Fire Sale FDI or Business As Usual?

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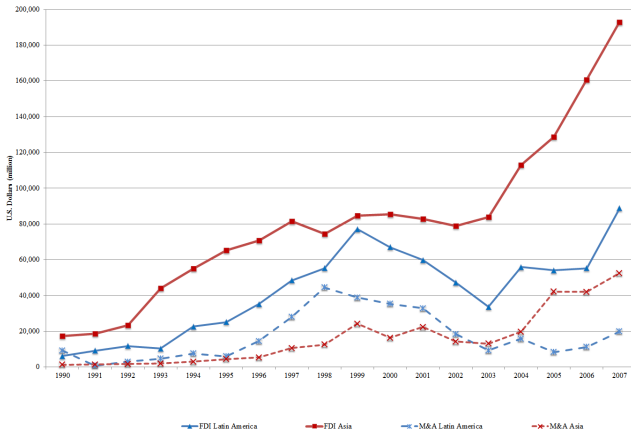[3]University of Michigan and NBER

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FDI Inflows and the Value of Foreign Acquisitions

Explaining the Surge in Cross-Border Acquisitions

- Fire-sale FDI (Krugman, 2000)
  - Occurs during banking crisis and currency crises
  - Asset prices and exchange rates collapse
  - Tight domestic credit conditions
  - Foreign firms able to alleviate liquidity constraints

- Empirical Implications (Aguiar and Gopinath, 2005; Chari et al., 2010; and Acharya et al., 2011)
  - Increase in foreign acquisitions
  - Decrease in domestic acquisitions
  - Foreign acquisitions generate excess risk-adjusted returns
  - Foreign acquirers purchase larger stakes
  - Target acquired during fire-sale is "flipped"

Challenge to the Fire-Sale Explanation

What is the counterfactual?

- How would have asset prices and cross-border transactions evolved in the absence of the crisis?

- Emerging markets are volatile, even in non-crisis periods

- Large changes in regulatory environment, often coinciding with the crisis

  - IMF conditionality required the relaxation of limits on corporate control for foreign firms during Asian crisis

- Most studies have compared period preceding the crisis with the crisis and not with the post-crisis period

Main Conclusions

- Model framework for thinking about M&A during crises
  - Increase in foreign acquisitions
  - Probability of acquisition increases in dependence on external finance
  - Targets acquired during crises crises flipped (in progress)

- Empirical evidence on fire-sale FDI
  - Foreign acquisitions increase
  - External finance dependence not associated with probability of acquisition
  - No evidence of flipping

Outline

- Stylized facts about M&A in emerging markets

- Modeling framework

- Empirical evidence

Foreign Transactions by Regional Origin of Target

	No. of Transactions					**Share of Foreign Acquirers**			
	1990-94	95-99	2000-04	05-07	Total	1990-94	95-99	2000-04	05-07
Latin America	795	2,716	2,480	1,018	7,009	0.56	0.56	0.51	0.59
Asia	1,399	4,829	7,492	8,517	22,237	0.38	0.33	0.30	0.30
South Africa	318	1371	744	320	2,753	0.19	0.22	0.27	0.42
All Countries	2,512	8,916	10,716	9,855	31,999	0.41	0.38	0.35	0.33

Foreign Transactions by Origin of Acquirer

	No. of Transactions					Share of Foreign Acquisitions
	1990-94	1995-99	2000-04	2005-07	Total	
United States	304	1,132	921	751	3,108	0.27
Europe	272	1,038	1,085	749	3,144	0.27
Asia	287	816	1,205	1,182	3,490	0.30
of which						
China	7	14	15	25	61	0.01
Japan	71	186	176	145	578	0.05
Hong Kong	106	262	430	361	1,159	0.10
Latin America	41	139	115	64	359	0.03
Australia, Canada, and New Zealand	113	232	284	322	951	0.08
Other	22	75	107	206	410	0.04
Total	1,039	3,432	3,717	3,274	11,462	

What Types of Firms Undertake Acquisitions?

Acquiring Firm SIC Category	Domestic		Foreign		
	Freq.	Percent	Freq.	Percent	Total
0 Agriculture, Forestry, and Fishing	299	1.5%	85	0.7%	384
1 Mining and Construction	1,116	5.4%	918	8.0%	2,034
2 Manufacturing (food, textiles, petroleum)	2,707	13.2%	1,810	**15.8%**	4,517
3 Manufacturing (rubber, electronics)	2,933	14.3%	2,190	**19.1%**	5,123
4 Transport and Communications	1,623	7.9%	1,053	9.2%	2,676
5 Wholesale and Retail	1,121	5.5%	566	4.9%	1,687
6 Finance, Insurance, and Real Estate	8,559	41.7%	3,372	**29.4%**	11,931
7 Services (hotels, amusement)	1,459	7.1%	1,087	9.5%	2,546
8 Services (education, legal, other)	680	3.3%	369	3.2%	1,049
9 Public Administration	40	0.2%	12	0.1%	52
Total	20,537	100%	11,462	100%	31,999

What Types of Firms Are Acquired?

Target Firm SIC Category	Domestic		Foreign		
	Freq.	Percent	Freq.	Percent	Total
0 Agriculture, Forestry, and Fishing	320	1.6%	120	1.1%	440
1 Mining and Construction	1,165	5.7%	1,097	9.6%	2,262
2 Manufacturing (food, textiles, petroleum)	3,199	15.6%	2,054	**17.9%**	5,253
3 Manufacturing (rubber, electronics)	3,390	16.5%	2,369	**20.7%**	5,759
4 Transport and Communications	2,285	11.1%	1,334	11.6%	3,619
5 Wholesale and Retail	1,565	7.6%	777	6.8%	2,342
6 Finance, Insurance, and Real Estate	5,383	26.2%	1,904	**16.6%**	7,287
7 Services (hotels, amusement)	2,253	11.0%	1,390	12.3%	3,643
8 Services (education, legal, other)	939	4.6%	394	3.4%	1,333
9 Public Administration	38	0.2%	23	0.2%	61
Total	20,537	100%	11,462	100%	31,999

Who Buys Whom?

Acquirer SIC					Target SIC						Total
Agriculture, Forestry, and Fishing	**133**	3	109	13	18	22	72	7	7	0	384
Mining and Construction	5	**1,276**	102	128	132	48	242	42	58	1	2,034
Manufacturing (food, textiles, petroleum)	116	105	**2,981**	290	117	313	401	108	82	4	4,517
Manufacturing (rubber, electronics)	15	146	328	**3,308**	203	281	450	267	117	8	5,123
Transport and Communications	3	83	79	132	**1,820**	72	190	241	43	13	2,676
Wholesale and Retail	17	51	184	207	80	**765**	215	132	34	2	1,687
Finance, Insurance, and Real Estate	135	514	1,335	1,418	1,014	680	**5,313**	1,106	401	15	11,931
Services (hotels, amusement)	12	27	85	160	169	115	249	**1,614**	114	1	2,546
Services (education, legal, other)	4	54	50	98	53	44	145	123	**472**	6	1,049
Public Administration	0	3	0	5	13	2	10	3	5	**11**	52
Total	440	2,262	5,253	5,759	3,619	2,342	7,287	3,643	1,333	61	31,999

How Large a Stake is Acquired?

| Decile	Domestic		Foreign		
	Freq.	Percent	Freq.	Percent	Total
0-10 percent	1,211	5.9%	626	5.5%	1,837
10-20 percent	1,367	6.7%	772	6.7%	2,139
20-30 percent	1,365	6.6%	798	7.0%	2,163
30-40 percent	933	4.5%	602	5.3%	1,535
40-50 percent	958	4.7%	634	5.5%	1,592
50-60 percent	1,712	8.3%	1,122	9.8%	2,834
60-70 percent	1,252	6.1%	661	5.8%	1,913
70-80 percent	521	2.5%	297	2.6%	818
80-90 percent	758	3.7%	454	4.0%	1,212
90-100 percent	589	2.9%	303	2.6%	892
100 percent	9,871	**48.1%**	5,193	**45.3%**	15,064
Total	20,537	100%	11,462	100%	31,999
Controlling Share ($\geq$ 50%)	14,703	**71.6%**	8,030	**70.1%**	22,733

A Model of Fire-Sale FDI

- Extension of Aguiar and Gopinath (2005) to take account of partial acquisitions, within-industry synergies, and flipping

- Sequence of choices:

  1. Domestic firm chooses capital stock subject to liquidity constraint
  2. Foreign acquirer chooses size of stake in domestic target and optimal capital stock
  3. Leftward shift in distribution of liquidity
  4. Liquidity distribution returns to pre-crisis level
  5. Foreign acquirer chooses whether to flip acquisition

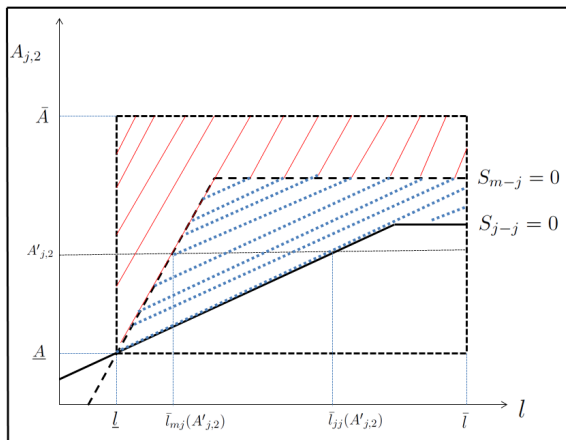- Formal decision problem for flipping result remains a work in progress

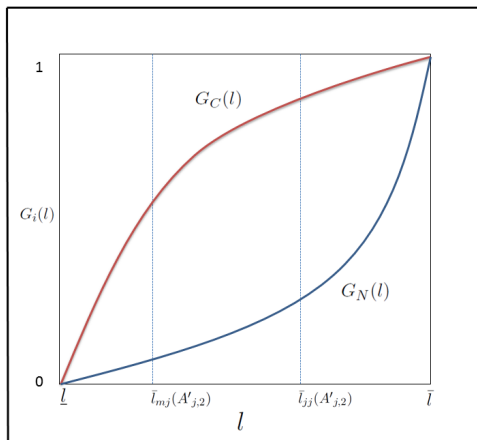# Foreign Acquirer's Surplus: Different Industries
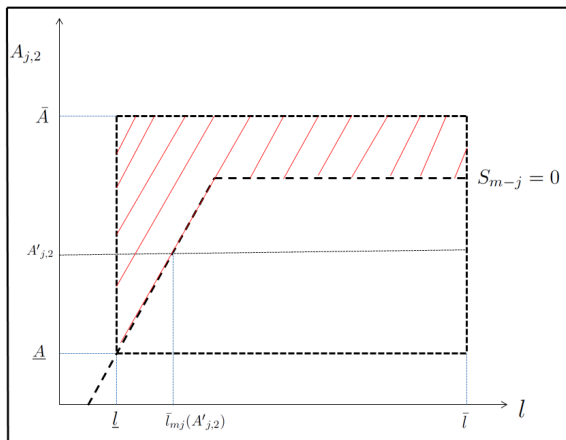
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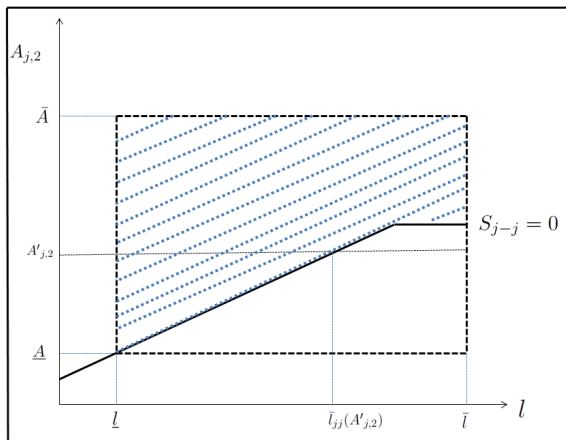
Foreign Acquirer's Surplus: All Industries

Distribution of Liquidity

Predictions about Characteristics of Transactions

During crises:

- Domestic firms become credit constrained
- Foreign acquirers have access to liquidity and take advantage of buying opportunity

Therefore:

- Increase in foreign acquisitions
- Probability of acquisition increasing in dependence on external finance
- Change in average size of stake acquired is ambiguous
- Conjecture: Targets acquired during crises flipped

Does the Composition of Transactions Change During Crises?

Linear Probability Model

$$P(D_l^{kjct} = 1 \mid \cdot) = \alpha + \beta_C D_{ct} + \beta_f frac_k + \beta_{jc} \delta_{jc} + \beta_{mc} controls_{ct} + \epsilon_{kjct}$$

where k, j, c and t = transaction, industry, country and time

- Country$\times$industry and month fixed effects
- Standard errors clustered two-way by country$\times$industry and month
- Control for size of acquisition and macroeconomic conditions (Brown and Dinc, 2011)

What Types of Acquisitions Increase During Crises?

Acquirer	Target		Full Sample	Asia	Post-1997 Asia	Non-Asia
Foreign	All		0.079***	0.075***	0.085***	0.060**
			(0.02)	(0.02)	(0.03)	(0.02)
		No. obs.	31,967	22,217	19,107	9,750
		R^2	0.1429	0.1127	0.1119	0.1087
Foreign	Same SIC		0.055***	0.045***	0.049***	0.049**
			(0.01)	(0.02)	(0.02)	(0.02)
		No. obs.	31,967	22,217	19,107	9,750
		R^2	0.1149	0.0768	0.0774	0.0986
Foreign	Different SIC		0.024***	0.030***	0.036***	0.011
			(0.01)	(0.01)	(0.01)	(0.01)
		No. obs.	31,967	22,217	19,107	9,750
		R^2	0.0585	0.0616	0.0633	0.0460
Foreign Financial	Financial		0.016**	0.012	0.014	0.022
			(0.01)	(0.01)	(0.01)	(0.01)
		No. obs.	31,967	22,217	19,107	9,750
		R^2	0.2259	0.1850	0.1920	0.3033
Foreign Financial	Non-Financial		0.012	0.007	0.011	0.019
			(0.01)	(0.00)	(0.01)	(0.01)
		No. obs.	31,967	22,217	19,107	9,750
		R^2	0.0437	0.0472	0.0489	0.0366

Does External Finance Dependence Play a Role?

$$P(D_l^{kjct} = 1 \mid \cdot) = \alpha + \beta_C D_{ct} + \beta_{ext} \textbf{\textit{extfin}}_j + \beta_{C,ext} D_{ct} \times \textbf{\textit{extfin}}_j +$$
$$\beta_f \textbf{\textit{frac}}_k + \beta_c \delta_c + \beta_{mc} \textbf{\textit{controls}}_{ct} + \epsilon_{kjct}$$

	Panel A: Full Sample			
	All	Same SIC	Different SIC	Non-Financial
External Finance	0.154***	0.116***	0.038*	0.019*
	(0.04)	(0.04)	(0.02)	(0.01)
Banking Crisis	0.112***	0.086***	0.026	0.026
	(0.04)	(0.03)	(0.02)	(0.02)
Banking Crisis×Ext.fin.	0.003	0.054	-0.051	-0.065
	(0.11)	(0.11)	(0.06)	(0.04)
No. obs.	10,997	10,997	10,997	10,997
R^2	0.1024	0.1005	0.0174	0.0223

Cox Proportional Hazards Model

Estimate hazard rate conditional on a set of factors:

$$h(t|X) = h_0(t)e^{X'\beta}$$

where h_0 is baseline hazard and X is a vector of explanatory variables

Equivalently:

$$\ln[h(t|X)] = \ln[h_0(t)] + X'\beta$$

Are Crisis-Time Acquisitions Flipped Faster?

$$\ln[h_{jc}(t|x)] = \ln[h_{jc}(t)] + \beta_F D_F + \beta_C D_C + \beta_{FC} D_F \times D_C +$$
$$\beta_f frac_k + \beta_{mc} \textbf{\textit{controls}}_{ct} + \epsilon_{kjct}$$

	Full Sample	Asia	Post-1997 Asia	Non-Asia
β_F	-0.164***	-0.272***	-0.138	0.041
	(0.06)	(0.07)	(0.09)	(0.08)
β_C	-0.115	-0.231**	-0.313***	0.227
	(0.11)	(0.09)	(0.09)	(0.20)
β_{FC}	0.090	0.241**	0.107	-0.301
	(0.11)	(0.12)	(0.13)	(0.18)
No. obs.	30,131	20,706	17,862	9,425
Log L	-20,999.4	-15,422.4	-11,990.6	-5,552.3
$H_0 : \beta_F + \beta_{FC} = 0$	-0.074	-0.031	-0.030	-0.260
$H_0 : \beta_C + \beta_{FC} = 0$	-0.025	0.010	-0.206**	-0.074

The Effect of Crises on Merger Duration

	Panel B: Different SIC			
	Full Sample	Asia	Post-1997 Asia	Non-Asia
β_F	-0.151**	-0.234	-0.138	0.007
	(0.07)	(0.08)	(0.10)	(0.14)
β_C	-0.048	-0.022	0.017	0.124
	(0.16)	(0.21)	(0.20)	(0.26)
β_{FC}	0.384	0.513	0.351	0.162
	(0.30)	(0.38)	(0.34)	(0.46)
No. obs.	13,234	9,808	8,427	4,426
Log L	-9,195.5	-7,210.3	-5,468.8	-1,972.7
$H_0 : \beta_F + \beta_{FC} = 0$	0.336	0.491*	0.368	0.286
$H_0 : \beta_C + \beta_{FC} = 0$	0.234	0.280	0.213	0.170

Are Flipping and External Finance Dependence Correlated?

$$\ln[h_{jc}(t|x)] = \ln[h_{jc}(t)] + \beta_C D_{ct} + \beta_{ext} \textbf{extfin}_j + \beta_{C,ext} D_{ct} \times \textbf{extfin}_j +$$
$$\beta_f \textbf{frac}_k + \beta_{mc} \textbf{controls}_{ct} + \epsilon_{kjct}$$

	Full Sample	Asia	Post-1997 Asia
External Finance	-0.683	-0.216	-0.126
	(0.61)	(0.69)	(0.86)
Banking Crisis	0.225	0.625	0.586
	(0.27)	(0.41)	(0.57)
Bank×Ext.fin.	-0.983	-1.495	-1.642
	(0.78)	(1.03)	(1.16)
No. obs.	2,703	1,472	1,282
Log L	-710.9	-363.0	-290.8

Summary of Results

Fire sales of corporate assets do not appear to be a salient feature of emerging-market crises

- Foreign acquisitions do increase during crises

- But no evidence that acquisition activity increases in sectors with greater dependence on external finance

- No evidence of flipping

- External finance dependence is not associated with duration of transaction