“Too big to fail” or “Too non-traditional to fail”?  
The determinants of banks’ systemic importance

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Why we care about SIFIs?

- Systemic banking crisis
  - Distress of a large fraction of the financial system
  - Catastrophic loss in the financial system and to the economy
  - The failure of a single institution may trigger such a crisis

For policy maker:

- During a financial crisis
  - Justification of bailout policy
  - Lehmann v.s. AIG

- During normal time
  - Regulation on SIFIs
  - Basel III: capital surcharge
Who are the SIFIs?

- **In practice: “Too big to fail”**
  - Large banks are SIFIs.
- **A narrower interpretation**
  - The failure of a SIFI triggers failures of other institution
  - Network approach
- **Broader concern**
  - Moral hazard: enjoy the bailout during systemic crisis
  - The incentive to be part of “systemic crisis”
  - Not only those who trigger problems are SIFIs, those who follow problems are also SIFIs!
  - Too many to fail (Acharya (2009))
- Call for a measure on “systemic importance” and test whether size or other bank characteristics are related.
1. Size matters!
   - However, becomes insignificant above a certain level.
   - Cannot differentiate among large banks with size above this threshold.
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2. Non-traditional banking and systemic importance
   - Money market funding
   - Non-traditional income
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2. Non-traditional banking and systemic importance
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   - Non-traditional income

3. Opposite effects on the individual risk and systemic importance.
   - Activities that lowers a bank’s IR increases its SI
   - Specialization vs. Diversification
Conceptualize systemic importance

- Conceptually: systemic risk of a bank
  - Contribution to the overall Systemic Risk:
  - CoVaR, SES/MES, Shapley Values, etc...
    \[ SR = f(SRC_i), \ i = 1, 2, \ldots \]
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- Decompose the SR of each bank: Individual Risk and Systemic Importance.

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- Systemic importance: Given the bank fails, the impact in other banks:
  \[ SI_i = E(\text{Impact to System} \mid \text{bank } i \text{ fails}) \]
A concrete measure on systemic importance

- **Systemic Importance** of bank $i$:

$$SI_i = \sum_{i \neq j} LGD_j \cdot P\{D_j = 1|D_i = 1\}$$

where

1. $LGD_j$: Custom Deposits
2. $P\{D_j = 1|D_i = 1\}$: conditional probability of joint defaults
3. Key question: estimation of the conditional probability
Estimation of the conditional probability

- (Unfortunately) Data on actual defaults are rare
- Instead, we proxy default by a measure of **bank distress**
- $D_j = 1$ corresponds to $R_j < \text{VaR}_j(p)$, i.e., bank $j$ is in distress
- We do not specify the distress probability $p$.
- Using multivariate Extreme Value Theory:

$$P\{D_j = 1 | D_i = 1\} \approx \lim_{p \to 0} P\{R_j < \text{VaR}_j(p) | R_i < \text{VaR}_i(p)\}$$

- Estimator:

$$\frac{1}{k} \sum_{s=1}^{n} 1_{R_j,s < R_j,(n-k), R_i,s < R_i,(n-k)}$$
Data

- SI measure: Stock returns collected from 1999-2010
  - Estimation with 4-year daily data
  - Analysis split into three periods:
    - Global Financial Crisis: 2007-2010 (311 BHCs)
    - Four-year moving window: 2000-2010 (8 periods, 148 BHCs)
  - Data cleaning: excess returns
- Firm level determinants
  - Size, Non-traditional banking, CAMEL
  - At then end of the year preceding to the estimation window
- OLS regression
  - In each window (particularly the GFC)
  - Panel regression over 8 periods
Size effect: 2007-2010

~ 30,000,000,000 USD
Results in the period 2007-2010

<table>
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<td>Size</td>
<td>0.914***</td>
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<td>1.366***</td>
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<td></td>
<td>(9.39)</td>
<td>(10.09)</td>
<td>(9.90)</td>
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<td>Size(^2)</td>
<td>-0.256***</td>
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<tr>
<td>Purified Size</td>
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<td>(9.03)</td>
<td>(8.59)</td>
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<td>Tier 1 Ratio</td>
<td>-0.021</td>
<td>-0.018</td>
<td>-0.117**</td>
<td>-0.100*</td>
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<td>(-0.89)</td>
<td>(-0.77)</td>
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<td>Loans/Assets</td>
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<td>-0.167**</td>
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<td>(-2.32)</td>
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<td>Problem Loans/Loans</td>
<td>-0.307*</td>
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<td>MMF/Funding</td>
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Moore and Zhou

TBTF or TNTTF?
145 BHCs in 8 periods: 2000-2003,..., 2007-2010

Panel regression
- Size: non-linear effect
- Non-traditional income: remains significantly positive
- Money market funding: significantly positive

Regressions in each period
- The determinants are time varying
- Non-traditional income: significant in 6 periods
- Money market funding: insignificant in 02-05, 03-06
Systemic importance and individual risk

- Theoretically
  - Diversification effects
  - Systemic risk shifting

- Empirically
  - Measure individual risk: expected shortfall
  - Using individual risk as dependent variable
  - Panel regression
    - Size: significantly negative
    - Non-traditional income: significantly negative
    - Money market funding: negative (marginal significance)
    - CAMEL: all signs are reversed with "C" "A" significant
Conclusions and policy remarks

Conclusions

- Size matters for SI, but not linear!
- Above a threshold, size does not matter.
- Non-traditional banking also matters for SI.
- Determinants on SI and IR may have opposite effect

Policy remarks

- TBTF exists, but all large banks are SIFIs (above 30bn USD by end of 2006).
- TNTTF is an alternative notion for identifying SIFIs.
- Regulations on IR and SI should be carefully considered within a system context.