

# 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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# Stylised facts

Financial theory has stressed the role of *financial constraints* on firms' behavior.

The literature contains few studies considering how obstacles to external financing may vary across different financial systems. Some stylized facts on observed differences:

	Germany, 2005	US, 2005
Ratio of private credit by deposit money banks to GDP	1.23	0.48
Ratio of stock market capitalization to GDP	0.43	1.35

In which countries are firms more or less likely to face obstacles in their access to external financing?



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- 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

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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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# Evaluating the cash flow sensitivity of cash

- 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.

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# International evidence

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:
  - USA, France, Japan and UK (Gomes et al., *JFQA*, 2005)
  - UK, Belgium, France, Germany and US (Dowd et al., *JFQA*, 2005)
- The level of financial development affects the cash flow sensitivity of cash (Khurana et al., *JFQA*, 2006)

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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:

$$\begin{aligned}\Delta \text{CashHoldings}_{it} &= \zeta + \alpha \text{CashFlow}_{it} + \delta \text{Structure}_{it} \\ &+ \beta \text{CashFlow}_{it} \times \text{Structure}_{it} + X\gamma + \theta_i + \epsilon_{it}\end{aligned}$$

where

- $\Delta \text{CashHoldings}$  is the change in the ratio of cash and short term investment to total assets;
- $\text{CashFlow}$  is cash flow, defined as income before extraordinary items plus depreciation, normalized by total assets;
- $\text{Structure}$  is a measure of financial system structure directly introduced into the specification and interacted with  $\text{CashFlow}$ .
- $X$  is a vector of firm characteristics, with  $\theta_i$  a firm fixed effect.

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# Financial structure measures

Following Levine (*JFI*, 2002), we make use of two different measures of financial structure: *StructureActivity* and *StructureSize*. They both consist of ratios with *GDP* as the denominator.

$$\begin{aligned} \text{StructureActivity} &= \log \left( \frac{\text{total value traded ratio}}{\text{bank credit ratio}} \right) \\ \text{StructureSize} &= \log \left( \frac{\text{market capitalization ratio}}{\text{bank credit ratio}} \right) \end{aligned}$$

Source: Financial Structure Database by Beck et al. (*World Bank Ec Rev*, 2000, website, 2007).

# 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 ( $\Delta NWC$ ) and changes in short term debt ( $\Delta ShortDebt$ ).

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# Description of the firm-level data

- 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)
  - Dividend payout ratio: above 70th pct (below 30th pct) of distribution: unconstrained (constrained)

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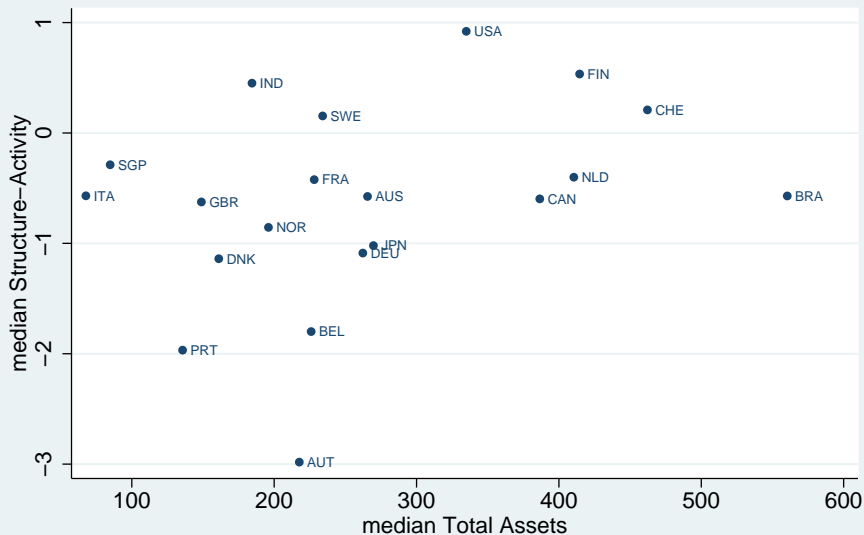
Descriptive statistics by variable, 1989–2006

Variable	<i>N</i>	<i>p</i> 25	<i>p</i> 50	<i>p</i> 75	$\mu$	$\sigma$
$\Delta$ <i>CashHoldings</i>	67,249	-0.0206	0.0008	0.0260	-0.0014	0.0939
<i>CashHoldings</i>	67,257	0.0303	0.0849	0.1791	0.1307	0.1425
<i>CashFlow</i>	67,291	0.0285	0.0909	0.1718	0.1142	0.2370
<i>StructureSize</i>	66,183	-0.4634	0.1108	0.7519	0.1278	0.7361
<i>StructureActivity</i>	66,091	-1.0204	-0.2903	0.3898	-0.2277	1.0820
<i>CF</i> $\times$ <i>StructureSize</i>	66,183	-0.0441	0.0035	0.0798	0.0016	0.1797
<i>CF</i> $\times$ <i>StructureActivity</i>	66,091	-0.1080	-0.0147	0.0581	-0.0659	0.2927
<i>FinanceSize</i>	66,183	-1.2173	-0.4893	-0.1744	-0.6090	0.8025
<i>FinanceActivity</i>	66,091	-1.6055	-0.7851	-0.3153	-0.9668	0.9877
<i>CF</i> $\times$ <i>FinanceSize</i>	66,183	-0.1094	-0.0336	0.0076	-0.0501	0.2559
<i>CF</i> $\times$ <i>FinanceActivity</i>	66,091	-0.1819	-0.0537	0.0024	-0.1178	0.3604
<i>LeadInvestment</i>	67,291	0.8345	1.5041	10.0000	4.0302	4.1432
<i>Size</i>	67,279	4.2600	5.4557	6.7285	5.4596	1.9497
<i>Investment</i>	61,458	0.0215	0.0413	0.0703	0.0535	0.0483
$\Delta$ <i>NWC</i>	66,824	-0.0317	0.0050	0.0414	0.0021	0.0909
<i>NetWorkingCapital</i>	66,854	-0.0141	0.0856	0.1909	0.0660	1.9859
$\Delta$ <i>ShortDebt</i>	66,472	-0.0122	0.0000	0.0111	-0.0034	0.0598
<i>ShortTermDebt</i>	66,626	0.0000	0.0333	0.1162	0.0832	0.3074

## Descriptive statistics for selected countries, 1989–2006

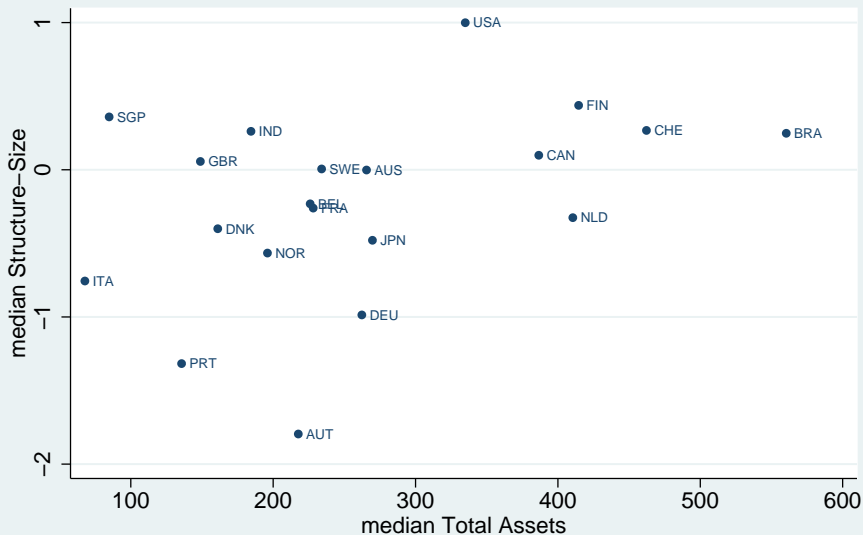
Country	Structure Activity	Structure Size	Finance Activity	Finance Size	Cash/TA	N
Australia	-0.64	-0.02	-1.11	-0.50	0.09	967
Austria	-2.87	-1.85	-2.92	-1.91	0.10	424
Belgium	-1.86	-0.17	-2.54	-0.85	0.12	499
Brazil	-0.64	0.21	-3.23	-2.38	0.12	676
Canada	-0.60	0.14	-1.70	-0.96	0.10	1,659
Denmark	-0.90	-0.34	-1.77	-1.21	0.14	749
Finland	-0.21	0.28	-1.17	-0.68	0.10	649
France	-0.89	-0.46	-1.17	-0.74	0.12	2,623
Germany	-1.03	-1.03	-0.85	-0.85	0.09	3,086
India	0.12	0.18	-2.52	-2.46	0.06	1,299
Italy	-0.95	-0.73	-1.68	-1.45	0.11	782
Japan	-1.01	-0.45	-0.80	-0.24	0.15	15,478
Malaysia	-0.61	0.48	-0.74	0.35	0.11	2,739
Netherlands	-0.46	-0.25	-0.20	0.01	0.09	827
Norway	-0.97	-0.67	-1.81	-1.50	0.15	441
Portugal	-1.88	-1.16	-1.97	-1.25	0.05	172
Singapore	-0.28	0.37	-0.24	0.41	0.15	1,158
South Africa	-0.65	0.85	-1.55	-0.05	0.12	268
Sweden	0.19	0.38	-0.90	-0.61	0.13	929
Switzerland	-0.01	0.15	0.93	1.10	0.15	1,145
United Kingdom	-0.52	0.05	-0.15	0.42	0.12	4,629
United States	0.91	0.94	-1.00	-0.97	0.15	21,061

## Structure–Activity vs Firm Size Selected Countries





## Structure-Size vs Firm Size Selected Countries



Basic specification: *StructureActivity*

Models of the change in cash holdings

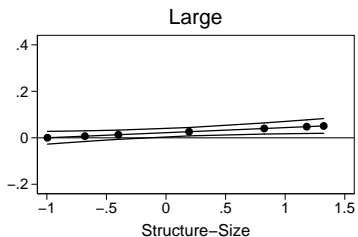
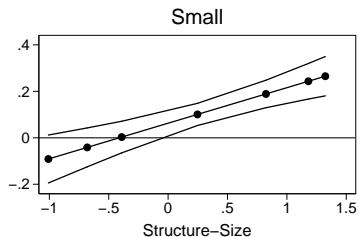
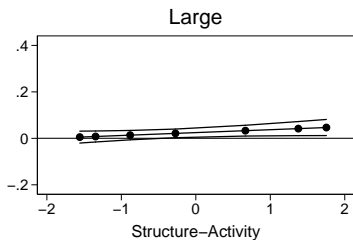
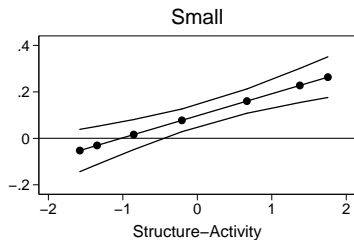
	Firm Size		Payout Ratio	
	Small	Large	Low Payout	High Payout
	(1)	(2)	(3)	(4)
<i>CashFlow</i>	0.097*** (0.024)	0.025** (0.010)	0.106*** (0.013)	-0.024 (0.063)
<i>StructureActivity</i>	-0.015 (0.009)	0.001 (0.002)	-0.001 (0.004)	0.023 (0.021)
<i>CF</i> × <i>StructureActivity</i>	0.095*** (0.023)	0.012*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

Basic specification: *StructureSize*

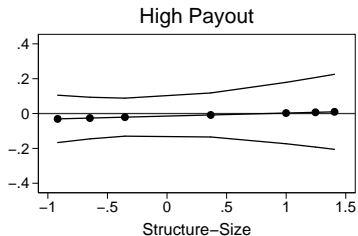
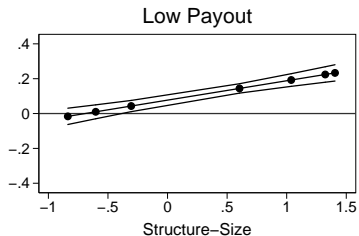
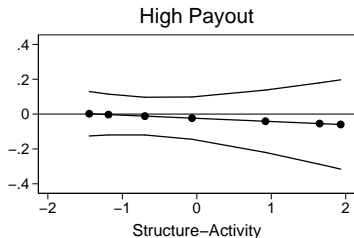
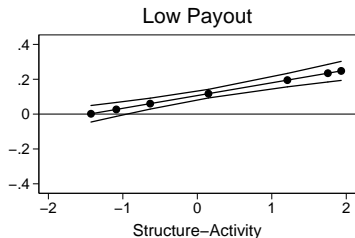
Models of the change in cash holdings

	Firm Size		Payout Ratio	
	Small	Large	Low Payout	High Payout
	(1)	(2)	(3)	(4)
<i>CashFlow</i>	0.063** (0.027)	0.022** (0.009)	0.077*** (0.013)	-0.015 (0.056)
<i>StructureSize</i>	-0.012 (0.020)	-0.005 (0.003)	-0.000 (0.008)	0.013 (0.032)
<i>CF</i> × <i>StructureSize</i>	0.153*** (0.035)	0.022** (0.010)	0.111*** (0.018)	0.017 (0.059)
<i>LeadInvestment</i>	0.096** (0.048)	0.012 (0.008)	0.026 (0.023)	0.161 (0.118)
<i>Size</i>	0.142** (0.061)	0.019*** (0.007)	0.064*** (0.025)	0.179* (0.096)
<i>Investment</i>	1.318* (0.756)	0.053 (0.086)	0.129 (0.332)	2.102 (1.718)
$\Delta NWC$	-0.221*** (0.050)	-0.159*** (0.028)	-0.173*** (0.021)	-0.396*** (0.093)
$\Delta ShortDebt$	-0.063 (0.070)	-0.029 (0.034)	-0.070** (0.029)	-0.342 (0.209)
<i>N</i>	12,155	13,919	14,285	11,467

# Cash flow sensitivity to cash by size groups



# Cash flow sensitivity to cash by dividend payout groups



# 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.

$$\textit{FinanceActivity} = \log(\textit{total value traded ratio} \times \textit{bank credit ratio})$$

$$\textit{FinanceSize} = \log(\textit{market capitalization ratio} \times \textit{bank credit ratio})$$

Source: Financial Structure Database by Beck et al. (2000, 2007).

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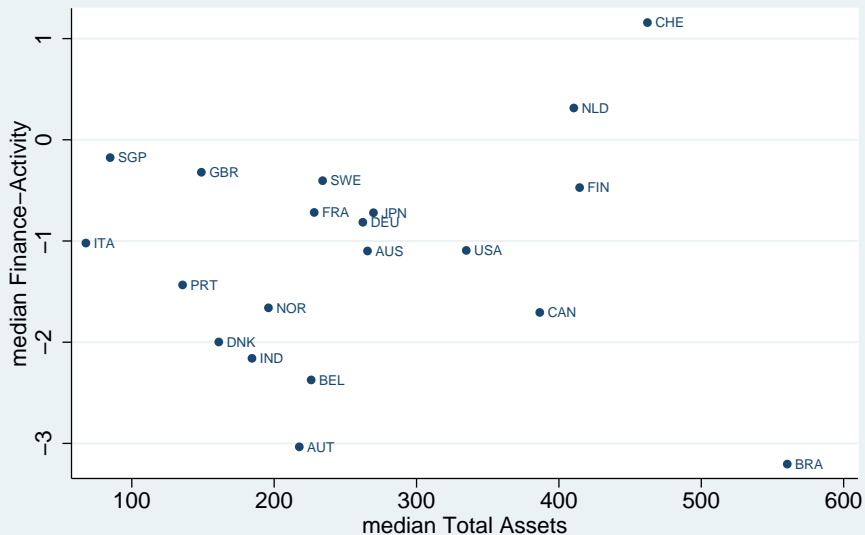
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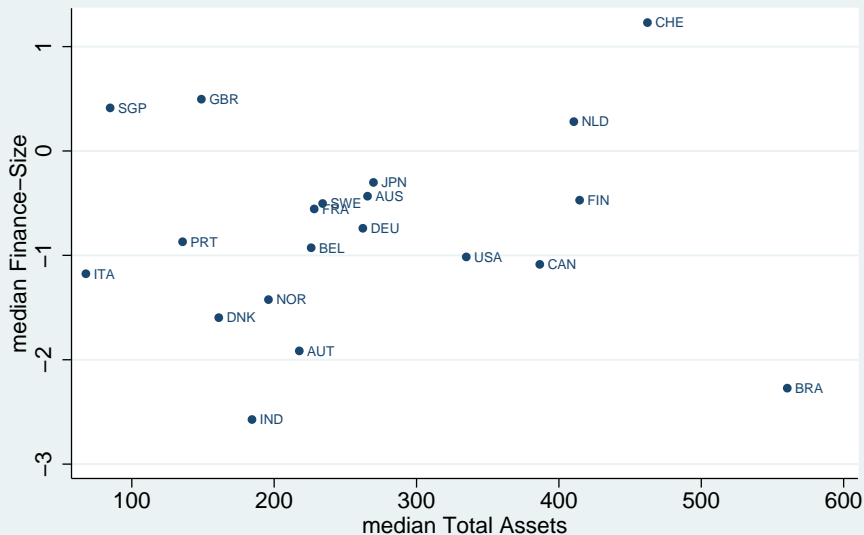
Source: Financial Structure Database by Beck et al. (2000, 2007).

## Finance–Activity vs Firm Size Selected Countries





## Finance-Size vs Firm Size Selected Countries



# Development augmented specifications

Models of the change in cash holdings: Selected results

	Firm Size		Payout Ratio	
	Small	Large	Low Payout	High Payout
<b>A: <i>StructureActivity</i> and <i>FinanceActivity</i> measures</b>				
<i>CashFlow</i>	0.066** (0.027)	0.026*** (0.009)	0.063*** (0.014)	-0.018 (0.067)
<i>StructureActivity</i>	0.030 (0.030)	0.001 (0.004)	0.023 (0.017)	0.041 (0.041)
<i>CF</i> × <i>StructureActivity</i>	0.114*** (0.025)	0.010 (0.012)	0.100*** (0.014)	-0.024 (0.060)
<i>FinanceActivity</i>	-0.056 (0.039)	-0.000 (0.004)	-0.029 (0.023)	-0.024 (0.036)
<i>CF</i> × <i>FinanceActivity</i>	-0.041* (0.025)	0.003 (0.012)	-0.058*** (0.016)	0.008 (0.057)
<b>B: <i>StructureSize</i> and <i>FinanceSize</i> measures</b>				
<i>CashFlow</i>	0.044 (0.028)	0.024*** (0.008)	0.047*** (0.013)	-0.001 (0.058)
<i>StructureSize</i>	0.017 (0.030)	-0.003 (0.004)	0.015 (0.013)	0.027 (0.039)
<i>CF</i> × <i>StructureSize</i>	0.159*** (0.036)	0.019 (0.012)	0.116*** (0.018)	0.010 (0.061)
<i>FinanceSize</i>	-0.066 (0.044)	-0.008 (0.005)	-0.042 (0.027)	-0.050 (0.047)
<i>CF</i> × <i>FinanceSize</i>	-0.028 (0.028)	0.007 (0.014)	-0.060*** (0.015)	0.027 (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.
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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.
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