The impact of financial structure on firms’ financial constraints: A cross-country analysis

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Outline

- Introduction
  - Literature review
  - Test design
  - Data description
  - Results
  - Conclusions
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In which countries are firms more or less likely to face obstacles in their access to external financing?
Which financial system provides greater incentives for economic growth?

- Stock markets can provide an important source of financing
- A strongly bank-based system may be a workable alternative
- Important differences exist in corporate governance systems, regimes of investor protection, corporate financing structures

The structure and the extent of the financial system of a specific country may be key determinants of the financial constraints that its firms face, and of that economy’s potential for growth.
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Research strategy

To address this question, we consider how firms’ cash flow sensitivity of cash varies across different countries and their varied financial systems. We evaluate how firms’ propensity to save cash out of their cash flow varies over categories of firms considered more or less financially constrained, and how that variation may respond to the underlying financial architecture.

To preview our findings, our results indicate that both the structure of the financial system and its level of development matter. Bank-based financial systems provide financially constrained firms with easier access to external financing. (Of course, these results were derived before the 2008 meltdown of banks worldwide).
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Defining financial constraints

- Fazzari, Hubbard, Petersen (*Brookings Pap.*, 1988): If firms’ access to external capital markets is limited, firms must rely on internal resources so that internally generated cash flows influence the investment path. (Gilchrist and Himmelberg (*J Mon.Ec.*, 1996) and Hoshi et al. (*QJE*, 1991))

- Critiques by Kaplan and Zingales (*QJE*, 1997): “those firms classified as less financially constrained exhibit a significantly greater investment-cash flow sensitivity than those firms classified as more financially constrained” (Cleary (*J Fin.*, 1999), Gomes (*AER*, 2001), and Cummings et al. (*AER*, 2006)).
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Doubts about the measurement of financial constraints brought forth further studies that broaden the analysis from the traditional cash flow-investment paradigms (e.g. Almeida and Campello (WP, 2002) and Moyen (J Fin., 2004)).

The innovative approach of Almeida et al. (J Fin., 2004) argues that savings out of a firm’s generated cash flow reflect the trade-off between present and future investment opportunity that constrained firms face. Thus, in the presence of financial frictions, scrutiny of the firm’s financial management should indicate imperfect financial markets earlier and more clearly than the observed path of capital investment expenditures.
Evaluating the cash flow sensitivity of cash

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Country-comparison studies on the relation between financial constraints and the financial environment are few in number, and based on evaluation of the investment–cash flow sensitivity.

- Firms in market based economies have higher investment–cash flow sensitivities:
  - France, Japan and USA (Mairesse et al., NBER WP, 1999)
  - Belgium, France, Germany and UK (Bond et al., RESstat, 2003)
- The level of financial development affects the cash flow sensitivity of cash (Khurana et al., JFQA, 2006)

Evidence on how financial architecture affects a less ambiguous indicator for the existence of financial constraints has not been produced.
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Our contribution to the literature

- We interact cash flow with proxies for country-specific financial structure. The latter measures reflect the relative importance (measured by activity or size) of the stock market compared to that of the banking system (following the approach of Levine, *J Fin Intermed.*, 2002).

- We show that our results are robust after controlling for the level of development of the financial system.
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- We show that our results are robust after controlling for the level of development of the financial system.
Our econometric specification:

\[
\Delta CashHoldings_{it} = \zeta + \alpha CashFlow_{it} + \delta Structure_{it} \\
+ \beta CashFlow_{it} \times Structure_{it} + X \gamma + \theta_i + \epsilon_{it}
\]

where

- \( \Delta CashHoldings \) is the change in the ratio of cash and short term investment to total assets;
- \( CashFlow \) is cash flow, defined as income before extraordinary items plus depreciation, normalized by total assets;
- \( Structure \) is a measure of financial system structure directly introduced into the specification and interacted with \( CashFlow \);
- \( X \) is a vector of firm characteristics, with \( \theta_i \) a firm fixed effect.
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Following Levine (JFI, 2002), we make use of two different measures of financial structure: \textit{StructureActivity} and \textit{StructureSize}. They both consist of ratios with \textit{GDP} as the denominator.

\[
\text{StructureActivity} = \log \left( \frac{\text{total value traded ratio}}{\text{bank credit ratio}} \right)
\]

\[
\text{StructureSize} = \log \left( \frac{\text{market capitalization ratio}}{\text{bank credit ratio}} \right)
\]

Control Variables

The choice of variables is motivated by prior research on the determinants of cash holdings, subject to data availability.

- The natural log of assets, *Size*, is used as a measure of firm size.
- The ratio of future investment to current investment, *LeadInvestment*, is used as a measure of the firm’s investment opportunities (an alternative to Tobin’s *Q*). Estimation is performed with IV-GMM to deal with endogeneity of this measure.
- The decision to hold cash also crucially depends on current capital expenditures (*Investment*), changes in net working capital (*ΔNWC*) and changes in short term debt (*ΔShortDebt*).
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A panel of non-financial firms from 36 countries obtained from the S&P GLOBAL COMPUSTAT database over the 1988–2006 period
- Normalized to real US dollars
- Screened to remove inappropriate or implausible values
- 67,291 manufacturing firm-year observations on 6,970 firms
- Two splits for defining financial constraints:
  - Size: above 70th pct (below 30th pct) of distribution: unconstrained (constrained)
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### Descriptive statistics by variable, 1989–2006

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<th>( p25 )</th>
<th>( p50 )</th>
<th>( p75 )</th>
<th>( \mu )</th>
<th>( \sigma )</th>
</tr>
</thead>
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<tr>
<td>( \Delta ) CashHoldings</td>
<td>67,249</td>
<td>-0.0206</td>
<td>0.0008</td>
<td>0.0260</td>
<td>-0.0014</td>
<td>0.0939</td>
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<tr>
<td>CashHoldings</td>
<td>67,257</td>
<td>0.0303</td>
<td>0.0849</td>
<td>0.1791</td>
<td>0.1307</td>
<td>0.1425</td>
</tr>
<tr>
<td>CashFlow</td>
<td>67,291</td>
<td>0.0285</td>
<td>0.0909</td>
<td>0.1718</td>
<td>0.1142</td>
<td>0.2370</td>
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<tr>
<td>StructureSize</td>
<td>66,183</td>
<td>-0.4634</td>
<td>0.1108</td>
<td>0.7519</td>
<td>0.1278</td>
<td>0.7361</td>
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<tr>
<td>StructureActivity</td>
<td>66,091</td>
<td>-1.0204</td>
<td>-0.2903</td>
<td>0.3898</td>
<td>-0.2277</td>
<td>1.0820</td>
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<tr>
<td>( CF \times ) StructureSize</td>
<td>66,183</td>
<td>-0.0441</td>
<td>0.0035</td>
<td>0.0798</td>
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<td>( CF \times ) StructureActivity</td>
<td>66,091</td>
<td>-0.1080</td>
<td>-0.0147</td>
<td>0.0581</td>
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<td>FinanceSize</td>
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<td>-1.2173</td>
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<td>FinanceActivity</td>
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<td>-1.6055</td>
<td>-0.7851</td>
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<td>0.9877</td>
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<tr>
<td>( CF \times ) FinanceSize</td>
<td>66,183</td>
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<td>-0.0336</td>
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<td>0.2559</td>
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<tr>
<td>( CF \times ) FinanceActivity</td>
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<td>-0.0537</td>
<td>0.0024</td>
<td>-0.1178</td>
<td>0.3604</td>
</tr>
<tr>
<td>LeadInvestment</td>
<td>67,291</td>
<td>0.8345</td>
<td>1.5041</td>
<td>10.0000</td>
<td>4.0302</td>
<td>4.1432</td>
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<tr>
<td>Size</td>
<td>67,279</td>
<td>4.2600</td>
<td>5.4557</td>
<td>6.7285</td>
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<td>1.9497</td>
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<tr>
<td>Investment</td>
<td>61,458</td>
<td>0.0215</td>
<td>0.0413</td>
<td>0.0703</td>
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<td>0.0483</td>
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<tr>
<td>( \Delta ) NWC</td>
<td>66,824</td>
<td>-0.0317</td>
<td>0.0050</td>
<td>0.0414</td>
<td>0.0021</td>
<td>0.0909</td>
</tr>
<tr>
<td>NetWorkingCapital</td>
<td>66,854</td>
<td>-0.0141</td>
<td>0.0856</td>
<td>0.1909</td>
<td>0.0660</td>
<td>1.9859</td>
</tr>
<tr>
<td>( \Delta ) ShortDebt</td>
<td>66,472</td>
<td>-0.0122</td>
<td>0.0000</td>
<td>0.0111</td>
<td>-0.0034</td>
<td>0.0598</td>
</tr>
<tr>
<td>ShortTermDebt</td>
<td>66,626</td>
<td>0.0000</td>
<td>0.0333</td>
<td>0.1162</td>
<td>0.0832</td>
<td>0.3074</td>
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</tbody>
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### Descriptive statistics for selected countries, 1989–2006

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<tr>
<th>Country</th>
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<th>Structure Size</th>
<th>Finance Activity</th>
<th>Finance Size</th>
<th>Cash/TA</th>
<th>N</th>
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<tbody>
<tr>
<td>Australia</td>
<td>-0.64</td>
<td>-0.02</td>
<td>-1.11</td>
<td>-0.50</td>
<td>0.09</td>
<td>967</td>
</tr>
<tr>
<td>Austria</td>
<td>-2.87</td>
<td>-1.85</td>
<td>-2.92</td>
<td>-1.91</td>
<td>0.10</td>
<td>424</td>
</tr>
<tr>
<td>Belgium</td>
<td>-1.86</td>
<td>-0.17</td>
<td>-2.54</td>
<td>-0.85</td>
<td>0.12</td>
<td>499</td>
</tr>
<tr>
<td>Brazil</td>
<td>-0.64</td>
<td>0.21</td>
<td>-3.23</td>
<td>-2.38</td>
<td>0.12</td>
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<td>Canada</td>
<td>-0.60</td>
<td>0.14</td>
<td>-1.70</td>
<td>-0.96</td>
<td>0.10</td>
<td>1,659</td>
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<td>-1.77</td>
<td>-1.21</td>
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<td>Japan</td>
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<td>0.41</td>
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<td>South Africa</td>
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<td>0.85</td>
<td>-1.55</td>
<td>-0.05</td>
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<tr>
<td>Sweden</td>
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<td>-1.00</td>
<td>-0.97</td>
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</table>
Structure–Activity vs Firm Size
Selected Countries

Baum, Schäfer, Talavera (BC/DIW/UEA)  Financial structure on financial constraints  DIME, April 2010
Structure–Size vs Firm Size
Selected Countries

Baum, Schäfer, Talavera (BC/DIW/UEA) Financial structure on financial constraints DIME, April 2010 17 / 1
### Empirical results

#### Basic specification: *StructureActivity*

**Models of the change in cash holdings**

<table>
<thead>
<tr>
<th></th>
<th>Firm Size</th>
<th></th>
<th>Payout Ratio</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Small</td>
<td>Large</td>
<td>Low Payout</td>
<td>High Payout</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>CashFlow</td>
<td>0.097***</td>
<td>0.025**</td>
<td>0.106***</td>
<td>-0.024</td>
</tr>
<tr>
<td></td>
<td>(0.024)</td>
<td>(0.010)</td>
<td>(0.013)</td>
<td>(0.063)</td>
</tr>
<tr>
<td>StructureActivity</td>
<td>-0.015</td>
<td>0.001</td>
<td>-0.001</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.002)</td>
<td>(0.004)</td>
<td>(0.021)</td>
</tr>
<tr>
<td>CF × StructureActivity</td>
<td>0.095***</td>
<td>0.012*</td>
<td>0.073***</td>
<td>-0.018</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.007)</td>
<td>(0.014)</td>
<td>(0.045)</td>
</tr>
<tr>
<td>Lead Investment</td>
<td>0.093**</td>
<td>0.012</td>
<td>0.027</td>
<td>0.160</td>
</tr>
<tr>
<td></td>
<td>(0.047)</td>
<td>(0.008)</td>
<td>(0.023)</td>
<td>(0.118)</td>
</tr>
<tr>
<td>Size</td>
<td>0.139**</td>
<td>0.020***</td>
<td>0.064***</td>
<td>0.178*</td>
</tr>
<tr>
<td></td>
<td>(0.059)</td>
<td>(0.007)</td>
<td>(0.024)</td>
<td>(0.096)</td>
</tr>
<tr>
<td>Investment</td>
<td>1.277*</td>
<td>0.057</td>
<td>0.133</td>
<td>2.082</td>
</tr>
<tr>
<td></td>
<td>(0.731)</td>
<td>(0.088)</td>
<td>(0.328)</td>
<td>(1.710)</td>
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<tr>
<td>ΔNWC</td>
<td>-0.213***</td>
<td>-0.159***</td>
<td>-0.169***</td>
<td>-0.393***</td>
</tr>
<tr>
<td></td>
<td>(0.049)</td>
<td>(0.028)</td>
<td>(0.021)</td>
<td>(0.091)</td>
</tr>
<tr>
<td>ΔShortDebt</td>
<td>-0.058</td>
<td>-0.030</td>
<td>-0.068**</td>
<td>-0.339</td>
</tr>
<tr>
<td></td>
<td>(0.069)</td>
<td>(0.034)</td>
<td>(0.029)</td>
<td>(0.207)</td>
</tr>
<tr>
<td>N</td>
<td>12,139</td>
<td>13,904</td>
<td>14,269</td>
<td>11,452</td>
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</tbody>
</table>
## Basic specification: \textit{StructureSize}

Models of the change in cash holdings

<table>
<thead>
<tr>
<th>Firm Size</th>
<th>Payout Ratio</th>
<th>(\text{CashFlow})</th>
<th>(\text{StructureSize})</th>
<th>(\text{CF} \times \text{StructureSize})</th>
<th>(\text{LeadInvestment})</th>
<th>(\text{Size})</th>
<th>(\text{Investment})</th>
<th>(\Delta \text{NWC})</th>
<th>(\Delta \text{ShortDebt})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>(1)</td>
<td>0.063**</td>
<td>-0.012</td>
<td>0.153***</td>
<td>0.096**</td>
<td>0.142**</td>
<td>1.318*</td>
<td>-0.221***</td>
<td>-0.063</td>
</tr>
<tr>
<td>Large</td>
<td>(2)</td>
<td>0.022**</td>
<td>-0.005</td>
<td>0.022**</td>
<td>0.012</td>
<td>0.019***</td>
<td>0.053</td>
<td>-0.159***</td>
<td>-0.029</td>
</tr>
<tr>
<td>Low Payout</td>
<td>(3)</td>
<td>0.077***</td>
<td>-0.000</td>
<td>0.111***</td>
<td>0.026</td>
<td>0.064***</td>
<td>0.129</td>
<td>-0.173***</td>
<td>-0.070**</td>
</tr>
<tr>
<td>High Payout</td>
<td>(4)</td>
<td>-0.015</td>
<td>0.013</td>
<td>0.017</td>
<td>0.161</td>
<td>0.179*</td>
<td>2.102</td>
<td>-0.396***</td>
<td>-0.342</td>
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</tbody>
</table>

\(N\) 12,155 13,919 14,285 11,467
Cash flow sensitivity to cash by size groups

Empirical results

Basic specification

Baum, Schäfer, Talavera (BC/DIW/UEA)  Financial structure on financial constraints  DIME, April 2010

Small

Large
Empirical results  Basic specification

Cash flow sensitivity to cash by dividend payout groups

Baum, Schäfer, Talavera (BC/DIW/UEA)  Financial structure on financial constraints  DIME, April 2010  21 / 1

Following Levine (*JFI*, 2002), we make use of two different measures of financial development: *FinanceActivity* and *FinanceSize*. They both make use of ratios with GDP as the denominator.

\[
\text{FinanceActivity} = \log \left( \frac{\text{total value traded ratio} \times \text{bank credit ratio}}{} \right)
\]
\[
\text{FinanceSize} = \log \left( \frac{\text{market capitalization ratio} \times \text{bank credit ratio}}{} \right)
\]

Adding financial development

Demirgüç-Kunt and Maksimovich (J Fin Ec, 2002) argue that financial development, rather than financial structure, matters.

Following Levine (JFI, 2002), we make use of two different measures of financial development: FinanceActivity and FinanceSize. They both make use of ratios with GDP as the denominator.

\[
\text{FinanceActivity} = \log (\text{total value traded ratio} \times \text{bank credit ratio}) \\
\text{FinanceSize} = \log (\text{market capitalization ratio} \times \text{bank credit ratio})
\]

Empirical results

Financial development measures

Finance–Activity vs Firm Size
Selected Countries

Baum, Schäfer, Talavera (BC/DIW/UEA) Financial structure on financial constraints DIME, April 2010
Empirical results

Financial development measures

Finance–Size vs Firm Size
Selected Countries

Baum, Schäfer, Talavera (BC/DIW/UEA)  Financial structure on financial constraints  DIME, April 2010
Empirical results

Development augmented specifications

Models of the change in cash holdings: Selected results

<table>
<thead>
<tr>
<th>Firm Size</th>
<th>Payout Ratio</th>
<th>( \text{StructureActivity} ) and ( \text{FinanceActivity} ) measures</th>
<th>( \text{StructureSize} ) and ( \text{FinanceSize} ) measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CashFlow</strong></td>
<td>0.066**</td>
<td>0.026***</td>
<td>0.063***</td>
</tr>
<tr>
<td>(0.027)</td>
<td>(0.009)</td>
<td>(0.014)</td>
<td>(0.067)</td>
</tr>
<tr>
<td><strong>StructureActivity</strong></td>
<td>0.030</td>
<td>0.001</td>
<td>0.023</td>
</tr>
<tr>
<td>(0.030)</td>
<td>(0.004)</td>
<td>(0.017)</td>
<td>(0.041)</td>
</tr>
<tr>
<td>( \text{CF} \times \text{StructureActivity} )</td>
<td>0.114***</td>
<td>0.010</td>
<td>0.100***</td>
</tr>
<tr>
<td>(0.025)</td>
<td>(0.012)</td>
<td>(0.014)</td>
<td>(0.060)</td>
</tr>
<tr>
<td><strong>FinanceActivity</strong></td>
<td>-0.056</td>
<td>-0.000</td>
<td>-0.029</td>
</tr>
<tr>
<td>(0.039)</td>
<td>(0.004)</td>
<td>(0.023)</td>
<td>(0.036)</td>
</tr>
<tr>
<td>( \text{CF} \times \text{FinanceActivity} )</td>
<td>-0.041*</td>
<td>0.003</td>
<td>-0.058***</td>
</tr>
<tr>
<td>(0.025)</td>
<td>(0.012)</td>
<td>(0.016)</td>
<td>(0.057)</td>
</tr>
</tbody>
</table>

| **CashFlow** | 0.044 | 0.024*** | 0.047*** | -0.001 |
| (0.028) | (0.008) | (0.013) | (0.058) |
| **StructureSize** | 0.017 | -0.003 | 0.015 | 0.027 |
| (0.030) | (0.004) | (0.013) | (0.039) |
| \( \text{CF} \times \text{StructureSize} \) | 0.150*** | 0.019 | 0.116*** | 0.010 |
| (0.036) | (0.012) | (0.018) | (0.061) |
| **FinanceSize** | -0.066 | -0.008 | -0.042 | -0.050 |
| (0.044) | (0.005) | (0.027) | (0.047) |
| \( \text{CF} \times \text{FinanceSize} \) | -0.028 | 0.007 | -0.060*** | 0.027 |
| (0.028) | (0.014) | (0.015) | (0.064) |
Interpretation

- The *FinanceActivity* coefficients are negative, but not significantly different from zero.
- As in Love (*Rev Fin Stud.*, 2003), the significant interaction term $CF \times FinanceActivity$ indicates that financial development can address obstacles in external financing.
- Both financial structure and financial development have important effects on constrained (small, low-payout) firms.
- The *FinanceSize* coefficients lead to similar inferences.
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Interpretation

Our results indicate the existence of tighter financial constraints for firms operating in *market-based* financial systems relative to *bank-based* financial systems.

Supporting analytical arguments:

- Allen and Gale (*Comparing Financial Systems*, 2000): banks have a comparative advantage in selecting different types of investment projects.
- Chakraborty and Ray (*J Mon.Ec.*, 2006): a bank-based financial system encourages participation in production activities and provides funding to a larger number of entrepreneurs.
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Conclusions

Our empirical analysis of the data provides several interesting findings. In contrast to the negative conclusions of earlier research, we conclude that financial architecture plays a crucial role in reducing obstacles to firms’ access to finance in external markets.

- Using two definitions of financial constraints and two different measures of relative financial market organization, we find that the cash flow sensitivity of cash is significantly higher for firms operating in market-based economies than for firms operating in bank-based economies.

- The results also suggest that the influence of financial structure is important even after controlling for the level of financial development.
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