Liquidity-Driven FDI

Ron Alquist[1] Rahul Mukherjee[2] Linda Tesar[3]

[1]Kings Peak Asset Management

[2]Graduate Institute, Geneva

[3]University of Michigan, Council of Economic Advisers and NBER

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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 at 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

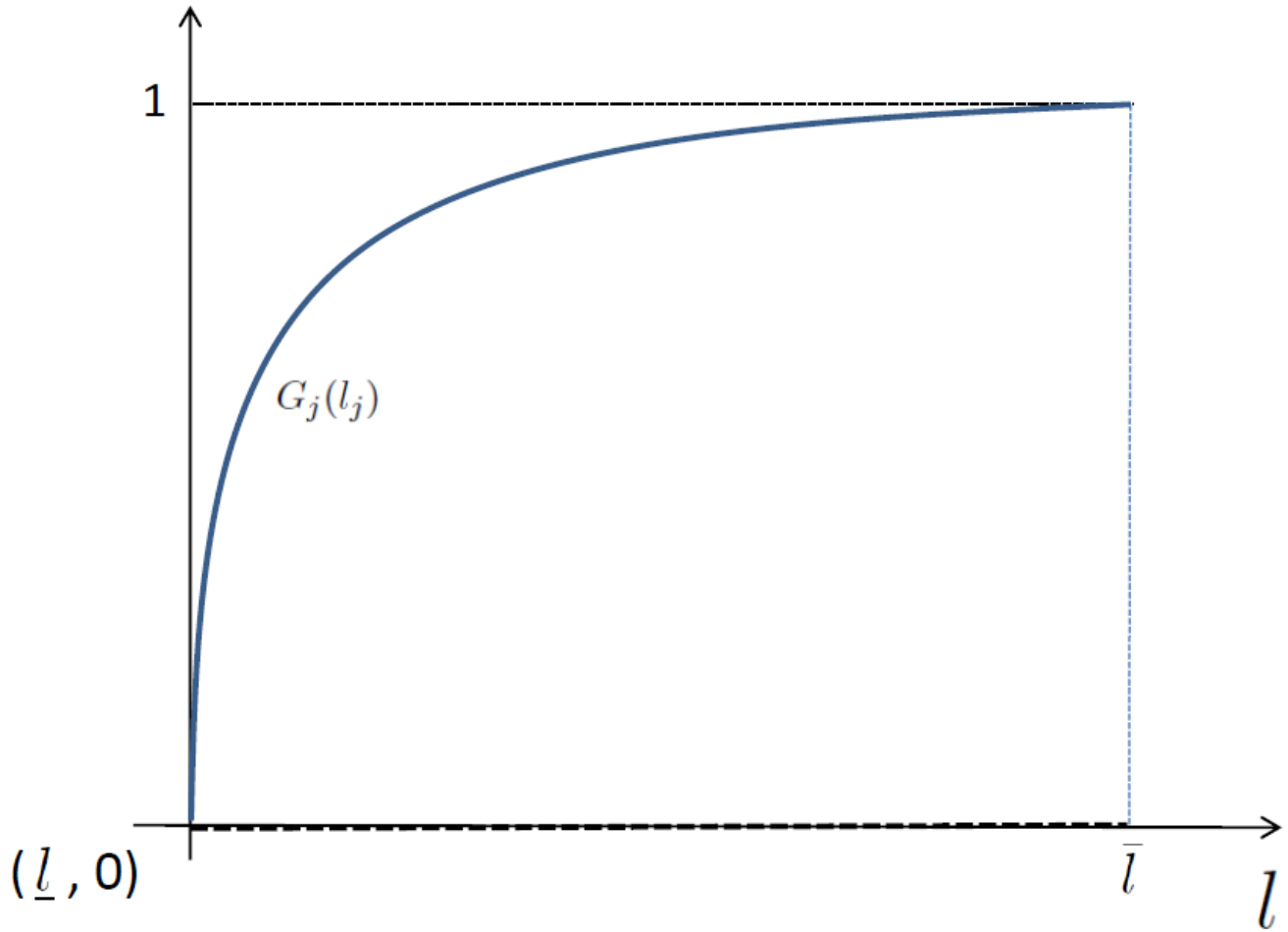
Definition of Asset Tangibility and Financial Development

- In model, $\bar{D}_{ij} \leq \tau_{jc} I_{ij}$, 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 me 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

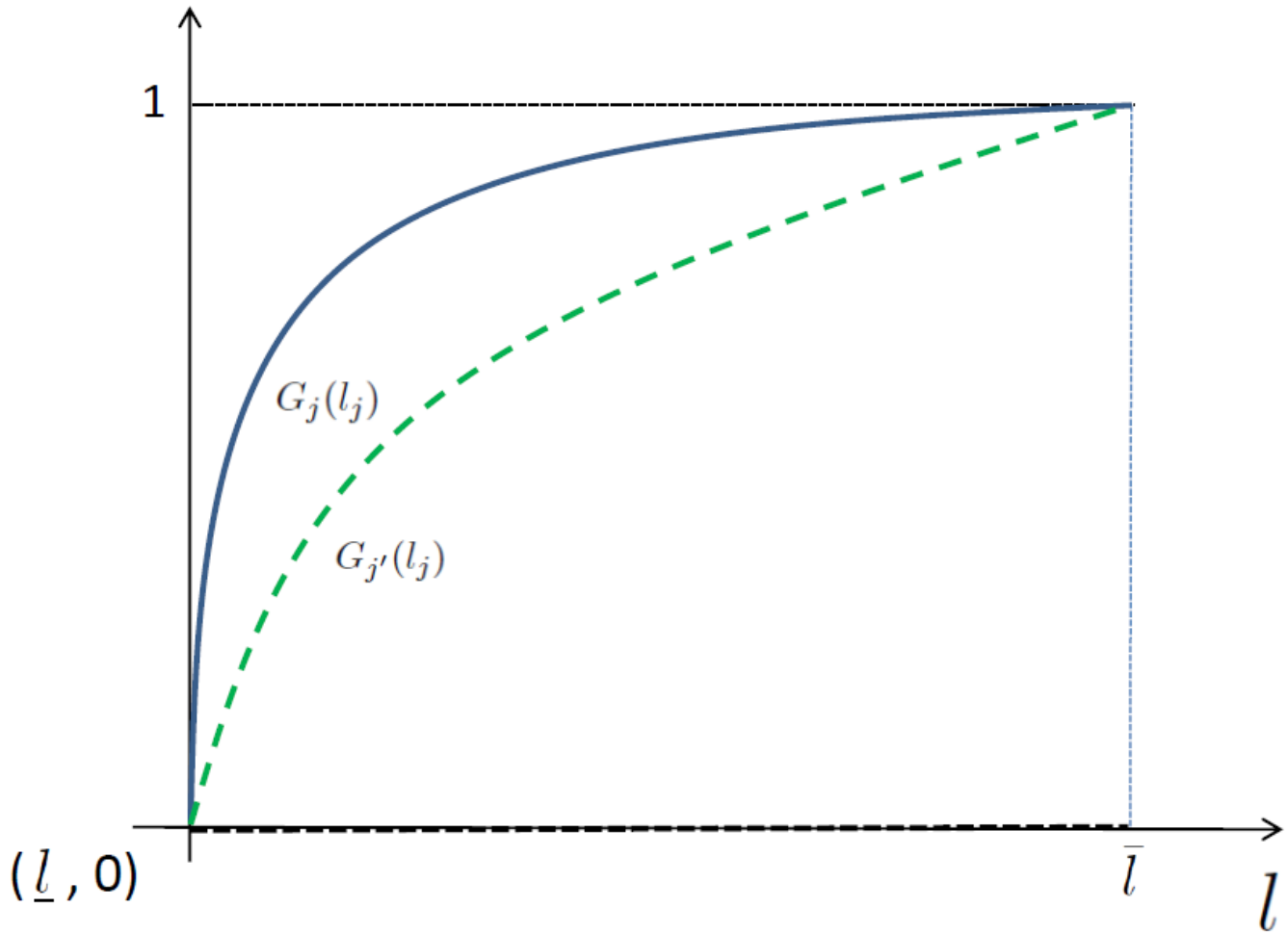
Formal Definition of External Finance Dependence

- 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 $I_{ij} - \pi_{ij,1}$ of *median* firm is higher in an EFD sector
- Since $\mathfrak{l}_{ij} \equiv \frac{\pi_{ij,1}}{(1-\tau_{jc})}$, for given τ_{jc} we have $G_{j'}(\pi_1) \leq G_j(\pi_1)\ \forall \mathfrak{l}_{ij}$

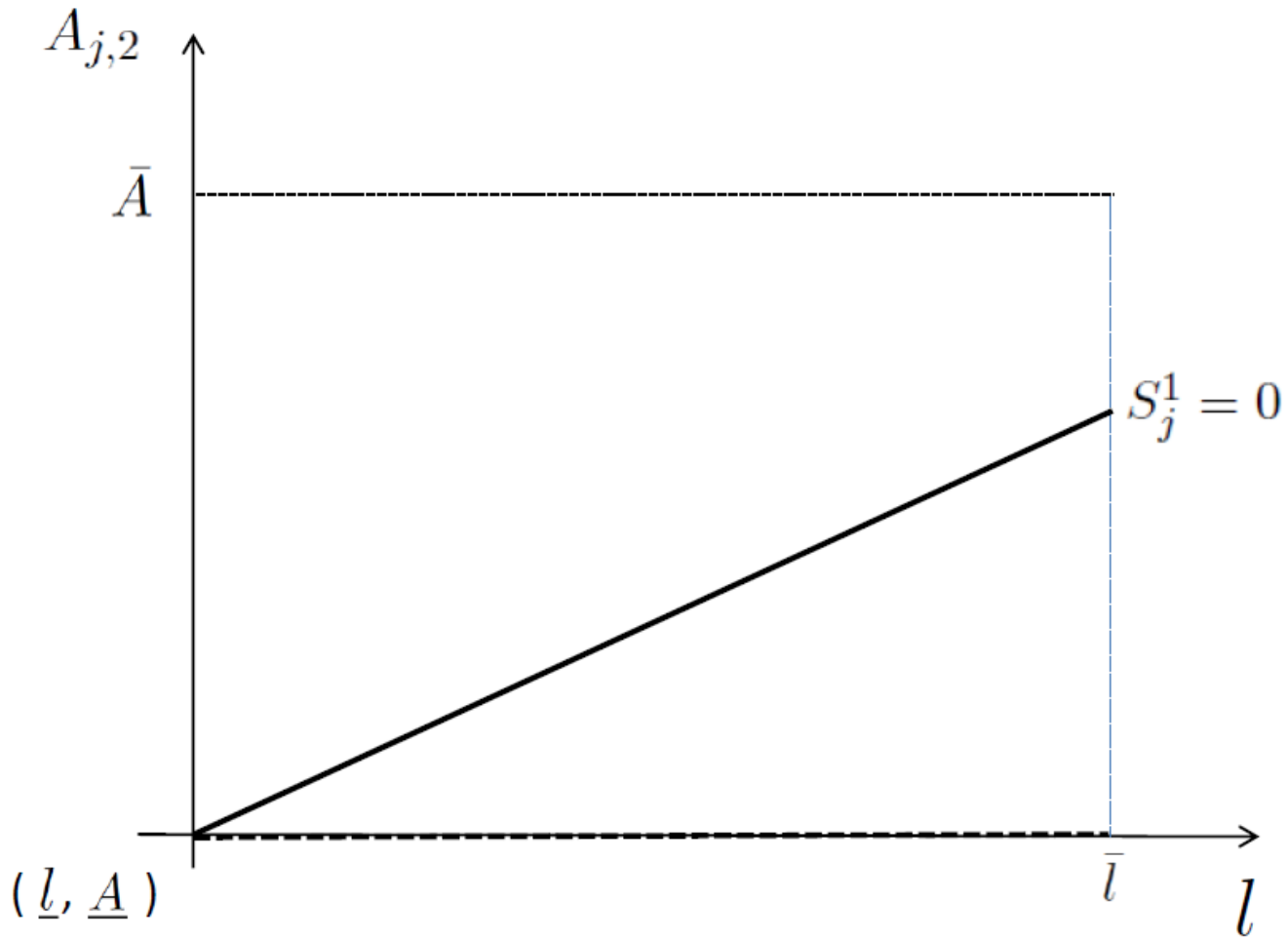
Distribution of Liquidity Across Firms in Industry *j*



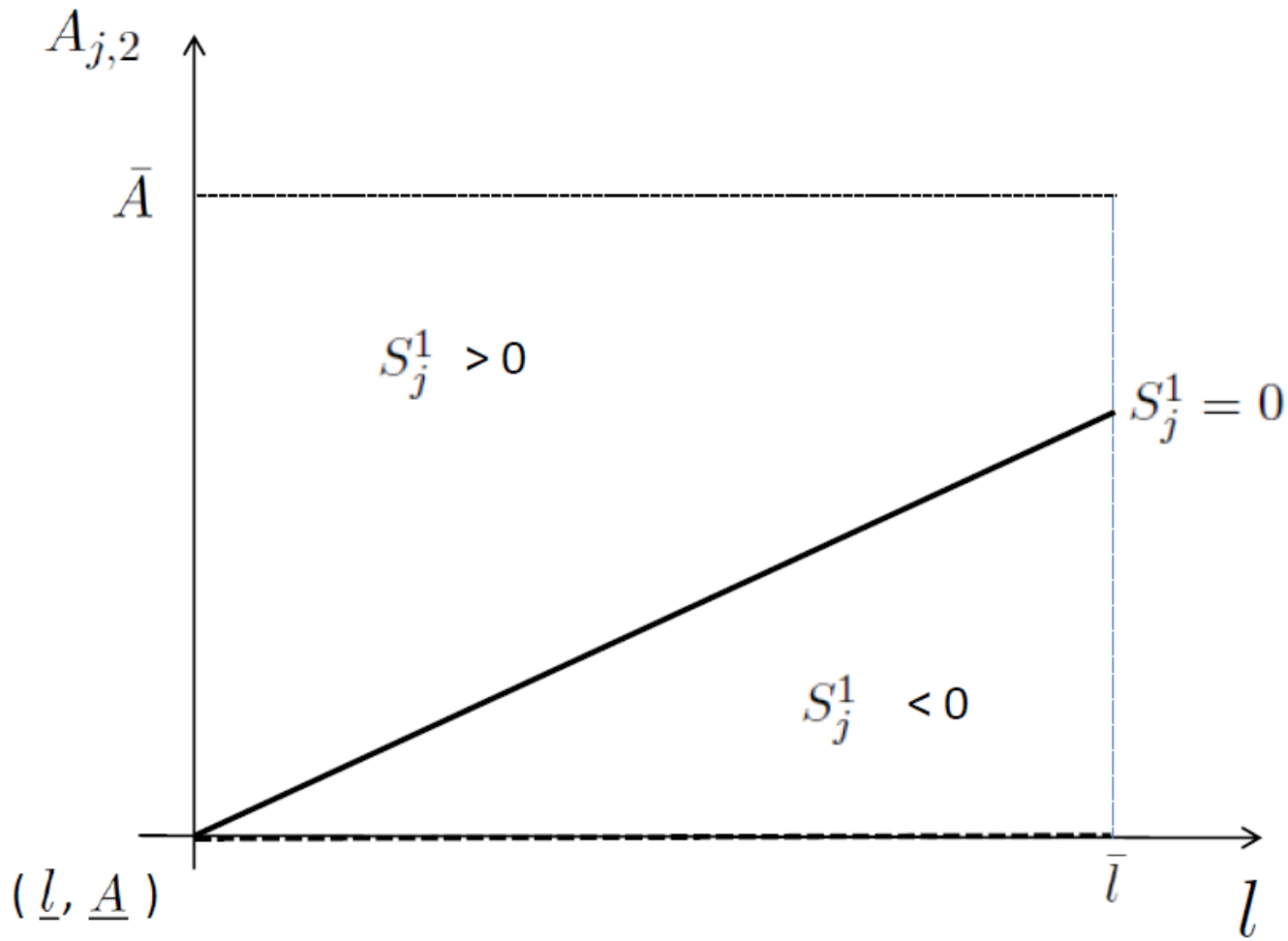
Sector j' *Less* EFD Than j



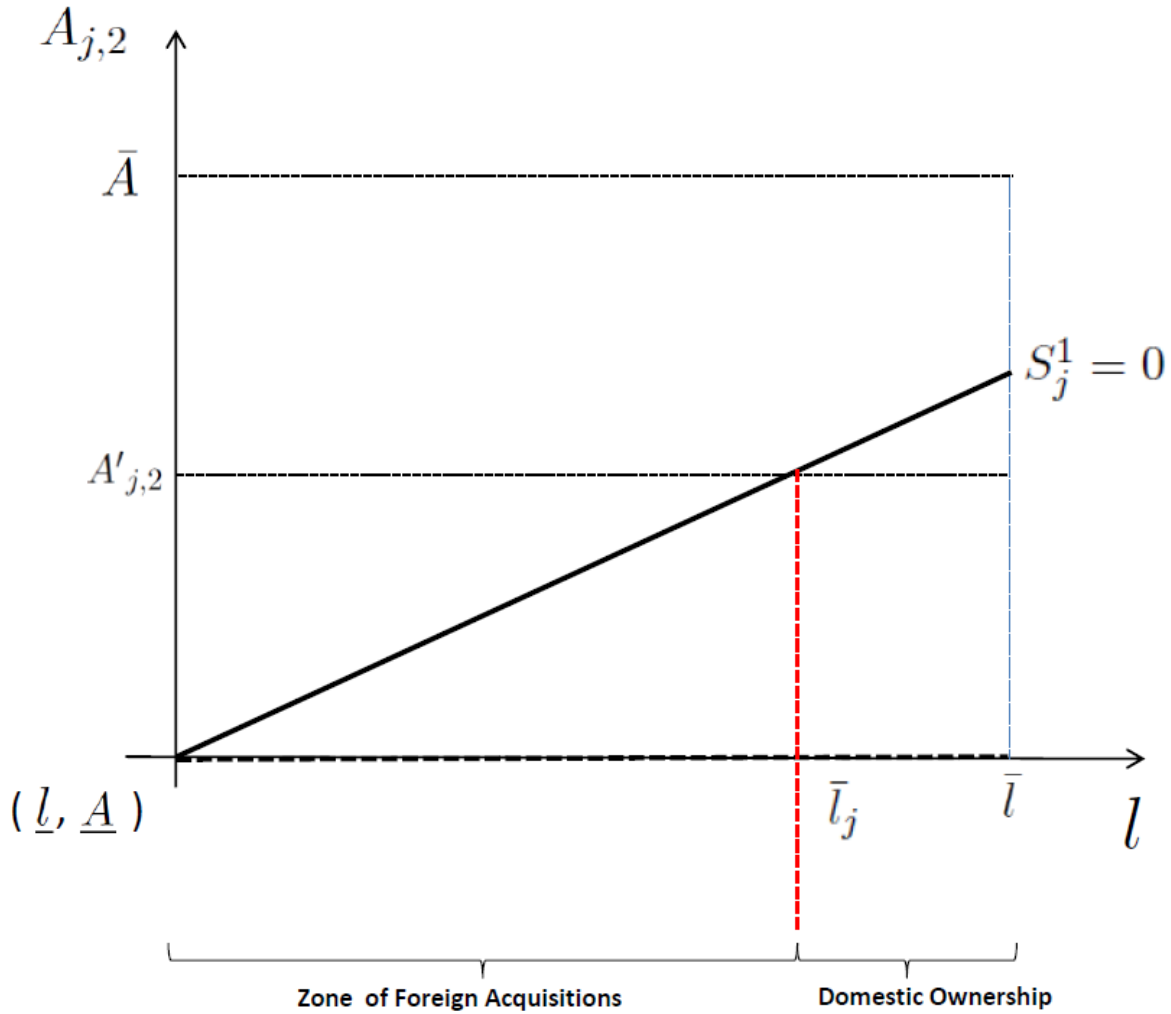
Zero Surplus Line in Sector *j*



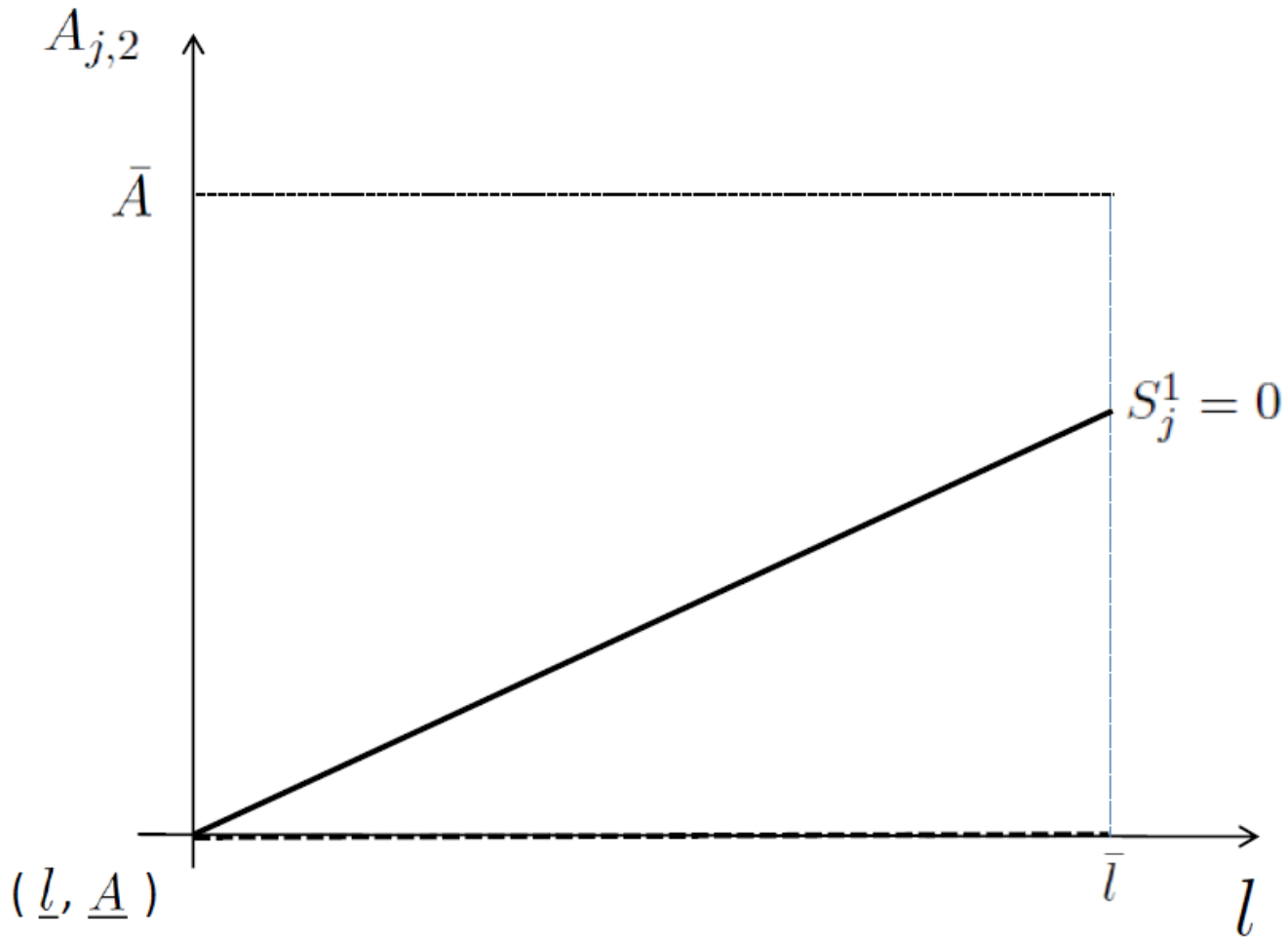
Positive/Negative Surplus Zones in Sector *j*



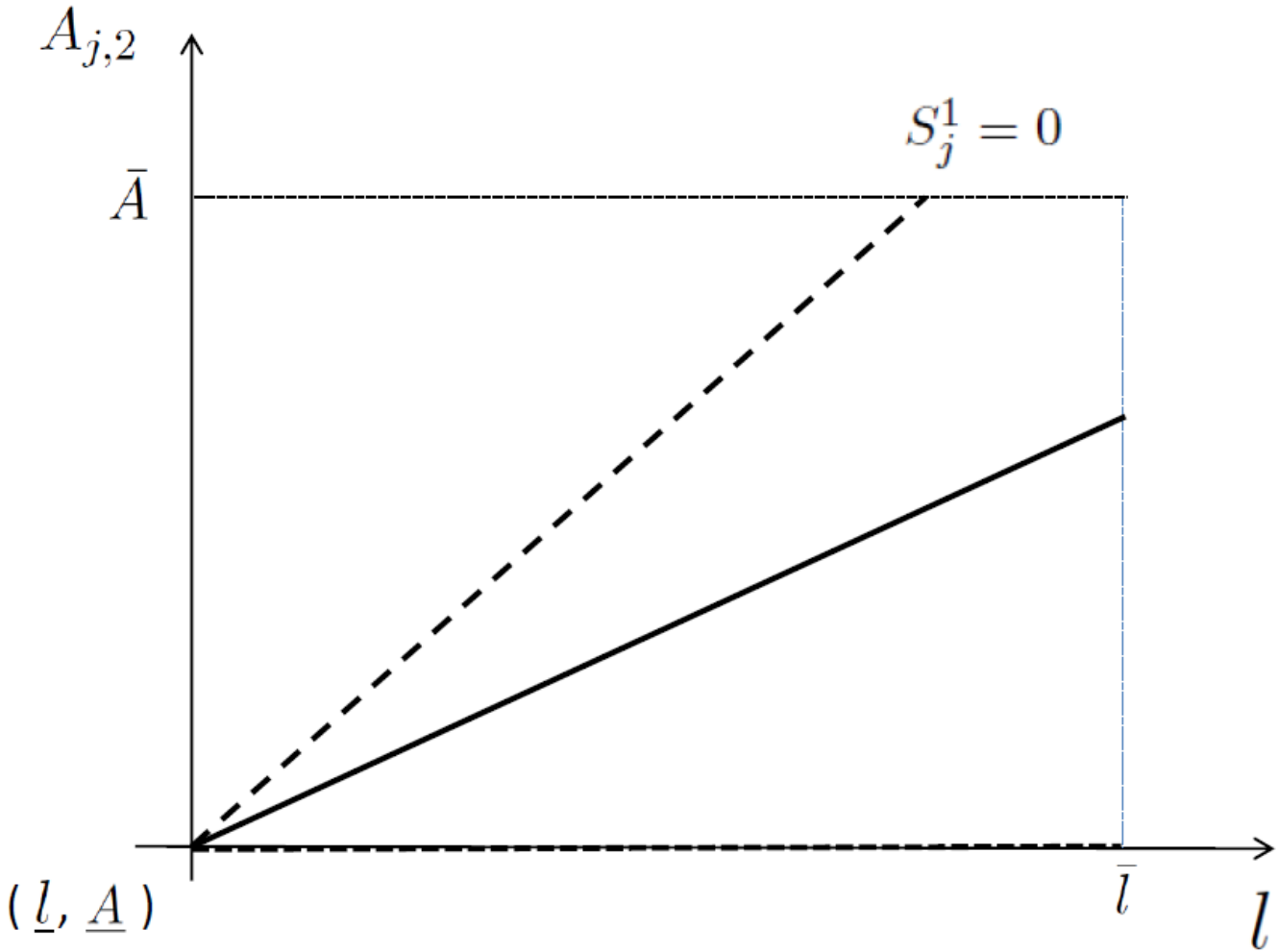
Corresponding Liquidity Cut-Off in Sector *j*



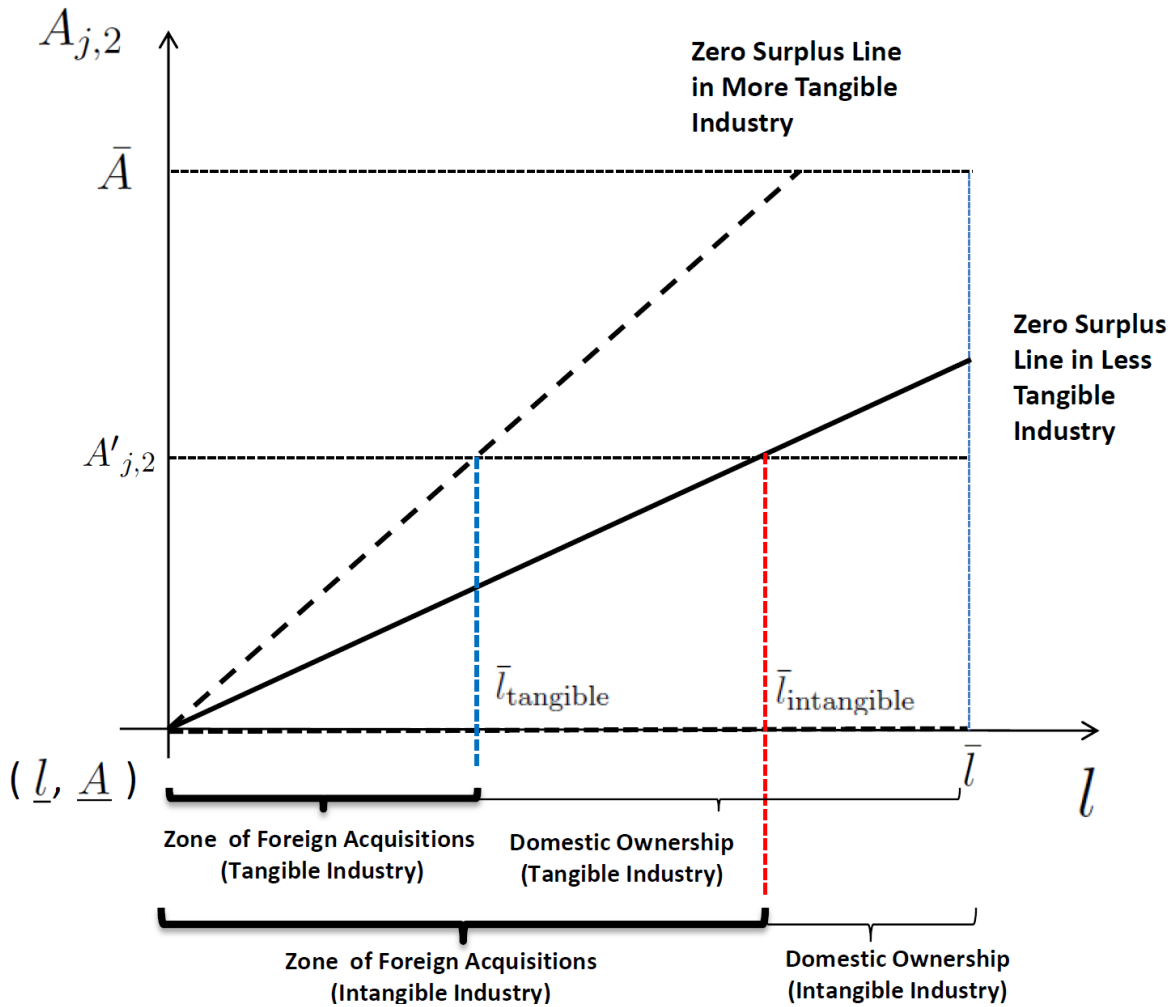
Zero Surplus Line in Sector *j*



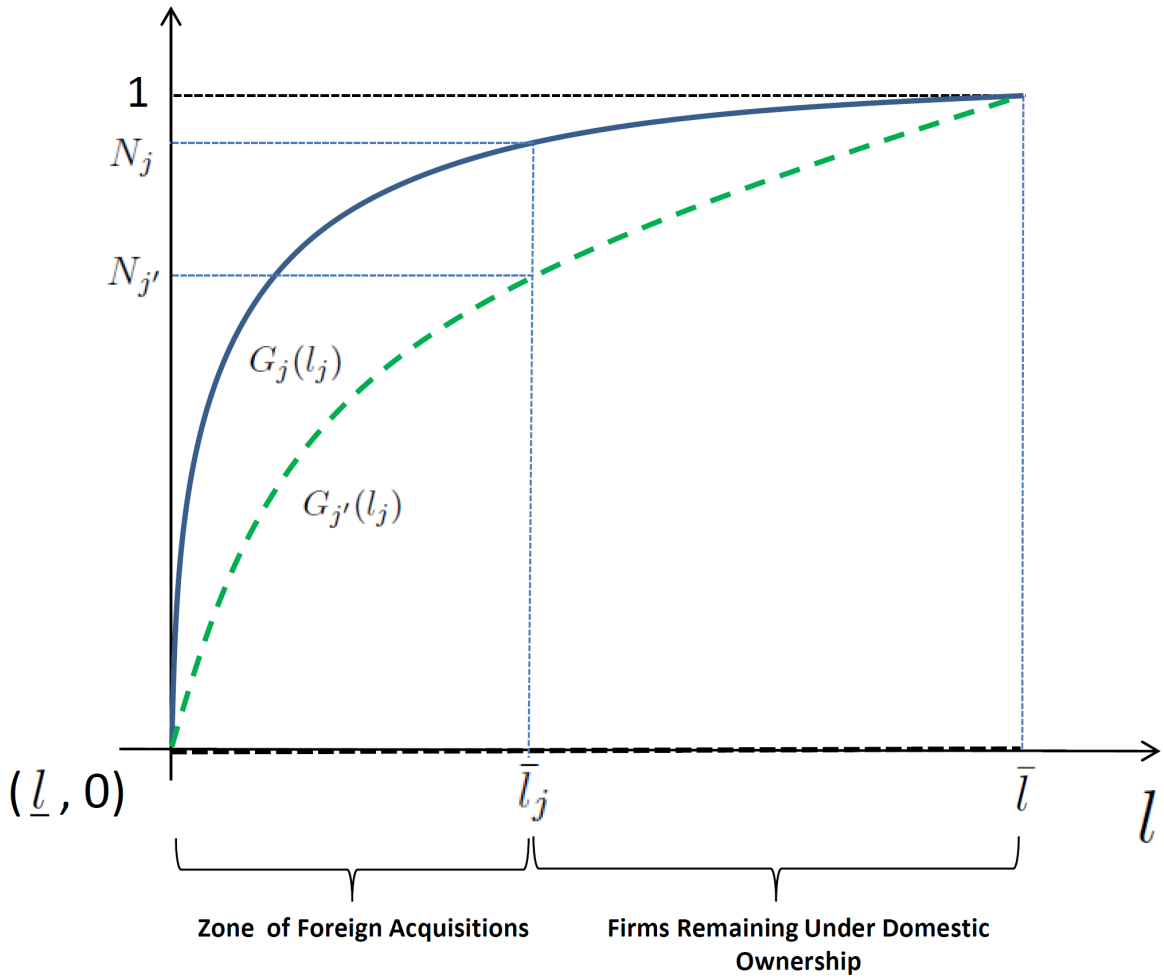
Zero Surplus Line in More Tangible Sector



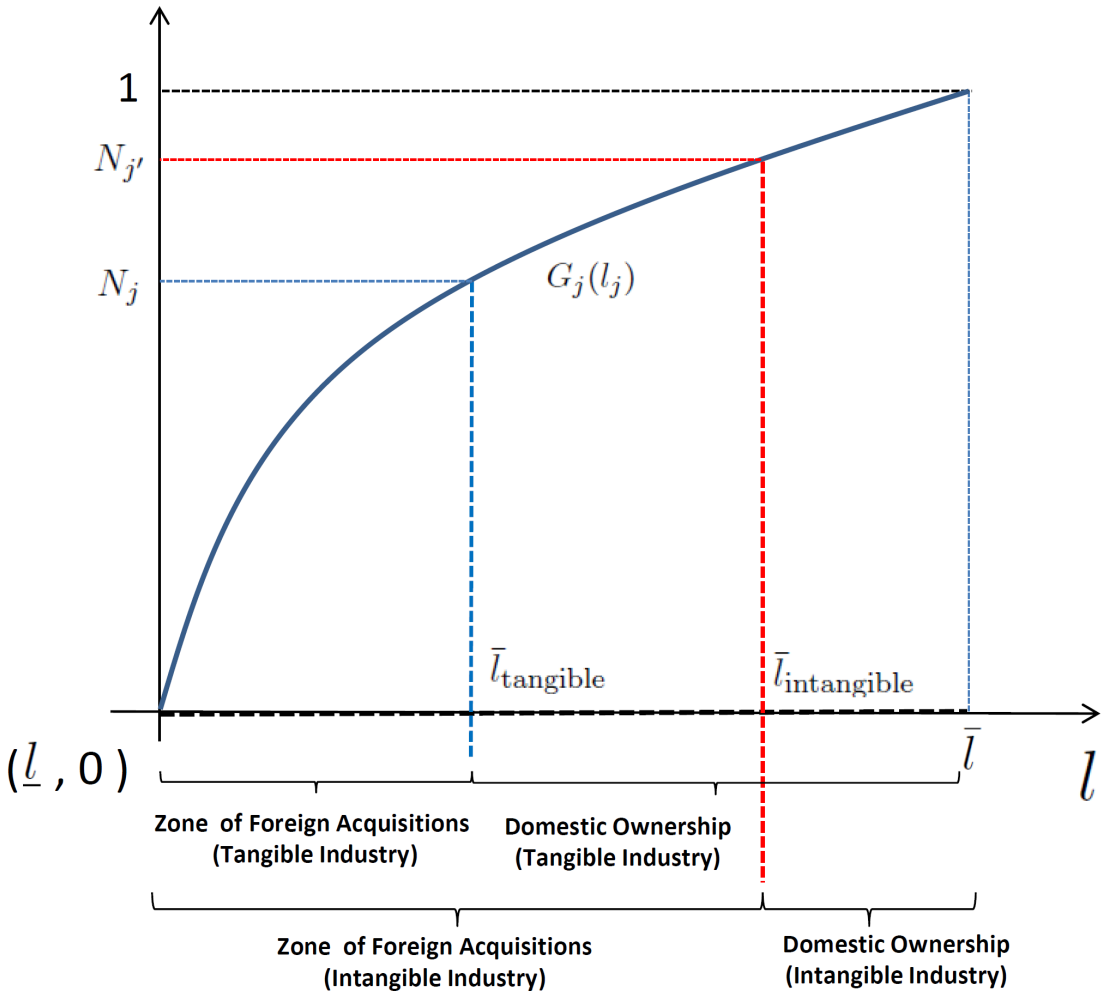
Liquidity Cut-Offs in Tangible and Intangible Sectors



More Foreign Acquisitions in EFD Sectors



Fewer Foreign Acquisitions in Tangible Sectors

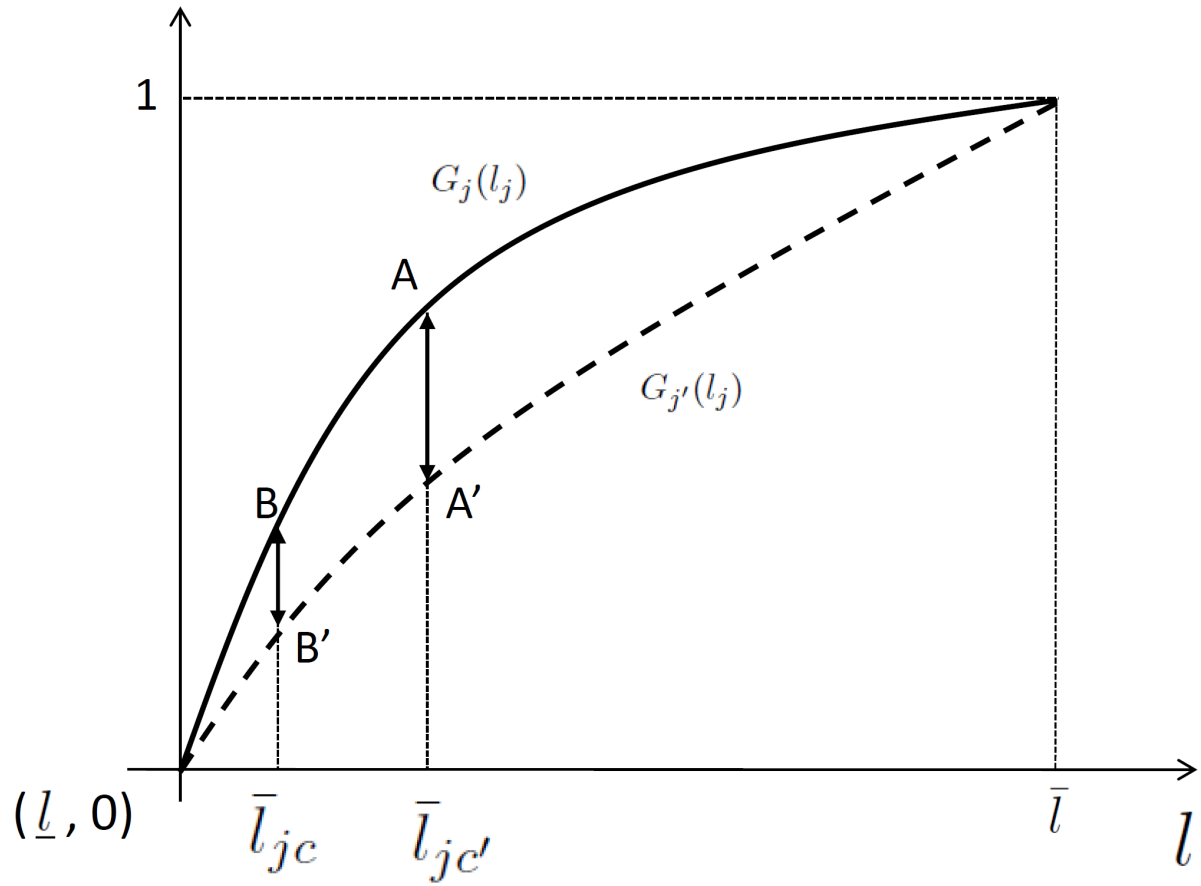


Optimal Ownership Structure

- 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

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

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

$$fracacq_{kjct} = F.E. + \beta_1 extfindep_j + \beta_2 assettangibility_j + \boldsymbol{FDI\ controls}'_{jct}\eta + \boldsymbol{controls}'_{c,t-4}\gamma + \epsilon_{kjct}$$

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

- Fixed effects: Country$\times$year; Country-pair and year; Country and year
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  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***	0.033***	0.026**	-0.002
	(0.007)	(0.009)	(0.011)	(0.006)
Asset Tang.	-0.020***	-0.006	-0.002	-0.000
	(0.006)	(0.007)	(0.011)	(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***	0.024*	0.029***	0.049**	-0.004	0.003
	(0.007)	(0.013)	(0.009)	(0.020)	(0.007)	(0.013)
Asset Tang.	-0.017**	-0.012	-0.006	-0.016	-0.002	0.004
	(0.007)	(0.014)	(0.008)	(0.014)	(0.007)	(0.011)
Tech. Rel. to U.S.		-0.010		-0.017		0.020**
		(0.012)		(0.010)		(0.008)
K/L		0.023		0.041		0.047
		(0.031)		(0.029)		(0.031)
log(Scale)		-0.015		-0.020		-0.038
		(0.020)		(0.022)		(0.024)
log(R&D/Sales)		0.026		-0.032		-0.004
		(0.026)		(0.027)		(0.021)
log(Adv./Sales)		-0.026**		0.023*		-0.002
		(0.010)		(0.012)		(0.014)
Tariff		0.017		-0.028*		0.036***
		(0.014)		(0.015)		(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

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

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

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

Financial Development and FDI Likelihood

	$\mathbb{P}^F$	$\mathbb{P}^F$	$\mathbb{P}^F$	$\mathbb{P}^F$
Ext. Fin. Dep.	0.030***	0.032***	0.023*	0.024*
	(0.007)	(0.007)	(0.013)	(0.014)
Asset Tang.	-0.018***	-0.018***	-0.011	-0.011
	(0.006)	(0.007)	(0.013)	(0.013)
Private Bond	0.027		0.050	
	(0.023)		(0.031)	
Ext. Fin. Dep. $\times$ Priv. Bond	-0.016***		-0.012**	
	(0.006)		(0.005)	
Asset Tang. $\times$ Priv. Bond	0.014**		0.007	
	(0.007)		(0.006)	
Private Credit		-0.025		-0.005
		(0.025)		(0.032)
Ext. Fin. Dep. $\times$ Priv. Credit		-0.023***		-0.017*
		(0.008)		(0.009)
Asset Tang. $\times$ Priv. Credit		0.010		0.008
		(0.006)		(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***	0.030***	0.050**	0.051***
	(0.009)	(0.009)	(0.020)	(0.019)
Asset Tang.	-0.006	-0.006	-0.017	-0.014
	(0.008)	(0.008)	(0.015)	(0.015)
Private Bond	-0.004		-0.029	
	(0.030)		(0.027)	
Ext. Fin. Dep. $\times$ Priv. Bond	-0.003		-0.001	
	(0.008)		(0.009)	
Asset Tang. $\times$ Priv. Bond	-0.001		0.005	
	(0.006)		(0.005)	
Private Credit		-0.024		0.042
		(0.027)		(0.046)
Ext. Fin. Dep. $\times$ Priv. Credit		-0.008		-0.007
		(0.008)		(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	-0.004	0.003	0.003
	(0.007)	(0.007)	(0.013)	(0.013)
Asset Tang.	-0.002	-0.002	0.004	0.003
	(0.007)	(0.006)	(0.011)	(0.011)
Private Bond	0.035		0.046	
	(0.027)		(0.032)	
Ext. Fin. Dep. $\times$ Priv. Bond	0.006		0.001	
	(0.007)		(0.006)	
Asset Tang. $\times$ Priv. Bond	-0.001		-0.003	
	(0.007)		(0.011)	
Private Credit		-0.060***		-0.105***
		(0.021)		(0.034)
Ext. Fin. Dep. $\times$ Priv. Credit		0.004		-0.001
		(0.007)		(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