- If MES measures systemic risk…do non-financial firms pose systemic risks too?
- Should non-financials also get the MES/SES systemic risk tax?
MES as Systemic Risk Measure

- If MES measures systemic risk
  - We would expect MES measures to be asymmetric
  - Expected returns given market returns in the lowest 5% bucket should be different from expected return the market returns are in the highest 5% bucket
There is no evidence that the MES measure accurately captures the asymmetry that should be there if it is a measure of systemic risk.
MES as a Macro Prudential Indicator

• APPRE show that MES for large financial firms was high in the depths of the crisis....

• Did the MES for these large financial firms anticipate the crisis?
MES is smallest in the years when systemic risks are building…

“It’s tough to make predictions, especially about the future” Yogi Berra
MES and capital requirement

• Using MES to define a stress test that set minimum regulatory capital has important issues/problems that need to be recognized
  – Stress test capital requirements are cheap and easy to evade if the scenario is fixed or known far ahead

• Recall that GSEs—Freddie and Fannie—were subject to a risk-based capital requirement set by a very detailed and severe stress test---
  – Stress-test-based capital requirements did not work well...
Summary

• Our results suggest that MES measures CAPM systematic risk, not systemic risk
• Our analysis using different cut off levels to define a financial crisis (-2%, -5%) generate similar results
• Non financial firms have MES measures as large or sometimes larger than financial firms
• MES in “up” market conditions are nearly identical to MES in “down” markets
  – No indication of asymmetric behavior that should be associated with systemic risk
• MES does not anticipate the build up of systemic risk

“In theory there is no difference between theory and practice. In practice there is.”
Yogi Berra