Market Discipline Working For and Against Financial Stability: The Two Faces of Equity Capital

Joseph P. Hughes
Rutgers University

Loretta J. Mester*
Federal Reserve Bank of Cleveland

Choon-Geol Moon
Hanyang University

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*The views expressed here do not necessarily represent those of the Federal Reserve Bank of Cleveland or the Federal Reserve System.
Does the capital market discipline bank risk-taking?

• “Except where market discipline is undermined by moral hazard, for example, because of federal guarantees of private debt, private regulation generally has proved far better at constraining excessive risk-taking than has government regulation.” – Alan Greenspan, 2005
Does the capital market encourage bank risk-taking?

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• “...those of us who have looked to the self-interest of lending institutions to protect shareholders’ equity (myself especially) are in a state of shocked disbelief.” – Alan Greenspan, 2008
The Role of Market Discipline in Promoting Bank Safety

- The second Basel Capital Accord rests on three “pillars”:
  - Minimum capital standards
  - Supervisory review
  - Market Discipline
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• BIS: “Market discipline imposes strong incentives on banks to conduct their business in a safe, sound and efficient manner, including an incentive to maintain a strong capital base as a cushion against potential future losses arising from risk exposures.”
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How does the capital market discipline bank risk-taking?

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  - **Low-risk capital strategy** to protect valuable investment opportunities
    - Relatively high expected cost of financial distress
  - **High-risk capital strategy** to exploit safety net and “reach for yield”
    - Lower valued investment opportunities
    - Relatively low expected cost of financial distress
    - Option value of explicit/implicit deposit insurance
Dichotomous Capital Strategies

• Low-risk capital strategy – high capital ratio – to protect valuable investment opportunities
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• High-risk capital strategy – low capital ratio – to exploit safety net and “reach for yield”
  - Market Discipline works against financial stability.
Incentives to Reach for Yield

- Incentive to take risk
  - Keeley (1990): Links increased competition to the incentive to increase leverage
Evidence on Risk-Taking Incentives

• Risk-Taking Incentives
  – Keeley (1990): Links increased competition to the incentive to increase leverage

• Papers that find evidence of dichotomous capital strategies
Dichotomous Risk-Taking Incentives

- **Data**
  - 2013 data on 167 publicly traded BHCs
  - 2007 data on 142 publicly traded BHCs

- **Performance Measurement**
  - Market Value of Assets
  - Market Value Inefficiency
    - Best practice market value of assets given book-value investment in assets
    - Difference between best-practice value and achieved market value = market-value shortfall
    - Inefficiency ratio = value shortfall / best-practice value
Estimating Highest (Best-Practice) Potential Value

- $MVA_i = \alpha + \beta (BVA_i) + \gamma (BVA_i)^2 + \epsilon_i$

- with maximum likelihood techniques
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- $\nu_i \sim \text{iid } N(0, \sigma^2_\nu)$
- from the systematic shortfall
- $\mu_i (> 0) \sim \exp(-\mu u)$
Estimating Highest (Best-Practice) Potential Value

- Achieved MV = Frontier MV − Lost MV
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  $= \alpha + \beta (BVA_i) + \gamma (BVA_i)^2$
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• Noise-Adjusted $MVA_i = MVA_i - \nu_i$
Estimating Highest (Best-Practice) Potential Value

• Achieved MV = Frontier MV − Lost MV

• \( \text{MVA}_i = \alpha + \beta \text{(BVA}_i ) + \gamma (\text{BVA}_i)^2 + \nu_i - \mu_i \)

• Highest Potential \( \text{MVA}_i \)

\[
= \alpha + \beta \text{(BVA}_i ) + \gamma (\text{BVA}_i)^2
\]

• Noise-Adjusted \( \text{MVA}_i = \text{MVA}_i - \nu_i \)

• \( \text{Lost } \text{MVA}_i = E [\mu_i |(\nu_i + \mu_i)] \)

\[
= \alpha + \beta \text{(BVA}_i ) + \gamma (\text{BVA}_i)^2 - (\text{MVA}_i - \nu_i)
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Stochastic Frontier: Highest Market Value to Book-Value Investment

Deterministic Kernel of the Potential-Value Frontier:
\[ FMVA_i = \alpha + \beta (BVA_i) + \gamma (BVA_i)^2 \]

- Highest Potential Market Value of Assets: \( \alpha + \beta (BVA_i) + \gamma (BVA_i)^2 \)
- Noise-Adjusted Achieved Market Value of Assets: \( MVA_i - \nu_i \)
- Achieved Market Value of Assets: \( MVA_i \)
- Market Value of Assets
- Book Value of Assets (net of goodwill)

MV Shortfall = 12
MV Inefficiency = 12/120
MV Inefficiency = 12/120 = 0.10
Q Ratio = 108/100 = 1.08
Value of Investment Opportunities

• Highest potential value of assets in markets in which a bank operates given
  – book value investment in assets
  – GDP growth rate
  – market concentration
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• Highest potential value assets/book value assets = investment opportunity ratio
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• Value of assets in a competitive auction
Value of Investment Opportunities vs Market-Value Inefficiency

- Highest potential value of assets in markets in which a bank operates given
  - book-value investment in assets
  - GDP growth rate
  - market concentration
Value of Investment Opportunities vs Market-Value Inefficiency

• Highest potential value of assets in markets in which a bank operates given
  - book-value investment in assets
  - GDP growth rate
  - market concentration

• Highest potential value of assets over all relevant banking markets given
  - book-value investment in assets
  - penalizes suboptimal locations
Investment Strategies and Financial Performance

• $P_i = a + X^2 + \mu_i$

  - where $P_i = $ performance measured by

    • ln market value of assets
    • market-value inefficiency ratio
Investment Strategies and Financial Performance

- $P_i = a + X^2 + \mu_i$
  - where $X$ is a set of regressors
    - In book-value of assets
    - ownership structure
    - investment opportunity ratio
    - loan quality
    - asset and liability composition
    - off-balance-sheet activities
    - equity capital ratio (proportion of assets)
    - equity capital ratio interacted with . . .
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- How is performance related to capital ratio?
  - Is the performance effect of capital influenced by
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    - value of investment opportunities
Performance Equations

• \( P_i = a + X^2 + \mu_i \)
  - estimated annually 2007 and 2013
Performance Equations

- \( P_i = a + X^2 + \mu_i \)
- 2013
- \( \partial \ln \text{Market Value}_i / \partial \text{capital ratio}_i \)
Performance Equations

• \( P_i = a + X^2 + \mu_i \)
  - 2013
  - \( \frac{\partial \ln \text{Market Value}_i}{\partial \text{capital ratio}_i} = 4.832 \)
    + (-0.239)(\( \ln(\text{book-value assets}_i (1000s)) \))
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Performance Equations

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2013 Data: Market Value of Assets for 167 BHCs

- Under-capitalized banks (more valuable IOs)
  
  • **132 of 167** BHCs improve financial performance by increasing capital ratio (97 statistically significant)
2013 Data: Market Value of Assets for 167 BHCs

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- **Over-capitalized banks** (less valuable IOs)
  - **35 of 167** BHCs improve performance by **reducing** capital ratio (15 statistically significant)
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<table>
<thead>
<tr>
<th>Year</th>
<th><strong>( \frac{\ln(\text{Market Value of Assets})}{\text{Capital Ratio}} )</strong></th>
<th><strong>Market-Value Inefficiency/( \frac{\text{Capital Ratio}}{} )</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \text{&gt; 0} ) N=97</td>
<td>( \text{&lt; 0} ) N=15</td>
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<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
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<td></td>
<td>( \text{&lt; 0} ) N=110</td>
<td>( \text{&gt; 0} ) N=20</td>
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<td></td>
<td>Mean</td>
<td>Mean</td>
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<tr>
<td>2013</td>
<td><strong>Performance/( \frac{\text{Capital Ratio}}{} )</strong></td>
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<tr>
<td></td>
<td>0.397</td>
<td>-0.6782</td>
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<td></td>
<td>(&lt; 0.0001)</td>
<td><strong>( \text{&lt; 0} ) )</strong></td>
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<td></td>
<td>-0.453</td>
<td>0.876</td>
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<tr>
<td></td>
<td>(&lt; 0.0001)</td>
<td><strong>( \text{&gt; 0} ) )</strong></td>
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<td></td>
<td><strong>Book Value Assets (1,000s)</strong></td>
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<tr>
<td></td>
<td>3,446,971</td>
<td>791,823,540</td>
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<tr>
<td></td>
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<td>(0.0018)</td>
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<td><strong>Investment Opportunity Ratio</strong></td>
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<td>1.125</td>
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<td>1.293</td>
<td>1.145</td>
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<td><strong>Tobin’s q Ratio</strong></td>
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<td><strong>Market-Value Inefficiency Ratio</strong></td>
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<td></td>
<td>0.195</td>
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<td><strong>Book-Value Equity/Total Assets</strong></td>
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<td>0.110</td>
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<td>0.9039</td>
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<td>(0.8453)</td>
<td>(0.8453)</td>
</tr>
<tr>
<td>Year</td>
<td>(\ln(\text{Market Value of Assets})/\text{Capital Ratio})</td>
<td>(\text{Market-Value Inefficiency/\text{Capital Ratio}})</td>
</tr>
<tr>
<td>------</td>
<td>------------------------------------------------</td>
<td>------------------------------------------------</td>
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<tr>
<td>2013</td>
<td>&gt; 0 (N=97) &lt; 0 (N=15)</td>
<td>&lt; 0 (N=110) &gt; 0 (N=20)</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>•Performance/ •Capital Ratio</strong></td>
<td>0.397</td>
<td>-0.6782</td>
</tr>
<tr>
<td><strong>Book Value Assets (1,000s)</strong></td>
<td>3,446,971</td>
<td>791,823,540</td>
</tr>
<tr>
<td><strong>Investment Opportunity Ratio</strong></td>
<td>1.3326</td>
<td>1.125</td>
</tr>
<tr>
<td><strong>Tobin’s q Ratio</strong></td>
<td>1.0751</td>
<td>1.037</td>
</tr>
<tr>
<td><strong>Market-Value Inefficiency Ratio</strong></td>
<td>0.233</td>
<td>0.054</td>
</tr>
<tr>
<td><strong>Book-Value Equity/ Total Assets</strong></td>
<td>0.110</td>
<td>0.109</td>
</tr>
<tr>
<td>2013</td>
<td>•(\ln(\text{Market Value of Assets})/\text{Capital Ratio})</td>
<td>• (\text{Market-Value Inefficiency}/\text{Capital Ratio})</td>
</tr>
<tr>
<td>------</td>
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<td>-------------------------------------------------</td>
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<tr>
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<td>(&gt; 0) (N=97)</td>
<td>(&lt; 0) (N=15)</td>
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<td>Mean</td>
<td>Mean</td>
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<tr>
<td>Mean</td>
<td>Mean</td>
<td>(P)</td>
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<tr>
<td>Mean</td>
<td>Mean</td>
<td>(P)</td>
</tr>
<tr>
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<td>0.397</td>
<td>-0.6782</td>
</tr>
<tr>
<td></td>
<td>(&lt; 0) (N=110)</td>
<td>(&gt; 0) (N=20)</td>
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<td></td>
<td>Mean</td>
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</tr>
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<td><strong>3,446,971</strong></td>
<td>791,823,540</td>
</tr>
<tr>
<td></td>
<td>0.0018</td>
<td>(0.0018)</td>
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<td>614,164,373</td>
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<td>0.0002</td>
<td>(0.0002)</td>
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<td>Investment Opportunity Ratio</td>
<td>1.3326</td>
<td>1.125</td>
</tr>
<tr>
<td></td>
<td>(&lt; 0.0001)</td>
<td>(&lt; 0.0001)</td>
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<td></td>
<td>1.293</td>
<td>1.145</td>
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<td>(&lt; 0.0001)</td>
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<tr>
<td>Tobin’s q Ratio</td>
<td>1.0751</td>
<td>1.037</td>
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<tr>
<td></td>
<td>0.0012</td>
<td>(0.0012)</td>
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<td>0.233</td>
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</tr>
<tr>
<td></td>
<td>(&lt; 0.0001)</td>
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<tr>
<td></td>
<td>0.195</td>
<td>0.058</td>
</tr>
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<td>(&lt; 0.0001)</td>
<td>(&lt; 0.0001)</td>
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<td>0.109</td>
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<tr>
<td></td>
<td>0.9039</td>
<td>(0.8453)</td>
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<td>0.109</td>
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<td></td>
<td>(0.8453)</td>
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<td>--------------</td>
<td>-----------------------------------------</td>
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<tr>
<td></td>
<td>0.8453</td>
<td>0.8453</td>
</tr>
</tbody>
</table>
Capital Market Incentives to Increase the Capital Ratio

• Smaller banks
Capital Market Incentives to Increase the Capital Ratio

• Smaller banks
  – 97 out of 167 banks in 2013
Capital Market Incentives to Increase the Capital Ratio

• Smaller banks
  - 97 out of 167 banks in 2013
  - 0 out of 142 banks in 2007
Capital Market Incentives to Increase the Capital Ratio

- Smaller banks
  - 97 out of 167 banks in 2013
  - 0 out of 142 banks in 2007

- Higher investment opportunity ratio
Capital Market Incentives to Decrease the Capital Ratio

• Large, systemically important banks
Capital Market Incentives to Decrease the Capital Ratio

• Large, systemically important banks
  - 15 out of 21 in 2013 (15/167)
Capital Market Incentives to Decrease the Capital Ratio

- Large, systemically important banks
  - 15 out of 21 in 2013
  - 17 out of 17 in 2007
Capital Market Incentives to Decrease the Capital Ratio

- Large, systemically important banks
  - 15 out of 21 in 2013
  - 17 out of 17 in 2007
- Lower investment opportunity ratio
Agency Incentives

- Laeven and Levine (2009)
  - Diversified large shareholders vs debtholders and non-shareholder managers
Agency Incentives

- Laeven and Levine (2009)
  - Diversified large shareholders vs debtholders and non-shareholder managers
  - Risk-taking is positively related to large shareholdings.
Agency Incentives

• Laeven and Levine (2009)
  - Diversified large shareholders vs debtholders and non-shareholder managers
  - **Risk-taking is positively related to large shareholdings.**

• Cheng, Hong, and Schneinkman (2015)
  - High risk and high residual executive compensation related to institutional ownership.
Conclusions

• Evidence of two faces of equity investment
  – Banks with higher valued investment opportunities: an increase in capital ratio associated with better financial performance
Conclusions

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    • market discipline tends to enhance financial stability
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    • large, systemically important banks
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    - smaller banks
    - market discipline tends to enhance financial stability
  - Banks with lower valued investment opportunities: a decrease in capital ratio associated with better financial performance
    - large, systemically important banks
    - market discipline tends to work against stability
Conclusions

- Market discipline working for stability
  - “...private regulation generally has proved far better at constraining excessive risk-taking than has government regulation.” – Alan Greenspan, 2005
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  – “...private regulation generally has proved far better at constraining excessive risk-taking than has government regulation.” – Alan Greenspan, 2005

• Market discipline working against stability
  – “When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance. We're still dancing.” – Charles O. Prince, 2007
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  – “...those of us who have looked to the self-interest of lending institutions to protect shareholders’ equity (myself especially) are in a state of shocked disbelief.” – Alan Greenspan, 2008
Conclusions

• Evidence of two faces of equity investment

• Need for regulatory capital requirements
  – Basel III
  – TLAC
  – CoCos