The Composition Matters: Capital Inflows and Liquidity Crunch during the 2007-09 Global Crisis

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Key Research Questions

- Is there a global liquidity crunch (for non-financial firms)?

- Whether the pre-crisis volume and composition of capital inflows affect the country-level credit crunch in emerging economies?

Are Non-financial Firms Under Liquidity Constraint?

- The view that there is a liquidity shock to the real sector is not self-evident
- Bates, Kahle, and Stulz (2007):
  - Secular increase in cash holding
  - Trend decline in net debt ratio
- Ben Bernanke: strong corporate balance sheets "a bright spot in the darkening forecast"
  - Congressional testimony, N Y Time,3/4/08

Are Non-financial Firms under More Liquidity Constraint?

- *"The claim that disruptions to the banking system necessarily destroy the ability of non-financial businesses to borrow from households is highly questionable."*

  - Chari, Christiano and Kehoe (Nov 2008).

- *"There is no clear evidence to date that supply constraints have cut off access to credit."*

 - ECB March 2009 Monthly Bulletin.

Methodology

- Ask not how the aggregate variables have done; ask how individual stocks have done differently relative to each other.

- Main ideas: (1) If credit crunch worsens, this should be reflected in the relative stock price responses between those firms that rely heavily on external finance versus those that don't.

- (2) If pre-crisis capital inflows affect vulnerability to a global credit crunch, it should be reflected in cross-country variations.

A crisis as an angle to examine financial globalization

- Earlier literature: financial globalization and currency crisis or balance of payments crisis.

- New angle: to examine how capital flows affect the spillover of credit crunch during a systemic crisis.

- Shed light on the debate on effects of composition of capital flows
  - Are non-FDI flows "*hot money*"?

Figure 1: Capital Flow to Emerging Economies (in US$ Billions)
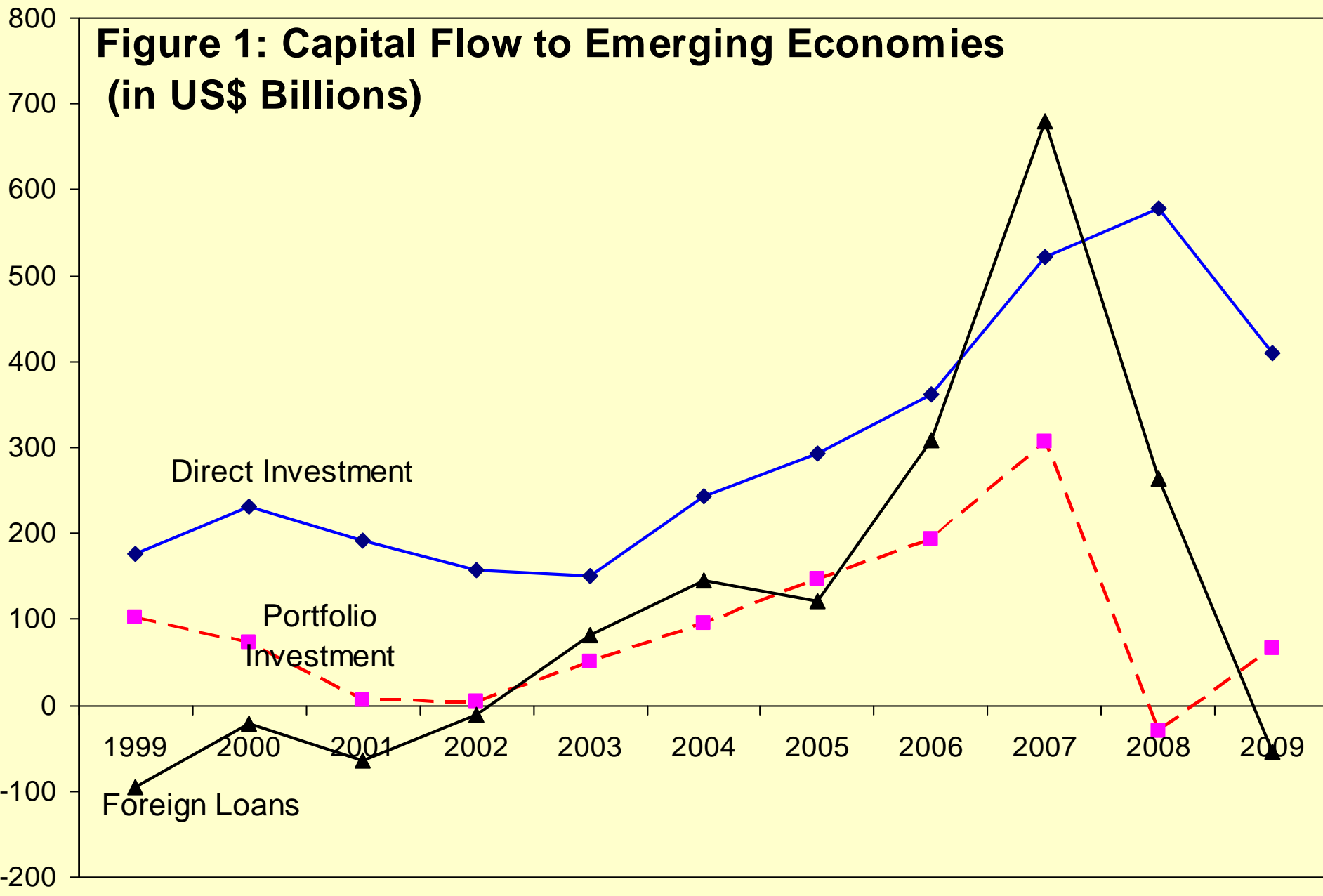
Main Findings (1)
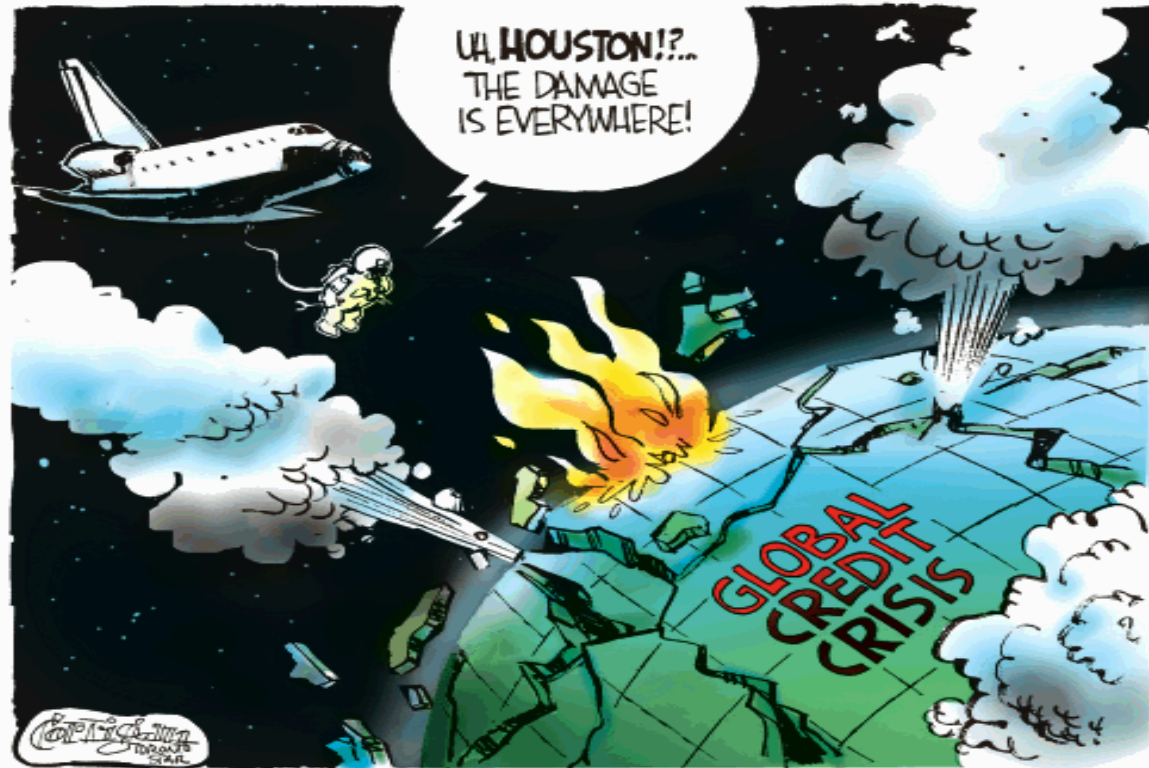
- Liquidity squeeze is wide-spread across countries.
- Firms that depend intrinsically more on external finance for working capital fare significantly worse

Main Findings (2)

- Pre-crisis volume of capital inflows does not predict severity of credit crunch in 2008

- The (lack of a) volume effect hides an important composition effect

  – The credit crunch is more severe in emerging countries with large exposure to non-FDI flows

  – but less severe in countries with exposure to FDI.
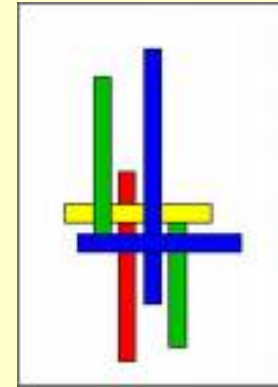
Econometric Model

- **The model**

$$(1) \quad StockReturn_{ijk} = \beta\, ExternalFinancialDependence_{j}$$

$$+ Control_{ijk} + Country\,Dummies + \varepsilon_{ijk}$$

- i: firm; j: sector; k: country
- Pure cross-sectional
- Key regressors are all pre-determined by values in 2006

Pre-crisis Financial Integration

$$(2)\ \beta = \beta_1 + \beta_2 Pattern\,of\ CapitalFlow_j$$

- The severity of credit crunch is systematically linked to its pre-crisis capital inflows since the crisis has triggered a reversal of global capital flows.

Intrinsic Dependence on External Finance for Capital Investment

- Dependence on external finance for investment

$$= \frac{[\text{capital expenditures - cash flow}]}{\text{capital expenditures}},$$

- We first calculate this ratio annually for U.S. firms from 1990 to 2006, then construct the SIC 3-digit sector median (DEF_INV).

- We apply DEF_INV to other countries, following Rajan and Zingales (1998).

Intrinsic Dependence on External Finance for Working Capital

- **Need for working capital**

Cash conversion cycle

$$= 365 * \left(\frac{\text{inventories - account payables}}{\text{cost of goods sold}} + \frac{\text{account receivables}}{\text{total sales}} \right)$$

- We first calculate this ratio for U.S. firms from 1990 to 2006, then take the SIC 3-digit sector median (DEF_WK).
- We apply DEF_WK to other countries, similar to Raddatz (2006) and Kroszner, Laeven and Klingebiel (2007).

Control Variables

- Firm-level features (measured at year 2006):

  – Four factors (firm size, beta*market return, market/book, momentum).

  – Leverage ratio

- Index of Sector Sensitivity to Demand Shock (Tong and Wei, 2008)

  – Track stock return from 9/10/01 to 9/28/01 for each U.S. listed firm.

  – Define the average stock return for each 3-digit SIC sector as the sector-level sensitivity to demand shock

The Extent of Liquidity Crunch

- Dependent Variable:
  - Stock return from July 31, 2007 to December 31, 2008
  - for 3823 manufacturing firms in 24 emerging economies.

- The fall in stock price is more severe for sectors with a greater dependence on external finance for working capital.

Table 3: Stock Returns from 7/31/07 to 12/31/08		
	Emerging Economies	**Advanced Economies**
Dependence for Working Capital (DEF_WK)	-0.136***	-0.18***
Dependence for Investment (DEF_INV)	-0.101	3.28
Demand Sensitivity	-8.876***	-4.74***
Leverage	-35.44***	-0.32***
Beta*Market Return	0.303***	0.26***
Firm Size	2.643***	5.17***

Role of Capital Flow

- We start with a de facto measure of financial integration: the country's annual inflow over GDP averaged from 2002 to 2006.

Table 4. Pre-crisis Exposure to Capital Inflows
(Averaged from 2002-06, % of GDP, 24 emerging economies)

| Country	Total inflow	FDI	FPI	Foreign Loans
Chile	8.41	5.61	1.43	1.38
Turkey	6.55	1.52	1.90	3.13
China	5.13	3.11	0.78	1.24
India	3.68	1.16	1.08	1.44
Korea	4.19	0.72	1.56	1.91

Capital Flow Volume is Insignificant

- Capital flow volume is only weakly associated with the severity of credit crunch. (Table 5)

Table 5. Role of Pre-crisis Financial Integration (Volume Effect) (Dependent Var: Stock return from 7/31/07—12/31/08)

	No Sector Fixed Effects	With Sector Fixed Effects
DEF_INV	-2.488	
DEF_INV*Inflow	0.442	0.576
DEF_WK	-0.05	
DEF_WK*Inflow	-0.00778*	-0.00846*
Firm level controls	Yes	Yes

But Composition Matters a Great Deal

- Separating FDI, portfolio investment, and foreign loan (over GDP).

- FDI reduces the liquidity crunch while Non-FDI aggravates it. (Table 6)
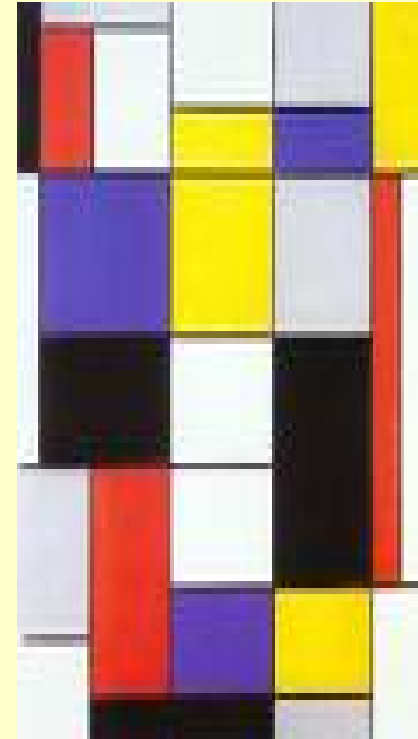
Table 6. Role of Pre-crisis Exposure to Capital Inflows in Emerging Economies (Composition Effect)

	No sector dummy	With sector dummy
DEF_INV	-4.585	
DEF_INV*FDI	2.859	3.610**
DEF_INV*FPI	-1.626*	-1.582*
DEF_INV*ForeignLoans	-2.531	-2.38
DEF_WK	-0.153*	
DEF_WK*FDI	0.0441**	0.0275
DEF_WK*FPI	-0.0219***	-0.0185**
DEF_WK*ForeignLoans	-0.0555***	-0.0473**
Leverage		-32.60***
Leverage*FDI		3.84
Leverage*FPI		-2.833**
Leverage*ForeignLoans		-4.154

Robustness Tests

- Add domestic financial development (x dependence on external finance) –no effect
- Alternative measures of capital openness (-- de jure capital openness).
- Alternative measures of demand sensitivity (-- use FTSE binary measure of sector-level cyclicality)
- Add a proxy of firm-level sensitivity to exports.

Robustness Tests (more)

- Use contemporaneous beta (vs pre-crisis beta).
- Use weighted regressions to control for different number of firms across sample countries.
- Different measure of stock return

  (P(t)-P(t-1))/P(t-1)

Table 7. Role of pre-Crisis Exposure to Capital Inflows (Robustness Checks)

	Financial Development	Capital Flow from 02 to 07	De Jure Openness
DEF_INV*FDI	3.384*	4.186**	20.99***
DEF_INV*FPI	-1.404*	-1.543**	-8.745
DEF_INV*ForeignLoans	-2.116	-2.059*	-8.568
DEF_WK*FDI	0.037	0.0323	-0.00035
DEF_WK*FPI	-0.0175**	-0.0153**	-0.149*
DEF_WK*ForeignLoans	-0.0499**	-0.0332**	0.0841
DEF_INV *(Domestic Credit/GDP)	-0.03		
DEF_WK *(Domestic Credit/GDP)	-0.002		
Firm controls & Sector fixed effects	Yes	Yes	Yes

Table 8. Role of Pre-Crisis Exposure to Capital Inflows (More Robustness Checks)

	Contemporary Beta	Alternative Price Change	Weighted Regression
DEF_INV*FDI	3.119*	2.944**	2.466*
DEF_INV*FPI	-0.949	-1.373**	-1.340*
DEF_INV*ForeignLoan	-2.152	-2.3	-1.859
DEF_WK*FDI	0.032	0.0227	0.027
DEF_WK*FPI	-0.0212***	-0.0147**	-0.0150**
DEF_WK*ForeignLoan	-0.0537***	-0.0372**	-0.0418**
Beta*Market Return	0.914***	0.215***	0.232***
Sector fixed effects	Yes	Yes	Yes

Case study:
Lehman Brothers Bankruptcy

- Examine stock returns from Sept 12, 2008 to Sept 16, 2008 for manufacturing firms in 24 emerging economies

.

- Same qualitative result:
  - pre-crisis FDI flows alleviate the credit constraints, while Non-FDI flows make it worse.

Table 11. Stock Returns around Lehman Brother Bankruptcy

	Case 6
DEF_INV*FDI	0.330***
DEF_INV*FPI	-0.0767
DEF_INV*ForeignLoans	-0.226
DEF_WK*FDI	0.00187
DEF_WK*FPI	-0.00163**
DEF_WK*ForeignLoans	-0.00352*
Leverage	-1.596**
Leverage*FDI	0.187
Leverage*FPI	-0.0511
Leverage*ForeignLoans	-0.25
Sector dummies and firm controls	Yes

Placebo Test

- Non-crisis period: Do capital flows during 2002-05 affect the stock prices during 1/1/2006 to 6/30/07?

- No significant effects

Table 10. Placebo Test
(Stock returns from Jan 1, 06 to June 30, 07)

|	Average Effect	Flow Volume	Flow Composition
DEF_INV	-0.14	-5.243	
DEF_INV*Inflow Volume		0.742	
DEF_INV*FDI			2.366
DEF_INV*FPI			-0.403
DEF_INV*ForeignLoans			-0.989
DEF_WK	-0.0513	-0.0343	
DEF_WK*Inflow Volume		-0.0024	
DEF_WK*FDI			0.014
DEF_WK*FPI			-0.0008
DEF_WK*ForeignLoans			-0.0099

Conclusions

- Strong evidence of a tightening financial constraint on manufacturing firms.

- The average effect of capital inflows is insignificant

- Composition matters
  - Countries with a greater dependence on non-FDI types of capital flows before the crisis experience worse liquidity crunch during the crisis

- Only one piece in welfare analysis
  - Benefits of capital flows in alleviating credit constraint in non-crisis times?

- Endogenous composition of capital flows
  - Is it institutional quality?
    - Wei (2006)
  - Does it result from the "original sin"?
    - Eichengreen, Hausmann

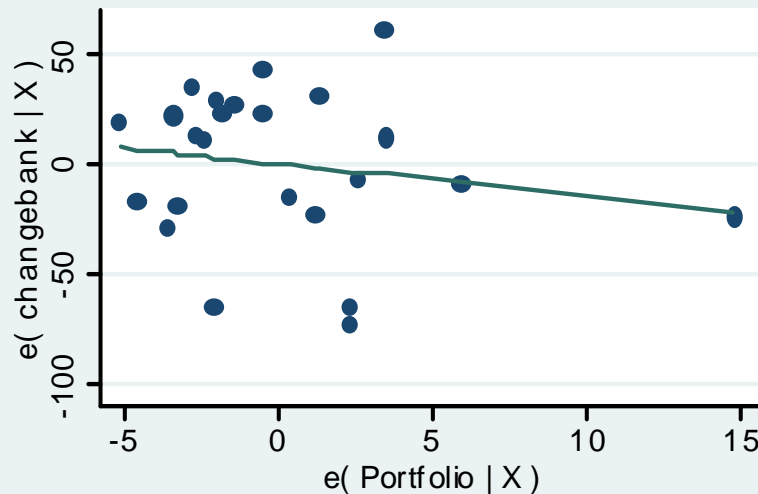- Item for discussion at the Financial Stability Forum?

Bank Stock Returns and Capital Flows
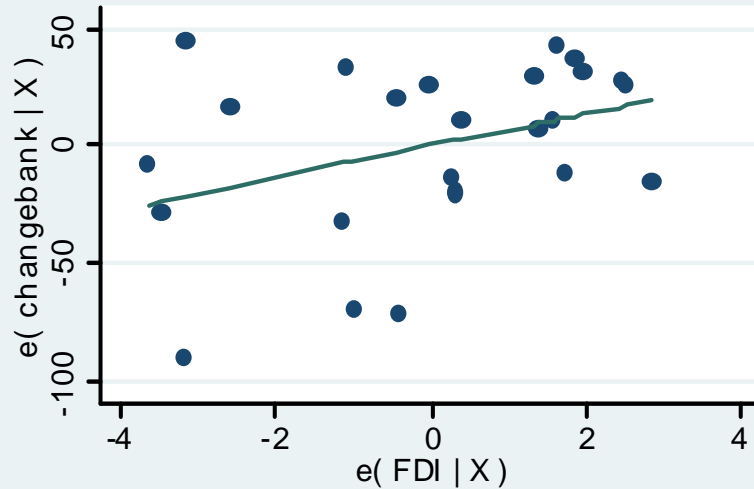
coef = 6.7457416, se = 3.7918411, t = 1.78
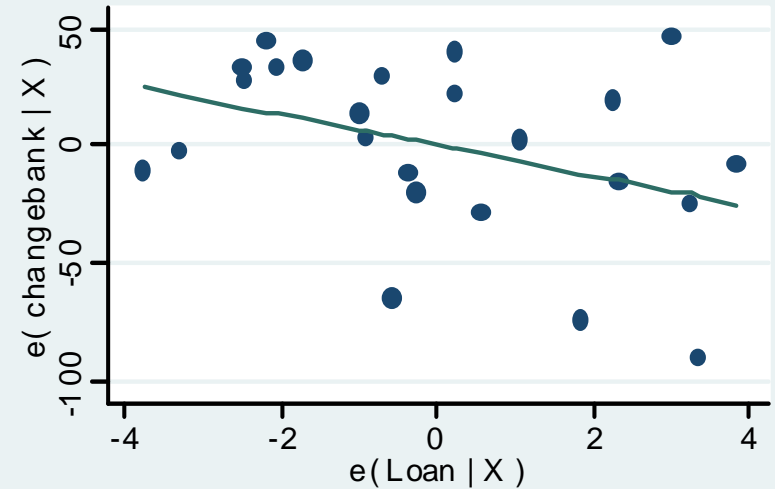
coef = -6.380839, se = 3.4748937, t = -1.84

coef = -1.4823118, se = 1.8124467, t = -.82

A crisis as an angle to examine financial globalization

- A large literature on effects of international capital flows ("financial globalization"):
  - Potential benefits: lower cost of capital, knowledge spillover, better discipline
  - Henry (2007); Stulz (2005), etc

- Stubborn lack of empirical corroboration
  - Kose, Prasad, Rogoff and Wei (2003); Rodrik and Subramanian (2008)
    - "Collateral benefits:" Kose, Prasad, Rogoff and Wei (2008)
    - Composition matters: Wei (2001, 2006 and 2007)

Plan for the Rest of the Talk

- Empirical Specification

- Key regressors

- Baseline findings and Robustness checks

Examples

- **DEP_INV:** dependence on external finance for investment
  - Low: Vegetable and animal oils; Textile goods; Sport and athletic goods
  - High: Drugs and medicines; Office and computing mach.

- **DEP_WK:** dependence on external finance for working capital (liquidity needs)
  - Low: Petroleum refineries, Soft drinks, Bakery products
  - High: Radio, TV. and comm. eqp; Leather products; Scientific equipment