

# **Fire-Sale FDI?**

## **The Impact of Financial Crises on Foreign Direct Investment**

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&

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# In a nutshell

- This paper
  - Analyzes the evolution of FDI inflows to developing and emerging countries around financial crises
  - Empirically examines the Fire-sale FDI hypothesis
  - Adds a more granular detail about the types of financial crises and different components of FDI

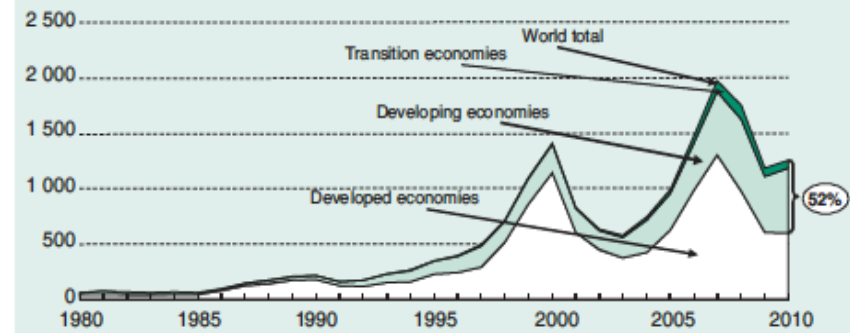
# Frank pre-emptive caveats

- This is preliminary work
- I don't believe my own regressions, so....
- If you have a good idea for an extension, we already are doing it.
- If you have a bad idea, it came from the IMF.
- Any data you think we should've used is fudged.

# Motivation

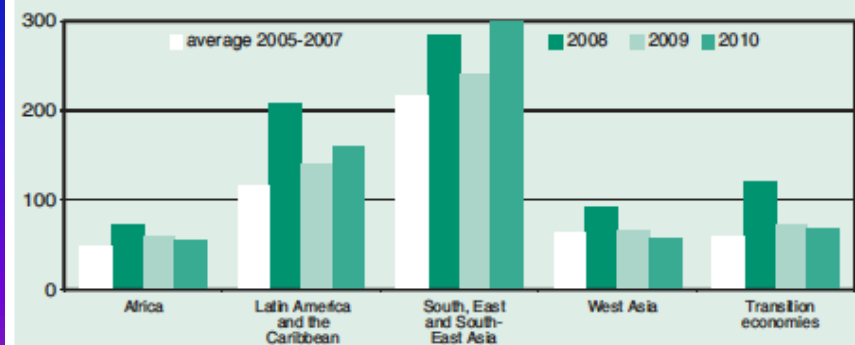
- Increasing importance of FDI globally
  - Stability relative to other types of capital flows
- Fire-sale FDI (Krugman, 2000)

Figure I.3. FDI inflows, global and by group of economies, 1980–2010 (Billions of dollars)



Source: UNCTAD, based on annex table I.1 and the FDI/TNC database ([www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)).

Figure I.6. FDI inflows to developing and transition economies, by region, average of 2005–2007 and 2008 to 2010 (Billions of dollars)



Source: UNCTAD, FDI/TNC database ([www.unctad.org/fdistatistics](http://www.unctad.org/fdistatistics)).

# Different crises, different impacts:

## Evolution of the crises literature

- Currency crises
  - Generations (1 and 2)
- Diamond-Dybvig type banking runs
  - Chang and Velasco, 2001; Uhlig, 2010
- Post-Asian crisis models
  - Corsetti et al., 1999; Dooley, 2000
- Sudden-stops
  - Calvo, 1998; Mendoza, 2010; Rothberg and Warnock, 2011

Reinhart and Rogoff (2009)

# Different crises, different impacts

- Origin in domestic problems?
- Expansionary depreciation?
- Impact on the real economy?
- Long-term vs. short-lived crisis?

# Different types of FDI, different impacts

- M&A: investing in existing projects
- Greenfield investment: constructing new production facilities (longer time to fruition)
- Horizontal FDI (tariff-jumping): domestic economy matters
- Vertical FDI: prices matter

# Relevant empirical literature

- Fire-sale FDI of the Asian crisis
  - Aguiar & Gopinath, 2005; Acharya et al., 2011
    - Both find evidence of FDI but have different normative conclusions
- Evidence of fire-sale following currency crises
  - Soliman, 2005

Our contribution: systematic evaluation of the effects of different types of crises on various forms of FDI



# Data: Types of FDI

- Sample: 40 developing countries; 1987-2009
- Distinguishing M&A and Greenfield FDI
  - UNCTAD and M&A database (Thomson Financial)
  - Greenfield investment = FDI inflows – M&A value
- Distinguishing horizontal and vertical FDI
  - Sales of US multinationals (US BEA)
    - Hanson et al., 2002; Aizenman & Marion, 2004
  - Vertical investment = affiliate sales either back to the U.S. or to other foreign countries (intermediate goods)
  - Horizontal investment = affiliate sales in the local market where affiliate resides (final goods)

# Data: Typology of crises

- Reinhart and Rogoff, 2009:  
banking, currency, debt (domestic & external),  
stock market, inflation crises
- Laeven & Valencia, 2010; Caprio et al., 2005:  
severe crises episodes

# Data: control variables

- Blonigen & Piger, 2011
  - Broad macroeconomic conditions (WDI, IMF)
  - Political, socio-economic, and business environment (Freedom House and ICRG – PRS databases)
  - Relative endowments, communications infrastructure, trade costs (WDI)
  - Geographic-spatial and possible agglomeration effects (Penn World Tables and CEPII Gravity data set)
  - Education level (Barro-Lee dataset)
  - Per capita real capital (Li et al., 2011)

# Estimation methodology

- Empirical equation:

$$FDI_{it}^T = \beta_1 + \beta_2 CRIS_{it}^P + \beta_3 X_{it} + \varepsilon_{it}$$

- Dynamic panel Arellano-Bond GMM estimation
  - Treat crisis variable as predetermined
  - Report one-step estimates
  - Limit the number of lags at one

# Results: FDI Flows

**Table 3: Arellano-Bond Difference GMM Estimation**

Dependent variable: FDI flow (in millions of real US dollars)

Independent variable	(1)	2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) All crises	(10) Severe crises
Banking crisis	-3,413.6*** (753.3)								3,211.6*** (742.6)	
Systemic banking crisis		-1,377.6 (901.1)								-1,219.3 (909.5)
Inflation crisis			-2,891.8*** (962.8)						-2,185.5** (893.1)	
Hyperinflation crisis				-19,737.4*** (2,178.4)						-
Currency crisis					22.1 (720.9)				40.9 (704.7)	
Stock market crisis						201.3 (723.6)			751.7 (730.2)	
Domestic debt crisis							-1,930.1 (1,422)		164.5 (1,118.6)	
External debt crisis								-5,496.4*** (1,196.9)	-4,832.7*** (1,149.3)	
# observations	529	529	529	529	527	529	529	529	527	529
# countries	34	34	34	34	34	34	34	34	34	34
# instruments	164	164	164	154	164	164	164	164	244	170

\* denotes 10% significance, \*\*5% significance, \*\*\*1% significance

One-step standard errors in parentheses

# FDI Stocks

**Table 4: Arellano-Bond Difference GMM Estimation**

Dependent variable: FDI stock (in millions of real US dollars)

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) All crises	(10) Severe crises
Banking crisis	-127,052.6** (53,070.3)								-108,115.0** (51,319.6)	
Systemic banking crisis		-33,626.0 (65,985.1)								-66,480.5 (64,634)
Inflation crisis			-136,041.7** (65,981.6)						-93,265.6 (60,785.6)	
Hyperinflation crisis				-1,316,256*** (172,400.2)						-1,284,376.0** (170,267.6)
Currency crisis					-46,434.4 (49,158.7)				-30,524.3 (47,965)	
Stock market crisis						-44,888.9 (49,801.9)			44,795.6 (49,709.2)	
Domestic debt crisis							-51,284.8 (107,553.3)		21,423.5 (105,997.1)	
External debt crisis								-152,188.0* (82,783.7)	-126,134.4 (79,537.1)	
# observations	545	545	545	545	545	545	545	545	543	545
# countries	34	34	34	34	34	34	34	34	34	34
# instruments	182	182	182	182	182	182	182	182	267	189

\* denotes 10% significance, \*\*5% significance, \*\*\*1% significance.

One-step standard errors in parentheses

# Results – Vertical FDI

**Table 5: Arellano-Bond Difference GMM Estimation**

Dependent variable: Vertical FDI (value of vertical FDI, in millions of real US dollars)

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) All crises	(10) Severe crises
Banking crisis	-785.2 (7,407.9)								3,866.7 (6,897.8)	
Systemic banking crisis		4,957.7 (8,771.7)								7,543.148 (8,537.0)
Inflation crisis			-29,829*** (10,678.3)						-20,274.6** (9,560.8)	
Hyperinflation crisis				-299,297.6*** (33,803.0)						-298,405.0*** (33,642.7)
Currency crisis					4,993.0 (7,369.8)				5,150.4 (7,142.0)	
Stock market crisis						976.0 (6,475.7)			-1,764.6 (6,432.4)	
Domestic debt crisis							-2,345.0 (14,807.9)		4,080.8 (14,781.5)	
External debt crisis								-32,961.4*** (11,020.2)	-22,597.1** (10,433.5)	
# observations	282	282	282	282	282	280	282	282	282	282
# countries	21	21	21	21	21	21	21	21	21	21
# instruments	181	179	182	165	182	181	182	178	253	179

\* denotes 10% significance, \*\*5% significance, \*\*\*1% significance.

One-step standard errors in parentheses

# Results – Horizontal FDI

**Table 6: Arellano-Bond Difference GMM Estimation**

Dependent variable: Horizontal FDI (value of horizontal FDI, in millions of real US dollars)

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) All crises	(10) Severe crises
Banking crisis	25,776.1 (16,288.2)								22,515 (15,435.2)	
Systemic banking crisis		28,026.9 (20,183.4)								34,567.3* (19,255.7)
Inflation crisis			-65,353.6** (26,663.6)						-36,516.5 (25,378.3)	
Hyperinflation crisis				-580,530.8*** (63,463.3)						-585,585.4*** (62,537.9)
Currency crisis					-1,493.8 (17,475.5)				-10,445.9 (17,280.9)	
Stock market crisis						18,591.9 (14,435.3)			8,767.9 (14,465.9)	
Domestic debt crisis							3,902.4 (38,364.3)		61,669.6 (40,808.4)	
External debt crisis								-82,672.5*** (26,482.8)	-73,236.8*** (26,625.7)	
# observations	249	249	249	249	247	249	249	249	247	249
# countries	22	22	22	22	22	22	22	22	22	22
# instruments	179	176	179	163	177	178	172	177	233	177

\* denotes 10% significance, \*\*5% significance, \*\*\*1% significance.

One-step standard errors in parentheses



# Results – M&A Investment

**Table 7: Arellano-Bond Difference GMM Estimation**

Dependent variable: M&A Value (value of M&A, in millions of real US dollars)

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) All crises	(10) Severe crises
Banking crisis	-1,361.4** (569.9)								-951.0* (540.4)	
Systemic banking crisis		-91.3 (680.7)								-277.8 (689.9)
Inflation crisis			-262.6 (992.6)						-449.9 (833.2)	
Hyperinflation crisis				-2,132.5 (1,784.0)						-2,372.4 (1,794.0)
Currency crisis					-99.0 (535.4)				91.4 (524.6)	
Stock market crisis						-360.9 (472.9)			-159.3 (457.6)	
Domestic debt crisis							-2400.2** (1,176.9)		-959.1 (1,109.4)	
External debt crisis								-1,619.4** (821.9)	-1,177.7 (791.9)	
# observations	280	280	280	278	278	280	280	280	278	280
# countries	30	30	30	30	30	30	30	30	30	30
# instruments	162	160	154	164	164	161	156	164	221	166

\* denotes 10% significance, \*\*5% significance, \*\*\*1% significance.

One-step standard errors in parentheses

# Results - summary

- Financial crises have a strong negative effect on FDI (if any)
  - Banking, inflation, hyperinflation, and external debt crises
- No empirical evidence of fire-sale FDI
  - On the contrary, crises are shown to reduce vertical, horizontal, and M&A investment

# Discussion

- Current financial turmoil
  - 40% decline in FDI flows
- The causes behind the current crises and differences in their impact on FDI inflows

# Appendix: Types of crises

**Table B: Typology of Crises**

Name	Definition	Data Source
Inflation crisis	An annual inflation rate of 20% or higher.	R&R
Hyperinflation crisis	An annual inflation rate of 500% or higher	R&R Chartbook
Currency crash	An annual depreciation versus the US dollar of 15% or more	R&R
Banking crisis	Defined by the following events: if there are no bank runs, the closure, merging, takeover, or large-scale government assistance of important financial institution that marks the start of a string of similar outcomes for other financial institutions	R&R (Kaprio & Klingebiel, Kaminsky & Reinhart, Jacome)
Systemic/severe Banking crisis	Defined by the following events: Bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions	R&R (Kaprio & Klingebiel, Kaminsky & Reinhart, Jacome)
External Debt crisis	The failure of government to meet a principal or interest payment on the due date (or within the specified grace period). These episodes include instances in which rescheduled debt is ultimately extinguished in terms less favorable than the original obligation	R&R
Domestic Debt crisis	The above definition for external debt crisis applies. In addition, domestic debt crises have involved the freezing of bank deposits and/or forcible conversions of such deposits from dollars to local currency	R&R
Stock market crash	A sudden decline of stock prices resulting in a significant loss of paper wealth	R&R
Banking crisis starting year	The first year of the start of the systemic banking crisis (defined by the above events)	R&R Chartbook
External crisis starting year	The first year of the start of the external debt crisis	R&R Chartbook
Domestic crisis starting year	The first year of the start of the external debt crisis	R&R Chartbook

# Appendix: List of countries

<b>South and East Asia (8)</b>
China
India
Indonesia
Malaysia
Myanmar
Philippines
Sri Lanka
Thailand
<b>Middle East &amp; North Africa (4)</b>
Algeria*
Egypt
Morocco
Tunisia
<b>Sub-Saharan Africa (10)</b>
Angola*
Central African Republic
Côte d'Ivoire
Ghana
Kenya
Mauritius
Nigeria*
South Africa
Zambia
Zimbabwe
<b>Latin America (18)</b>
Argentina
Bolivia
Brazil
Chile
Colombia
Costa Rica
Dominican Republic
Ecuador*
El Salvador
Guatemala
Honduras
Mexico
Nicaragua
Panama
Paraguay
Peru
Uruguay
Venezuela*
<b>East Europe and Central Asia (4)</b>
Poland
Romania
Russian Federation
Turkey
* OPEC member countries (Algeria, Angola, Ecuador, and Venezuela excluded from the sample in our regressions)

# Appendix: Greenfield results

**Table 8: Arellano-Bond Difference GMM Estimation**

Dependent variable: Greenfield FDI Value (value of Greenfield FDI, in millions of real US dollars)

Independent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) All crises	(10) Severe crises
Banking crisis	816.7 (601.1)								505.3 (583.6)	
Systemic banking crisis		163.5 (745.4)								30.8 (742.4)
Inflation crisis			-675.9 (1,037.3)						-678.8 (925.1)	
Hyperinflation crisis				-2,904.0 (1,867.4)						-2,871.2 (1,869.9)
Currency crisis					852.6 (592.2)				635.9 (582.2)	
Stock market crisis						541.6 (531.7)			346.7 (504.1)	
Domestic debt crisis							1,106.6 (1,198.9)		1,143.5 (1,181.5)	
External debt crisis								-581.6 (925.7)	-639.1 (915.8)	
# observations	283	283	283	283	283	283	283	283	281	283
# countries	30	30	30	30	30	30	30	30	30	30
# instruments	162	160	164	154	164	161	161	164	223	166

\* denotes 10% significance, \*\*5% significance, \*\*\*1% significance.

One-step standard errors in parentheses