

Liquidity-Driven FDI

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Research Question

- What drives FDI in the form of foreign mergers and acquisitions (M&A)?
- Motivation:
 - Likelihood of FDI different across industries
 - Ownership structure chosen different (how much of target to acquire) across industries
- Why is this the case?

Main Idea of this Paper

- Large part of the reason: Financial liquidity differences between acquiring and target firms

What We Do in this Paper

- Build a simple model: links firm-level liquidity to industry-level characteristics
- Two key characteristics: external finance dependence and asset tangibility
- Evidence from emerging market economies

Existing Work on Acquisitions and Liquidity

- The importance of liquidity during crises
Alquist et. al. (2014), Aguiar and Gopinath (ReStat, 2005)
 - Crisis time characterized by more foreign acquisitions
- Intra-industry liquidity mergers
Almeida et al (JFE, 2011)
 - Optimal financial policies (usage of cash vs. lines of credit) when opportunistic mergers are possible
 - Evidence from US same-industry mergers
- More evidence on liquidity provision
Erel et al (JF, 2014)
 - Acquisitions relieve liquidity constraints of targets
 - Evidence from European acquisitions

Preview of Theoretical Results

- Foreign acquisitions more likely in external finance dependent sector and sectors with fewer tangible assets
- Larger foreign stakes also more likely in external finance dependent sectors and sectors with fewer tangible assets
- Financial development can have mitigating effect

Intuition for Theoretical Results

- Foreign acquisitions more likely in external finance dependent sector and sectors with fewer tangible assets
 - Domestic firms are liquidity constrained, foreign acquirers are not
 - More severe liquidity constraint in external finance dependent and intangible sectors
 - Financial development relaxes credit constraints

Intuition for Theoretical Results

- Larger foreign stakes more likely in external finance dependent sectors and sectors with fewer tangible assets
 - Presence of local inputs in production, domestic firm has comparative advantage in its procurement
 - Partial domestic ownership is a way to share surplus from acquisition and motivate optimal provision
 - Outside option of domestic owner lower when sector external finance dependent or intangible
 - Smaller stakes can satisfy participation constraint of domestic agent

Preview of Empirical Results

- Strong evidence for external finance dependence related results
- Mixed evidence for asset tangibility related results
- Effects strongest for lower levels of financial development

Outline of Remaining Talk

- Stylized Facts
- Simple model motivated by stylized facts
- Evidence from manufacturing sector for 15 EMEs (1990-2007)

What Types of Firms Are Acquired

Target Firm SIC Category	Dom.	For.	Total	% For.
20 Food and Kindred Products	972	496	1,468	33.8%
21 Tobacco Products	23	20	43	46.5%
22 Textile Mill Products	243	102	345	29.6%
23 Apparel and other Finished Products made from Fabrics and Similar Materials	89	35	124	28.2%
24 Lumber and Wood Products, except Furniture	136	29	165	17.6%
25 Furniture and Fixtures	63	15	78	19.2%
26 Paper and Allied Products	246	142	388	36.6%
27 Printing, Publishing, and Allied Industries	229	91	320	28.4%
28 Chemicals and Allied Products	1,089	681	1,770	38.5%
29 Petroleum Refining and Related Industries	73	40	113	35.4%
30 Rubber and Miscellaneous Plastics Products	233	134	367	36.5%
31 Leather and Leather Products	43	9	52	17.3%
32 Stone, Clay, Glass, and Concrete Products	363	199	562	35.4%
33 Primary Metal Industries	489	177	666	26.6%
34 Fabricated Metal Products, except Machinery and Transportation Equipment	232	130	362	35.9%
35 Industrial and Commercial Machinery and Computer Equipment	467	329	796	41.3%
36 Electronic and other Electrical Equipment and Components, except Computer Equipment	783	422	1,205	35.0%
37 Transportation Equipment	380	280	660	42.4%
38 Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks	119	86	205	42.0%
39 Miscellaneous Manufacturing Industries	94	49	143	34.3%
Total	6,366	3,466	9,832	35.3%

How Much Ownership is Acquired

Target Firm SIC Category	Domestic		Foreign	
	Mean	Median	Mean	Median
20 Food and Kindred Products	68%	91%	63%	59%
21 Tobacco Products	67%	100%	47%	35%
22 Textile Mill Products	50%	36%	63%	58%
23 Apparel and other Finished Products made from Fabrics and Similar Materials	60%	60%	68%	100%
24 Lumber and Wood Products, except Furniture	74%	100%	72%	77%
25 Furniture and Fixtures	67%	70%	74%	90%
26 Paper and Allied Products	60%	63%	63%	54%
27 Printing, Publishing, and Allied Industries	60%	55%	62%	51%
28 Chemicals and Allied Products	57%	51%	65%	70%
29 Petroleum Refining and Related Industries	55%	47%	52%	50%
30 Rubber and Miscellaneous Plastics Products	61%	60%	70%	92%
31 Leather and Leather Products	70%	95%	62%	50%
32 Stone, Clay, Glass, and Concrete Products	56%	50%	55%	50%
33 Primary Metal Industries	55%	50%	53%	50%
34 Fabricated Metal Products, except Machinery and Transportation Equipment	67%	73%	66%	71%
35 Industrial and Commercial Machinery and Computer Equipment	55%	50%	67%	80%
36 Electronic and other Electrical Equipment and Components, except Computer Equipment	53%	50%	63%	69%
37 Transportation Equipment	53%	50%	54%	50%
38 Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks	66%	70%	70%	100%
39 Miscellaneous Manufacturing Industries	63%	70%	67%	86%

Two Main Stylized Facts

- Two features of data
 - ① Variation in the proportion of foreign acquirers across industries
 - ② Variation in ownership structure across industries
- We explore a new explanation – liquidity – for this industry variation
- Compare it to existing theories of FDI and MNC boundaries

Main Theoretical Question

- Is target industry liquidity a determinant of FDI?
- Model generates hypotheses regarding:
 - ① Relationship between the likelihood of foreign acquisitions and EFD/AT
 - ② Size of stake acquired and EFD/AT

A Model of Liquidity-Based FDI

- Main features of model:
 - ① Domestic firms liquidity constrained, foreign firms not
 - ② Domestic firms have comparative advantage in procuring a “local” input
 - ③ Firms more productive under foreign control
 - ④ Foreign firms face fixed cost of acquiring
 - ⑤ Industries differ in their EFD/AT

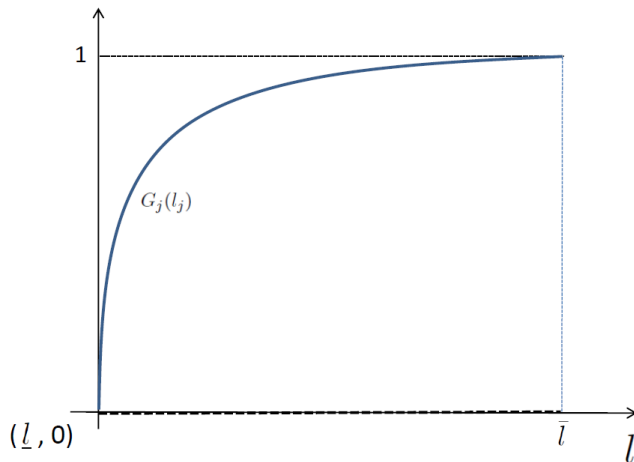
Definition of Asset Tangibility and Financial Development

- In model, $\bar{D}_{ij} \leq \tau_{jc} l_{ij}$, where $\tau_{jc} = \tau_c + \tau_j$
- τ_j : tangibility of a firm's assets, same across all firms in industry j – Almeida and Campello (RFS, 2007)
 - Higher τ_j means industry j 's assets can be more easily used as collateral
- τ_c : financial development, same across all firms in country C
 - Higher τ_c means any industry's assets can be more easily used as collateral

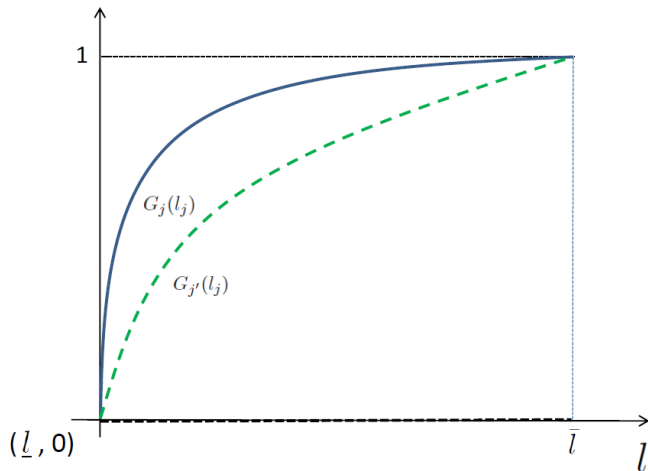
Formal Definition of External Finance Dependence

- Let P_j and $P_{j'}$ be the c.d.f. (across firms) of first period profit, π_1 , in industry j and j' , respectively
- Sector j is more external finance dependent than sector j' if $P_{j'}(\pi_1)$ f.o.s.d. $P_j(\pi_1)$, i.e., $P_{j'}(\pi_1) \leq P_j(\pi_1) \forall \pi_1$
- Note: Implies weaker RZ requirement that $l_{ij} - \pi_{ij,1}$ of *median* firm is higher in an EFD sector
- Since $l_{ij} \equiv \frac{\pi_{ij,1}}{(1-\tau_{jc})}$, for given τ_{jc} we have $G_{j'}(\pi_1) \leq G_j(\pi_1) \forall l_{ij}$

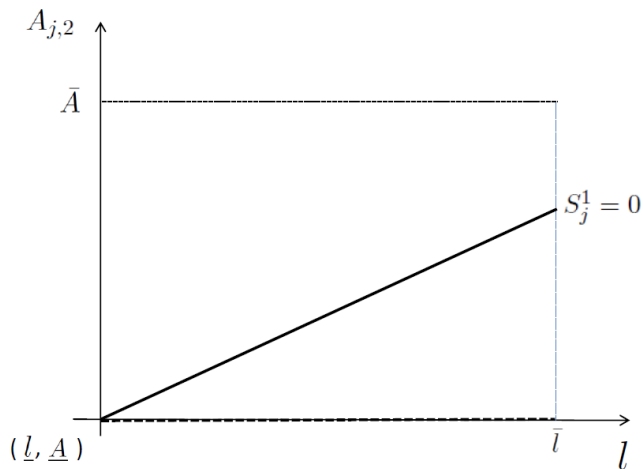
Distribution of Liquidity Across Firms in Industry j



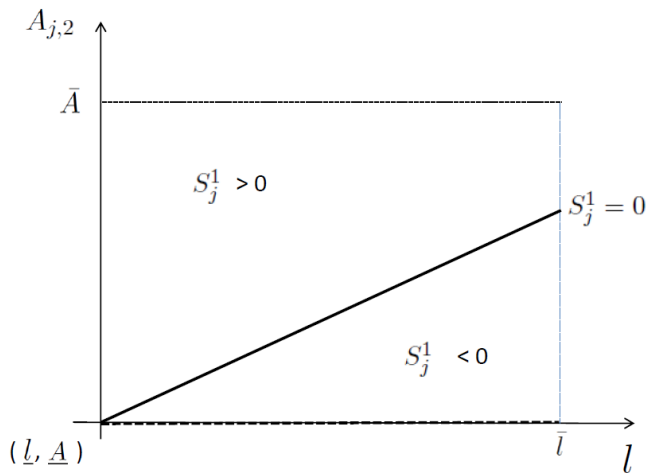
Sector j' Less EFD Than j



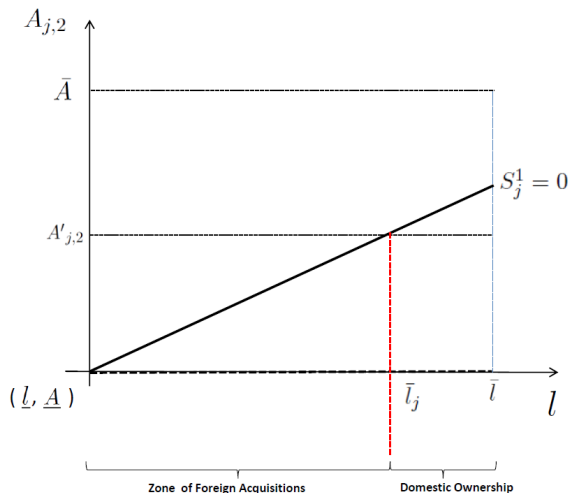
Zero Surplus Line in Sector j



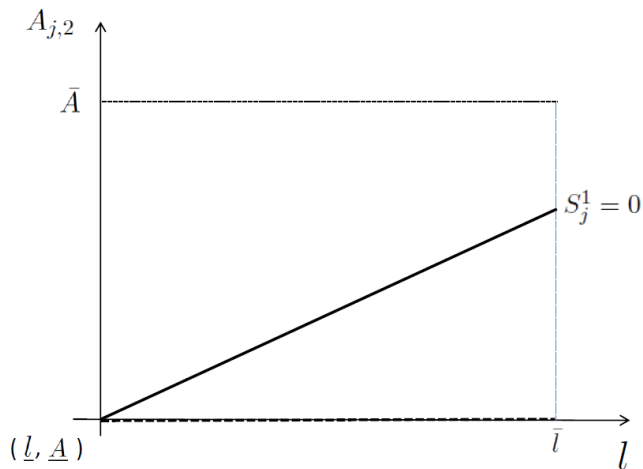
Positive/Negative Surplus Zones in Sector j



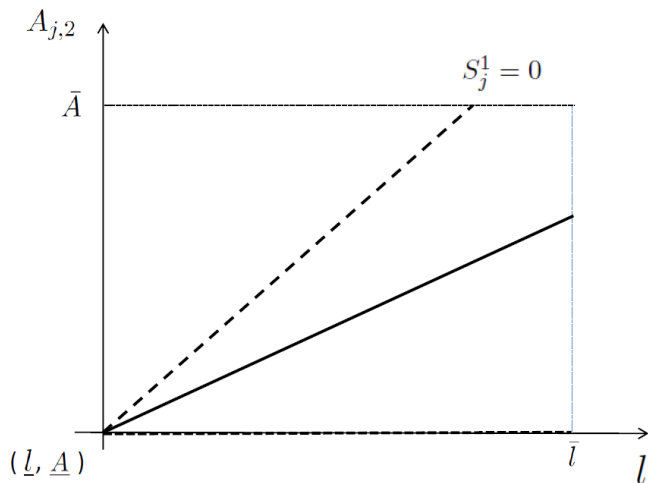
Corresponding Liquidity Cut-Off in Sector j



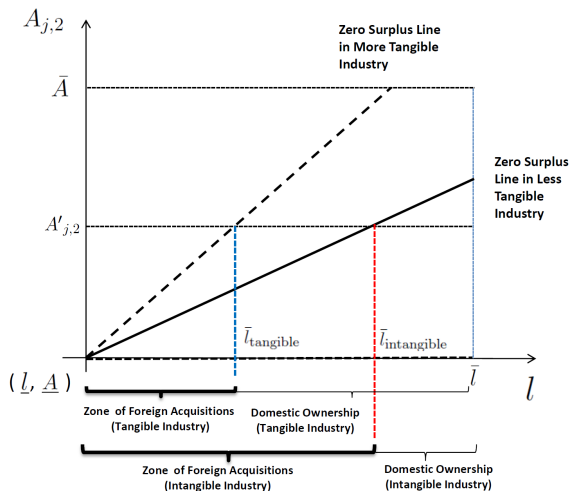
Zero Surplus Line in Sector j



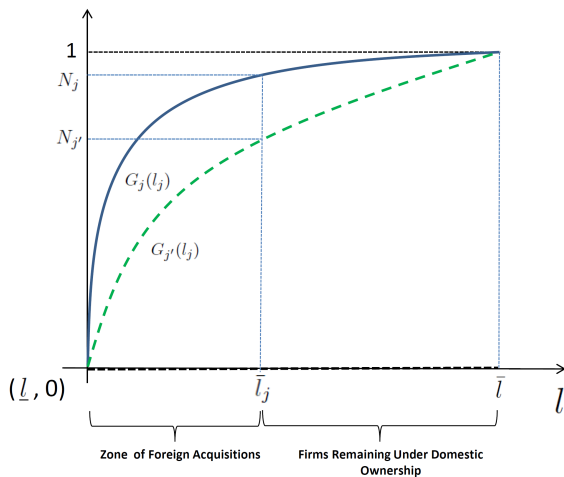
Zero Surplus Line in More Tangible Sector



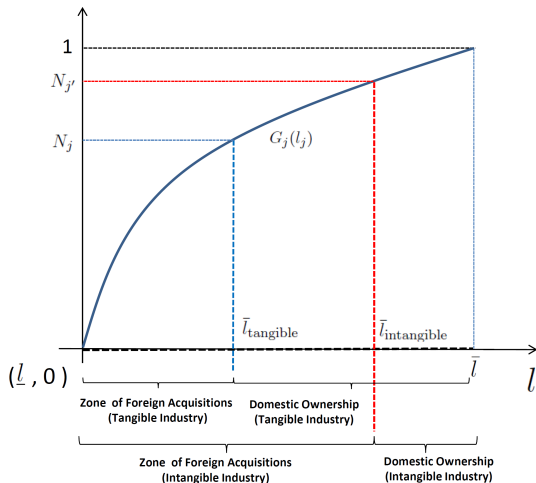
Liquidity Cut-Offs in Tangible and Intangible Sectors



More Foreign Acquisitions in EFD Sectors



Fewer Foreign Acquisitions in Tangible Sectors

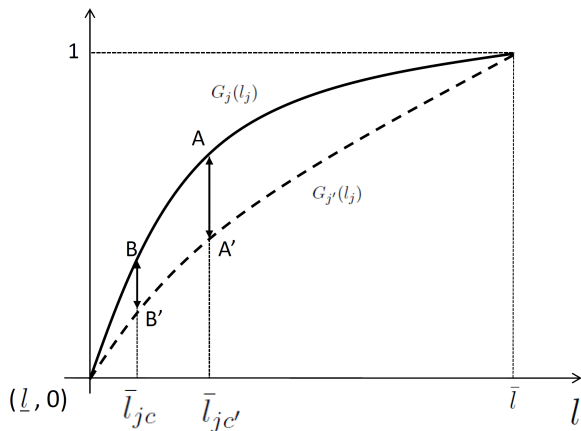


Optimal Ownership Structure

- Result: More foreign ownership in EFD and intangible sectors
 - Intuition: optimal ownership structure involves giving higher ownership to the domestic agent when her outside option of retaining ownership, is higher
 - Since outside option is higher in sectors with low EFD and tangible assets, more domestic ownership retained in those sectors

Effect of Financial Development

- Recall $\tau_{jc} = \tau_c + \tau_j$



Empirical Hypotheses

- Probability of foreign acquisitions higher in external finance dependent sectors
- Probability of foreign acquisitions higher in intangible sectors
- Size of foreign stakes higher in external finance dependent sectors
- Size of foreign stakes higher in intangible sectors

Empirical Hypotheses

- Financial development reduces likelihood of foreign acquisition overall
- Effect stronger in more EFD sectors
- Likewise for ownership structure results

Empirical Tests of the Theory

$$P(D_{kjct} = 1 | \cdot) = F.E. + \beta_1 extfindep_j + \beta_2 assettangibility_j \\ + \beta_3 fracaft_k + \mathbf{FDI\ controls}'_{jct}\eta + \mathbf{controls}'_{c,t-4}\gamma + \epsilon_{kjct}$$

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

- Fixed effects: Country \times year; Country-pair and year; Country and year
- Size of acquisition (fraction owned after an acquisition)
- Lagged macro conditions (Brown and Dinc, 2011)
 - ① Level of real GDP per capita
 - ② Real GDP growth
 - ③ Change in exchange rate
 - ④ IMF credit as share of quota
- Alternative theories control

Empirical Tests of the Theory

$$\text{fracacq}_{kijt} = F.E. + \beta_1 \text{extfindep}_j + \beta_2 \text{assettangibility}_j \\ + \mathbf{FDI \ controls}'_{ijt} \eta + \mathbf{controls}'_{c,t-4} \gamma + \epsilon_{kijt}$$

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

- Fixed effects: Country \times year; Country-pair and year; Country and year
- Lagged macro conditions (Brown and Dinc, 2011)
 - ① Level of real GDP per capita
 - ② Real GDP growth
 - ③ Change in exchange rate
 - ④ IMF credit as share of quota
- Alternative theories control

Empirical Tests of the Theory

- Baseline will be Linear Probability Model
- All variables standardized: “standardized coefficients” to facilitate comparison among alternative theories
- Results similar with logit and GLM

Baseline Regressions

	\mathbb{P}^F	α^F	α^F	α^D
Ext. Fin. Dep.	0.026*** (0.007)	0.033*** (0.009)	0.026** (0.011)	-0.002 (0.006)
Asset Tang.	-0.020*** (0.006)	-0.006 (0.007)	-0.002 (0.011)	-0.000 (0.006)
No. Obs.	9,832	3,466	3,466	6,366
R^2	0.1736	0.1915	0.0056	0.1510
Macroeconomic Controls	No	No	No	No
Country \times Year Fixed Effects	Yes	Yes	No	Yes
Country Pair and Year Fixed Effects	No	No	Yes	No

Summary of Findings

- Probability of foreign acquisitions higher in external finance dependent sectors: **YES**
- Probability of foreign acquisitions higher in intangible sectors: **YES**
- Size of foreign stakes higher in external finance dependent sectors: **YES**
- Size of foreign stakes higher in intangible sectors: **CORRECT SIGN ONLY**
- Effect on stakes in domestic acquisitions: **NO**

Alternative Theories We Control For

- Proximity-concentration trade-off (without firm heterogeneity)
Brainard (AER, 1997)
 - The role of trade barriers, plant level returns to scale
 - Industry-level tariff data from WITS
- Cream skimming
Razin and Sadka (EER, 2007)
 - FDI targets more efficient firms
 - Industry technological efficiency relative to US from Levchenko and Zhang

Alternative Theories We Control For

- Contracting approach to MNC boundaries

Antras (QJE, 2003)

- FDI and ownership more likely in capital intensive sectors
- Same controls as Antras

Asiediu and Esfahani (ReStat, 2001)

- Full ownership more likely when industry uses foreign factor more intensively
- Proxied by K-L ratio

Alternative Theories We Partly Control For

- Proximity-concentration trade-off (with firm heterogeneity)
Helpman, Melitz, Yeaple (AER, 2004)
 - Suggests firm size distribution parameters as control
 - But speaks more to distribution in *source* country
- Greenfield versus M&A
Knocke and Yeaple (ReStud, 2008; JIE 2007)
 - Partly control for using R&D and advertising intensity
 - Again suggests interaction of above with firm size distribution in *source* country

Alternative Theories

	\mathbb{P}^F	\mathbb{P}^F	α^F	α^F	α^D	α^D
Ext. Fin. Dep.	0.028*** (0.007)	0.024* (0.013)	0.029*** (0.009)	0.049** (0.020)	-0.004 (0.007)	0.003 (0.013)
Asset Tang.	-0.017** (0.007)	-0.012 (0.014)	-0.006 (0.008)	-0.016 (0.014)	-0.002 (0.007)	0.004 (0.011)
Tech. Rel. to U.S.		-0.010 (0.012)		-0.017 (0.010)		0.020** (0.008)
K/L		0.023 (0.031)		0.041 (0.029)		0.047 (0.031)
log(Scale)		-0.015 (0.020)		-0.020 (0.022)		-0.038 (0.024)
log(R&D/Sales)		0.026 (0.026)		-0.032 (0.027)		-0.004 (0.021)
log(Adv./Sales)		-0.026** (0.010)		0.023* (0.012)		-0.002 (0.014)
Tariff		0.017 (0.014)		-0.028* (0.015)		0.036*** (0.008)
No. Obs.	9,489	5,549	3,286	2,057	6,203	3,492
R^2	0.1181	0.1379	0.1237	0.1341	0.1022	0.1457
Macroeconomic Controls	Yes	Yes	Yes	Yes	Yes	Yes
Country and Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes

Summary of Findings

- External finance dependence results robust to controls
- Asset tangibility has correct sign but imprecisely estimated
- Controls for alternative theories largely have expected signs
- Standardized coefficients: magnitudes suggest that the liquidity channel is large and comparable to other channels

Summary

- Probability of foreign acquisitions higher in external finance dependent sectors
- Probability of foreign acquisitions higher in intangible sectors
- Size of foreign stakes higher in external finance dependent sectors
- These effects are robust to different controls
- Size of effects at least as large as “traditional theory” coefficients

Summary

- Effect absent for ownership structure in domestic acquisitions
- Robust to exclusion of financial sector FDI and different estimation techniques

Conclusions

- A new channel: Relative liquidity as a driver of FDI and boundaries of MNC
- Channel likely most important for countries at the lower end of financial development
- Ownership structure driven by liquidity even for more financially developed markets

Financial Development Tests

$$P(D_{kjct} = 1 | \cdot) = F.E. + \beta_1 extfindep_j + \beta_2 assettangibility_j + \beta_3 financialdev_{ct} + \mathbf{interaction}'_{jct} \theta + \beta_4 fracact_k + \mathbf{controls}'_{c,t-4} \gamma + \epsilon_{kjct}$$

$$fracacq_{kjct} = F.E. + \beta_1 extfindep_j + \beta_2 assettangibility_j + \beta_3 financialdev_{ct} + \mathbf{interaction}'_{jct} \theta + \mathbf{controls}'_{c,t-4} \gamma + \epsilon_{kjct}$$

- Two alternative measures of FD:
 - ① Bond market capitalization/GDP
 - ② Private Credit/GDP

Financial Development and FDI Likelihood

	P^F	P^F	P^F	P^F
Ext. Fin. Dep.	0.030*** (0.007)	0.032*** (0.007)	0.023* (0.013)	0.024* (0.014)
Asset Tang.	-0.018*** (0.006)	-0.018*** (0.007)	-0.011 (0.013)	-0.011 (0.013)
Private Bond	0.027 (0.023)		0.050 (0.031)	
Ext. Fin. Dep. \times Priv. Bond	-0.016*** (0.006)		-0.012** (0.005)	
Asset Tang. \times Priv. Bond	0.014** (0.007)		0.007 (0.006)	
Private Credit		-0.025 (0.025)		-0.005 (0.032)
Ext. Fin. Dep. \times Priv. Credit		-0.023*** (0.008)		-0.017* (0.009)
Asset Tang. \times Priv. Credit		0.010 (0.006)		0.008 (0.007)
Observations	9,489	9,489	5,549	5,549
R-squared	0.1211	0.1215	0.1395	0.1397
Trade and Technology Controls	No	No	Yes	Yes
Macroeconomic Controls and F.E.	Yes	Yes	Yes	Yes

Summary of Findings

- Financial development lowers the advantage of foreign acquirers in EFD sectors
- EFD and AT have predicted effect (at mean of financial development)
- Effect stronger for lower levels of financial development
- Financial development has predicted effect for more EFD sectors

Financial Development and Foreign Ownership

	α^F	α^F	α^F	α^F
Ext. Fin. Dep.	0.029*** (0.009)	0.030*** (0.009)	0.050** (0.020)	0.051*** (0.019)
Asset Tang.	-0.006 (0.008)	-0.006 (0.008)	-0.017 (0.015)	-0.014 (0.015)
Private Bond	-0.004 (0.030)		-0.029 (0.027)	
Ext. Fin. Dep. \times Priv. Bond	-0.003 (0.008)		-0.001 (0.009)	
Asset Tang. \times Priv. Bond	-0.001 (0.006)		0.005 (0.005)	
Private Credit		-0.024 (0.027)		0.042 (0.046)
Ext. Fin. Dep. \times Priv. Credit		-0.008 (0.008)		-0.007 (0.010)
Asset Tang. \times Priv. Credit		-0.004 (0.008)		0.008 (0.009)
No. Obs.	3,286	3,286	2,057	2,057
R^2	0.1237	0.1245	0.1351	0.1357
Trade and Technology Controls	No	No	Yes	Yes
Macroeconomic Controls and F.E.	Yes	Yes	Yes	Yes

Summary of Findings

- Financial development has no effect on the size of foreign acquisitions
- Results for asset tangibility not significant
- EFD has predicted effect even for mean level of financial development

Financial Development and Domestic Ownership

	α^D	α^D	α^D	α^D
Ext. Fin. Dep.	-0.005 (0.007)	-0.004 (0.007)	0.003 (0.013)	0.003 (0.013)
Asset Tang.	-0.002 (0.007)	-0.002 (0.006)	0.004 (0.011)	0.003 (0.011)
Private Bond	0.035 (0.027)		0.046 (0.032)	
Ext. Fin. Dep. \times Priv. Bond	0.006 (0.007)		0.001 (0.006)	
Asset Tang. \times Priv. Bond	-0.001 (0.007)		-0.003 (0.011)	
Private Credit		-0.060*** (0.021)		-0.105*** (0.034)
Ext. Fin. Dep. \times Priv. Credit		0.004 (0.007)		-0.001 (0.007)
Asset Tang. \times Priv. Credit		0.007 (0.006)		0.006 (0.006)
No. Obs.	6,203	6,203	3,492	3,492
R^2	0.1029	0.1045	0.1466	0.1491
Trade and Technology Controls	No	No	Yes	Yes
Macroeconomic Controls and F.E.	Yes	Yes	Yes	Yes

Summary of Findings

- EFD and asset tangibility have no effect