Liquidity-Driven FDI

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Abstract

We develop a model of foreign direct investment (FDI) in which financially liquid foreign firms acquire liquidity-constrained target firms. Using a large dataset of emerging-market acquisitions, we find evidence supporting three central predictions of the model: (i) firms in external finance dependent and intangible sectors are more likely to be targets of foreign acquisitions; (ii) these targets have ownership structures with larger foreign stakes; (iii) these effects are most prominent in countries with low levels of financial development. The regression evidence indicates that liquidity is at least as economically important as technology- or trade-related motives for FDI in emerging-market economies.

Keywords: Foreign direct investment; cross-border mergers and acquisitions; financial development; external finance dependence; asset tangibility; emerging markets.
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1 Introduction

What drives foreign direct investment (FDI) and determines the boundaries of multinational corporations (MNCs)? The trade literature highlights economies of scale, trade barriers, or cross-border differences in production costs as motivations for becoming a multinational firm. The finance literature, on the other hand, stresses the role of corporate control and differences in the return to capital investment as drivers of FDI. A multitude of explanations have also been put forth to explain the extent of control that foreign firms wish to exercise when conducting FDI. Besides being of lasting interest to international economists, the answer to these questions have important implications for the study of growth, investment and technological convergence across countries, especially since FDI now accounts for the majority of international non-banking investment flow.[1]

This paper identifies a new, and empirically important, channel — the financial liquidity of firms — as a unified explanation for the distribution of brownfield FDI across sectors and countries, and the ownership structure of foreign owned firms.[2] Financial liquidity as a driver of FDI is intuitively appealing. It has been extensively documented that financial liquidity is an important impediment to investment and growth (see Levine, 2005, for a survey). This is especially true for countries with low financial development, where firms often face credit constraints and find it hard to raise capital.[3] Concurrently, low domestic interest rates have induced firms based in industrialized countries with high levels of financial development to reach for higher returns outside their own borders. The lack of access to credit in financially less developed markets and investors' demand for higher returns have together created a wedge between the internal and external valuations of firms, making illiquid firms attractive targets of acquisitions by more liquid firms. This paper develops a model of such liquidity-driven motives for brownfield FDI and uses data on cross-border mergers and acquisitions (M&As) from fifteen emerging market economies (EMEs) to test its predictions.

In the model, foreign firms that face no constraints on their available liquidity seek to acquire target firms that are undervalued because of credit constraints. Target industries differ in their dependence on external finance and the tangibility of the assets used in production. This setup generates two testable predictions. First, liquidity-driven FDI is more likely in sectors of the economy that are more dependent on external finance and have fewer tangible assets. This result is driven by the presence of liquidity-constrained firms that are more valuable to liquidity-rich foreign acquirers. Because firms are more likely to be financially constrained in sectors that are external finance dependent and lack tangible assets, foreign acquisitions are more likely in these sectors. The model also sheds light on the role played by domestic financial development in this context. We find that an increase in domestic financial development, by improving the pledgability

[1] According to the IMF, the share of FDI in the world total of non-banking capital flows — defined as the sum of FDI and portfolio debt and equity – has broadly increased over time and stood at 54% in 2013.

[2] We define financial liquidity for a firm as the sum of internal funds and credit available from external sources.

[3] According to the World Bank Enterprise Surveys, up to 46% and 34% of South Asian and Latin American firms in different size categories reported difficulties in accessing desired levels of credit (WBES, 2013).

of assets, lowers the advantage that foreign acquirers have in the market for corporate control. Financial development is predicted to have heterogeneous effects across industries in this regard. But interestingly, we find that the sign and magnitude of the heterogeneity depends on the initial level of financial development and the distribution of liquidity across firms within an industry.

Second, the ownership structure chosen by foreign firms — that is, how much of the domestic firm they acquire — is also determined by the external finance dependence and asset tangibility of the target's sector. The intuition behind this result is as follows. In our model domestic firm owners have an absolute advantage over foreigners in providing local inputs. By local inputs, we mean such things as better political access and superior information about domestic labor or intermediate goods markets. Even though foreign acquirers have an absolute advantage in providing scarce liquidity, they may prefer to buy a partial equity stake to have a local partner that provides such local inputs. The incentive to supply the optimal quantity of local inputs increases in the size of the domestic agents equity stake. Thus, as in Asiedu and Esfahani (2001), the share acquired by the foreigner declines in the importance of the local input. However, the foreign acquirer also has to satisfy the domestic agents participation constraint, which involves giving her a larger equity share when her outside option is higher. Because the outside option of retaining ownership is higher for the domestic owner of firms in sectors that are less external finance dependent and own more tangible assets, smaller foreign stakes are more likely in such sectors. This theoretical link between liquidity and ownership structure is, to the best of our knowledge, novel in the literature.

We test these two predictions using a data set of 9,832 cross-border and domestic M&As in the manufacturing sector of fifteen EMEs in Asia, Latin America and Africa spanning almost two decades. We find evidence that firms in external finance dependent sectors and sectors with lower asset tangibility are more likely to be targets of foreign acquisitions. These effects are quantitatively large: According to our estimates the probability of being a target of a foreign acquisition for the average firm in the most external finance dependent sector (instruments) is 18.5 percentage points higher than in the least external finance dependent sector (tobacco). Consistent with the theory, we find that domestic financial development lowers the advantage that foreign firms have in acquiring targets in external finance dependent sectors. Conditional on entry, the ownership structure by foreign acquirers also varies with industry characteristics as predicted by the model. Larger foreign ownership stakes are more likely in external finance dependent sectors. Here, the estimated effects are even larger: The average firm in the most external finance dependent sector alluded to in the previous example is likely to have a foreign ownership stake that is 36.7 percentage points higher than that of the average firm in the least external finance dependent sector. Importantly, the ownership structure chosen by domestic acquiring firms is found to be insensitive to the external finance dependence of the target industry, which is further evidence that the difference between the average liquidity levels of the acquiring and target firms drives the result. We find that these results are robust to the inclusion of time and country fixed effects, time-varying country controls,

different estimation procedures, and a host of sector level variables that proxy for existing theories of FDI.

This last set of controls also lets us directly compare existing theories of FDI and ownership structure with our liquidity-driven theory of foreign acquisitions to evaluate the relative economic importance of each of the channels for EME acquisitions. In particular, we control for a number of industry-level determinants of the likelihood of FDI and ownership structure, such as economies of scale, trade barriers in the form of tariffs, productivity differences between target countries and developed markets, as well as capital, R&D, and advertising intensity. Our estimates suggest that liquidity differences are at least as important as the alternative channels, and oftentimes more so, in explaining the industry-level variation in FDI and ownership structure.

In other work (see Alquist et al., 2014), we examine whether the quality of matches formed between foreign acquiring firms and target firms, measured by metrics such as the divestiture rate, deteriorate during banking crises. We find little evidence that acquirers from developed markets purchased emerging market firms for the purpose of flipping them after the end of the crisis. Aguiar and Gopinath (2005) also analyze the role of scarce liquidity in EMEs during financial crises and conclude that target liquidity influenced the probability and price of foreign acquisitions during the 1997-98 Asian financial crisis. In contrast, the present paper examines whether scarce liquidity plays a role more generally as a determinant of the likelihood and ownership structure of foreign acquisitions in EMEs, outside of extreme events such as financial crises.[4] Furthermore, we examine whether variation in the level of domestic financial development and its interaction with the determinants of industry-level liquidity explain the patterns of FDI we observe in the data.

The present paper is related to the broader literature on FDI, cross border M&As, capital flows, and the effects of financial development. First, it provides a theoretical framework to analyze the market for corporate control when there is industry-level variation in the debt capacity of target firms, and evidence in support of the liquidity channel as a rationale for FDI. Most of the theoretical literature on cross border M&As so far has focused on entry mode and location decisions of foreign firms (Nocke and Yeaple, 2007, 2008). Our paper complements this literature by identifying industry-level liquidity as a key determinant of the likelihood of FDI. While the empirical results suggest that this mechanism is likely to be most important for countries at the lower end of financial development, the point that target liquidity matters for FDI is more general.

Second, it provides evidence in favor of industry-level determinants of capital flows in general and cross-border M&As in particular. While the determinants of cross-border M&A along the

[4]We also introduce a local input as an additional factor of production as in Asiedu and Esfahani (2001). This assumption permits us to analyze the link between ownership structure and industry-level liquidity in a contracting framework. Asiedu and Esfahani (2001) study the technological and institutional determinants of foreign ownership in FDI projects. They find that foreign ownership increases with the importance of the assets provided by the foreign investor and declines with the contribution of local assets. They also find that government taxation policies aimed at retaining the surplus from FDI domestically and local institutions that complement particular inputs are important country level determinants of ownership structure. In contrast to that paper, our focus is on the determinants of foreign acquisitions that are related to industry-level liquidity and domestic financial development.

country and time dimension are well documented empirically (see, for example Moeller et al., 2005; Erel et al., 2012), to the best of our knowledge this paper is the first to provide empirical evidence on the importance of industry-level factors in cross-border M&As. In this regard, our theoretical model of FDI complements that of authors such as Jin (2012), who identifies industrial structure as a determinant of portfolio capital flows.

Third, the paper contributes both theoretically and empirically to the literature on the boundaries of multinational corporations (MNCs). A number of papers explore trade- and technology-related determinants of FDI and the MNCs (see Brainard, 1997; Antràs, 2003; Antràs et al., 2009, for example). In contrast to these papers, we derive a model that links the ownership structure chosen in foreign acquisitions to industry-level liquidity. Our empirical analysis shows that the relative importance of the liquidity channel is at least as important as the other industry-level determinants that have been identified in the literature. The results indicate that the liquidity channel we identify is at least as quantitatively important as these other factors in the context of emerging markets. Finally, the paper contributes to the recent literature in international economics that examines the interaction of firm-level credit constraints (Berman and Héricourt, 2010) and domestic financial development (Beck, 2002; Manova, 2008) by providing evidence that financial development has the sharpest effects on brownfield FDI flows in external finance dependent and intangible sectors.

To the best of our knowledge this paper is one of the first to demonstrate a general role for financial liquidity in determining FDI outside of financial crises (Aguiar and Gopinath, 2005), and complements recent findings in the M&As literature (Almeida et al., 2011; Erel et al., 2014) about the importance of liquidity.[5] Our paper also has a number of implications for sectoral technology diffusion, investment, and growth in countries at the lower end of financial development. Our results suggest that financial liquidity may be a more important determinant of FDI in emerging and developing economies than previously supposed. This finding is especially significant because developing economies are now the recipients of the majority of total FDI inflows.[6] External finance dependent and intangible sectors are most likely to be recipients of such liquidity-driven FDI when markets for corporate control are opened up in developing economies. Since existing evidence from emerging economies (see Yasar and Morrison Paul, 2007; Blalock and Gertler, 2008; Arnold and

[5] Almeida et al. (2011) present a model in which financially distressed firms are acquired by liquid firms. The primary motivation of the acquirers is to reallocate liquidity to firms that may otherwise be inefficiently terminated. Almeida et al. (2011) focus on the optimal financial policies of firms that have the opportunity to acquire illiquid firms within the same industry. In related work, Erel et al. (2014) provide evidence that acquisitions ease financial frictions in target firms. Using a sample of 5,187 European acquisitions occurring between 2001 and 2008, they find that the level of cash that target firms hold, the sensitivity of cash to cash flow, and the sensitivity of investment to cash flow all decline significantly, while investment significantly increases following an acquisition.

[6] According to the latest World Investment Report (UNCTAD, 2014) FDI to developing economies reached a new high of 778 billion USD or 54% of total FDI inflows. Brownfield FDI flows in the form of cross-border M&As have been an important source of financing for developing economies, peaking at about 152 billion USD or 31% of total FDI to these countries in 2007. M&A activity dropped sharply during the years after 2007 due to the Great Recession, but has been picking up again lately and stood at 113 billion USD in 2013. The data are from the 2005, 2008, and 2014 editions of the World Investment Report (see UNCTAD, 2005, 2008, 2014)

Javorcik, 2009, for example) show large and persistent increases in productivity, investment, and wages in acquired firms after foreign acquisitions, such sectors are most likely to reap the direct benefits of the international diffusion of technology and management practices through MNCs. On the other hand, since larger foreign stakes, as well as full foreign ownership, are found to be more common in such sectors, the indirect benefits of technology spillovers through backward linkages to domestic firms are likely to be lower in these sectors (Javorcik, 2004).[7]

The rest of the paper is organized as follows. We describe some of the prominent features of corporate acquisitions in the manufacturing sector of emerging markets in Section 2. We then derive the implications of the model of liquidity-driven FDI in Section 3. Section 4 reports the results of the regressions that we estimate to test the models predictions. Section 5 concludes.

2 Stylized Facts

In this section, we illustrate two prominent features of foreign acquisitions of manufacturing firms located in emerging markets — the substantial cross-industry variation in both the likelihood of a foreign acquisition and its average size.

2.1 Data Description

The data are from a sample of foreign acquisitions that occurred in fifteen emerging-market economies between 1990 and 2007.[8] We end the sample in 2007 because the period from 2008 onward was one during which the acquirers based in the developed markets faced liquidity constraints. The post-2007 period is not ideal for testing the theory because it assumes that, unlike the emerging-market targets, foreign acquirers are not liquidity constrained.

Table 1 shows manufacturing-sector acquisitions by the country in which a target is located. The data set contains a total of 9,832 transactions of which the largest number of acquisitions occur in China, Malaysia, India, South Korea and Brazil. Over the sample period, more than 70% of acquisitions occurred in Asia and about 23% in Latin America. Historically, up to 40% of the transactions in the manufacturing sector in Asia included a foreign acquirer, but more recently that share has declined to about 25%. About half of the transactions in the manufacturing sector in

[7] Javorcik (2004) in a firm-level study in Lithuania finds positive productivity spillovers from FDI through contacts between foreign affiliates and their local suppliers in upstream sectors, but only for projects with shared domestic and foreign ownership, not those with fully owned foreign investments.

[8] We use a subset of the data available from the Securities Data Company (SDC) Thompson's International Mergers and Acquisitions database, which reports public and private merger and acquisition transactions involving at least a 5% ownership stake in the target company. This database is described in more detail in Alquist et al. (2014). The database is an exhaustive list of the mergers and acquisitions that occurred in these countries. The information on the transactions is obtained from a variety of news sources, regulatory agencies, trade publications, and surveys. The data thus include all of the domestic and foreign acquisitions that occurred in the SIC industry codes 2000-4000 between 1990 and 2007 in one of fifteen emerging markets: Argentina, Brazil, Chile, China, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Singapore, South Africa, South Korea, Thailand and Vietnam.

Latin America involved a foreign acquirer. In total, foreign acquisitions in manufacturing account for 30-40% of the corporate transactions in the sample.

The breakdown of foreign acquirers by the country of origin is shown in Table 2. Over the sample period, the United States accounts for 34% of foreign acquisitions, Europe another 38%, and Asia about 20%. About 98% of the foreign transactions in the manufacturing sector involve an acquirer from a developed economy.[9]

Table 3a shows the composition of domestic and foreign acquirers by one-digit SIC category. Most of the acquisitions of targets in the manufacturing sector are undertaken by foreign firms that are either in the manufacturing sector or in the finance, insurance and real estate (FIRE) sector. About 72% of the foreign acquirers are manufacturing firms and another 17% are in the FIRE sector. The pattern is similar for domestic acquisitions, but the FIRE sector represents a larger share (30.8%) of domestic acquisitions compared with foreign ones.

2.2 Two Key Patterns

Table 3b illustrates the first of two key patterns that we identify in these data — namely, that there is wide variation across industries in the share of foreign acquirers. The table reports both the number and the share of domestic and foreign acquisitions by the target's industrial sector at the two-digit level. Foreign acquisitions are the most common in tobacco, transportation, and the measuring, analyzing and controlling instruments sector. Foreign acquisitions account for more than 40% of the total number of acquisitions in these sectors. Foreign acquisitions are the least common in the leather, lumber, and furniture sectors. They represent between 17% and 19% of acquisitions in these sectors. Overall, foreign acquisitions represent about one-third (35%) of total (foreign and domestic) acquisitions in the manufacturing sector.

Table 4a shows that partial acquisitions are an important characteristic of the data, a feature of acquisitions in emerging markets that we documented for a wider range of industries in Alquist et al. (2014). Slightly less than 50% of the foreign acquisitions in the sample are partial acquisitions in the sense that the acquirer purchases less than 100% of the firm. About 57% of the domestic acquisitions are partial acquisitions. More generally, foreign acquirers tend to purchase larger stakes than domestic acquirers in the manufacturing sector: About 75% of the foreign acquisitions involve the purchase of at least a 50% stake in the target, whereas about 68% of the domestic acquisitions do.

Table 4b shows the second main stylized fact: The ownership structure chosen by foreign firms varies considerably across industries. Table 4b reports the mean and median share acquired for domestic and foreign acquisitions. While there is substantial variation in both the mean and median share acquired within foreign acquisitions, there are fewer differences along this dimension between

[9] We removed the acquisitions that occurred between target countries within the sample. Such transactions account for a tiny share of foreign acquisitions.

foreign and domestic acquisitions. For foreign acquisitions, the mean and the median share acquired range between 47% and 74% and 35% and 100%, respectively. The shares for domestic acquisitions are similar.

Taken together, these tables reveal two broad patterns about the industry-level variation in foreign acquisitions in emerging markets. First, the share of foreign acquisitions in the total number of acquisitions varies across industries. Second, the share acquired in foreign acquisitions also varies across industries. This evidence suggests the importance of industry-level determinants of foreign acquisitions that appear to matter above and beyond the country- and time-level determinants of such acquisitions that have been explored in the related literature (see Moeller et al., 2005; Erel et al., 2012, for example). The model in the next section provides a framework for thinking about the determinants of this cross-industry variation in the likelihood and size of foreign acquisitions. In particular, it relates these two variables to the industry-level variation in external finance dependence and asset tangibility.

3 A Model of Liquidity-Driven FDI

In this section we develop a theoretical model of liquidity-driven M&As based on Alquist et al. (2014) and Aguiar and Gopinath (2005) in which industries differ in their degree of external finance dependence and the tangibility of their assets.[10] We first define the concepts of asset tangibility and external finance dependence in the context of the model and set up the production decisions of a firm under domestic control. We then characterize the conditions under which a full foreign acquisition is feasible and optimal, and demonstrate the effect of varying the asset tangibility and external finance dependence of a sector. We then solve for the ownership structure chosen by foreign firms, adapting the optimal contracting models of shared input provision as in Eswaran and Kotwal (1985) and Asiedu and Esfahani (2001) to study the effect of external finance dependence and asset tangibility on this decision. We conclude by analyzing the effect of domestic financial development.

3.1 Definitions and Domestic Firm's Problem

The unit of analysis is firm i in industry j. There are two periods labeled $t = 1, 2$. We abstract from the production decision in period 1 and focus on the investment decision in period 1 and the production decision in period 2. Production in period 2 utilizes capital, $K_{ij,2}$, and a "local" input that we label $L_{ij,2}$. Investment in capital has to be made one period in advance. Domestic agents have an absolute advantage in providing the local input. This advantage may be due to better knowledge of local labor and product markets, political connections, or a domestic bias in

[10] We take the mode of entry decision (greenfield versus acquisition), that is the subject of papers like Nocke and Yeaple (2007, 2008) as given.

the preferences of bureaucrats or regulators. The local input can be procured at a price p^D by the domestic agent. It is convenient to assume that procurement contracts for the local input are drawn up in period 1 itself but payment can be deferred till revenues are realized in period 2.[11] This lets us focus on investment in physical capital as being constrained by debt limits and internal funds.

At the start of period 1, a fully domestically owned firm i in industry j is characterized by a borrowing constraint $\bar{D}_{ij}$, and period 1 profits $\pi_{ij,1}$. The amount of liquidity available to the firm, l_{ij}, is defined as $l_{ij} \equiv \bar{D}_{ij} + \pi_{ij,1} \in [\underline{l}, \bar{l}]$. In period 1, the firm chooses its optimal investment I_{ij} subject to the borrowing constraint and anticipated period 2 productivity, $A_{ij,2}$. Capital fully depreciates within a period and hence the capital stock in period 1, $K_{ij,1}$ does not enter into the analysis. An industry j in the model is characterized by two attributes — the tangibility of its assets and the extent of its dependence on external financing. These concepts are clarified below.

Under the assumption of the inalienability of human capital (see Hart and Moore, 1994), the maximum value that can be pledged to outside creditors is the value of the original investment. The idea is that the entrepreneur cannot commit not to withdraw her human capital from the project due the inalienable nature of human capital. We assume that liquidation in the state of default only yields a proportion of the original investment value due to country- and industry-specific transaction costs (see Almeida and Campello, 2007, for example). Specifically, if a firm's physical assets are seized by its creditors in period 2, only a fraction $\tau_{jc} \in (0, 1)$ of I_{ij} can be recovered. Thus, the firm faces a borrowing constraint,

$$\bar{D}_{ij} \leq \tau_{jc} I_{ij}. \tag{3.1}$$

Because the firm has an amount $\pi_{ij,1}$ of first period profits (or internal funds) available for investment, we have $I_{ij} \leq \bar{D}_{ij} + \pi_{ij,1} \equiv l_{ij}$. Substituting the borrowing constraint $\bar{D}_{ij}$ in terms of τ_{jc} and I_{ij} we have

$$I_{ij} \leq \frac{\pi_{ij,1}}{(1 - \tau_{jc})} \equiv l_{ij}. \tag{3.2}$$

This constraint has an intuitive form. When $\tau_{jc} = 0$, an industry has no tangible assets that can be used as collateral. In this case, investment is limited to the cash flows in period 1, $\pi_{j,1}$. When $\tau_{jc} = 1$, all assets in an industry can be used as collateral. In this case there is no upper bound to investment and a firm in the industry can borrow up to its full investment need.

τ_{jc} is made up of a country component τ_c and an industry component τ_j. We assume that $\tau_{jc} = \tau_c + \tau_j$ for analytical simplicity. The parameter τ_c captures the financial development of a country. τ_j, the tangibility of the firm's assets, is assumed to be industry specific and determined by technological factors unique to particular industries. Since $\tau_{jc} = \tau_c + \tau_j$, domestic financial

[11] This timing assumption lets us analyze the input provision problem for the foreign acquirer and the domestic co-owner in a later section as a simultaneous one in the case of partial ownership.

development can substitute for the tangibility of an industry's assets.[12] The ordering of country-industry pairs in terms of financial development and asset tangibility is determined as follows.

Definition 1 *Country c is more financially developed than country c' if $\tau_c > \tau_{c'}$. Sector j is more tangible than sector j' if $\tau_j > \tau_{j'}$.*

We henceforth suppress firm subscript i for notational simplicity. Let α_j denote the amount of foreign ownership in a domestic firm. The value of the firm under full domestic ownership ($\alpha_j = 0$) in industry j, $V_j^{D,0}$, can be expressed as

$$V_j^{D,0} \equiv \max_{I_j,\ L_j} \{\pi_{j,1} - I_j + A_{j,2}F(I_j, L_j) - p^D L_j\} \tag{3.3}$$

subject to

$$I_j \leq \frac{\pi_{j,1}}{(1-\tau_{jc})} \equiv l_j$$

where L_j is the amount of local input used in production, $F' > 0$, and $F'' < 0$. The profits in the first period $\pi_{j,1}$ are used for investment, I_j. If $I_j > \pi_{j,1}$, then investment is financed by debt up to the borrowing limit $\frac{\pi_{j,1}}{(1-\tau_{jc})}$. Output, $A_{j,2}F(I_j)$, net of the cost of the local inputs, $p^D L_j$, comprises profits in the second period. The value $V_j^{D,0}$ depends on $\pi_{j,1}$ and τ_{jc} when the liquidity constraint binds, and represents the outside option of the domestic firm in the sense that it is the minimum payoff guaranteed to its owners whether or not it becomes the target of a successful foreign acquisition. An important property of $V_j^{D,0}$, that we utilize later, is that it is increasing in l_j when the firm's optimal level of investment is greater than available liquidity l_j so that the liquidity constraint binds.

Lemma 1 *$V_j^{D,0}$ is increasing in $\pi_{j,1}$ and τ_{jc} when the liquidity constraint binds.*

Proof: See Appendix. ■

Lemma 1 suggests that variation in τ_{jc}, or the average $\pi_{j,1}$, across sectors of the economy will lead to variation in the outside option of domestic owners across sectors. In particular, sectors with higher τ_{jc} or average $\pi_{j,1}$ will have higher $V_j^{D,0}$ on average.

The need for external financing of a domestic firm in industry j is given by $I_j - \pi_{j,1}$. The quantities I_j and $\pi_{j,1}$ in the domestic firm's maximization problem above correspond closely to the

[12] To judge the plausibility of this formulation, think of the polar case of a firm in an industry with little or no tangible assets located in a country with a well-developed financial market, for example, a software startup in Silicon Valley. This firm is more likely to be able to find adequate financing to cover its investment needs than the same firm in India, which would be forced to rely more on internally generated funds, or the wealth of firm insiders. In the case of the US, financial development both substitutes for industry tangibility by in the sense that a greater fraction of the final investment of the firm may be financed even though its assets are mostly intangible, while enhancing the pledgability of the few tangible assets that such a firm might have.

concepts of capital expenditures and cash flow from operations that the seminal empirical work of Rajan and Zingales (1998) uses to define external finance dependence. In principle, external finance dependence can arise out of any mismatch between I_j and $\pi_{j,1}$, either because I_j is relatively high, or $\pi_{j,1}$ relatively low. We assume that differences in external finance dependence across industries are due to variation in cash flow from operations in the first period rather than investment requirements for the second period.[13] Thus an external finance dependent sector in the model is one which has lower first period cash flow, $\pi_{j,1}$. Note that industries that have lower $\pi_{j,1}$, are also ceteris paribus less liquid because $l_j \equiv \pi_{j,1} + \bar{D}$. More precisely[14]:

Definition 2 *Sector j is more external finance dependent than sector j' if $P_{j'}(\pi_1)$ first order stochastically dominates (f.o.s.d.)) $P_j(\pi_1)$, i.e., $P_{j'}(\pi_1) \leq P_j(\pi_1)\ \forall \pi_1$ in any state of nature, where P_j and $P_{j'}$ are the cumulative distribution functions of first period profit, π_1, in industry j and j', respectively.*

This definition of external finance dependence implies the weaker condition, higher *median* external finance dependence, that Rajan and Zingales (1998) use to identify relatively external finance dependent sectors. Lemma 1 thus implies that domestic firms in external finance dependent sectors will have a lower value $V_j^{D,0}$ on average.

Abusing notation slightly, let the function $G_j(l)$, defined over $l \in [\underline{l}, \bar{l}]$, denote the cumulative distribution function of liquidity across domestic firms in industry j, conditional on a particular value of asset tangibility. Because $l_j \equiv \pi_{j,1} + \bar{D}_j = \frac{\pi_{j,1}}{(1-\tau_{jc})}$, there is a one-to-one correspondence between the distribution of first period profits which defines the external finance dependence of a sector, and the distributions of liquidity. In particular, conditional on a given value of asset tangibility, τ_{jc}, if $P_{j'}(\pi_1)$ f.o.s.d. $P_j(\pi_1)$ then $G_{j'}(l_j)$ also f.o.s.d. $G_j(l_j)$, i.e., $G_{j'}(l_j) \leq G_j(l_j)\ \forall\ l_j$ (see Hadar and Russell, 1969, 1971). Here G_j and $G_{j'}$ are the cumulative distribution functions of liquidity in two sectors j and j' that have the same τ_{jc} but differ in their external finance dependence. In words, a sector that is more external finance dependent in the sense of the definition (sector j), will also have a cumulative distribution of *liquidity* across firms that lies to the left of the liquidity distribution in a sector that is less external finance dependent(sector j').

Continuing the convenient abuse of notation, now consider the liquidity distributions in two industries, j and j', that differ only in their asset tangibility. Because $l_j = \frac{\pi_{j,1}}{(1-\tau_{jc})}$, for the same distribution of $\pi_{j,1}$ (which defines external finance dependence), the industry with higher asset tangibility will also have higher values of liquidity. In particular, for a given firm level distribution

[13] In the model, differences in investment needs across industries can only be due to differences in productivity. Thus more external finance dependent industries would have to be more productive, which seems unnatural. Higher investment needs could also be due to higher fixed costs, which would be straightforward to introduce into the model, but would be equivalent to lower first period profits. We thus view differences in first period cash flow as a simple and accurate way to model the origin of industry variation in the need for external finance.

[14] The random variable x first-order stochastically dominates (f.o.s.d.) the random variable x' if $B(a) \leq C(a)\ \forall\ a$, where $B(x)$ and $C(x')$ are the cumulative distribution functions of x and x' respectively.

of first period profits the industry j with the higher asset tangibility, will have $G_j(l_j)$ f.o.s.d. $G_{j'}(l_j)$, i.e., $G_j(l_j) \leq G_j(l'_j)\ \forall\ l_j$. Here G_j and $G_{j'}$ are the cumulative distribution functions of liquidity in two sectors j and j' with $\tau_j > \tau_{j'}$. In words, a sector that has more tangible assets will have a cumulative distribution of liquidity across firms that lies to the right of the liquidity distribution in a sector that has fewer tangible assets.

It is worth noting here that an increase in the parameter τ_c has the effect of increasing the tangibility of assets across all sectors j of the economy since $\tau_{jc} = \tau_c + \tau_j$. Hence financial development, captured by an increase in τ_c, will lead to a shift in liquidity distributions in all sectors of the economy towards higher liquidity values. Thus the liquidity distribution of sector j in a financially developed country will stochastically dominate the liquidity distribution in the same sector j in a less financially developed country. The precise magnitude of this shift will be parameterized in a later section using a Pareto distribution for sectoral liquidity.

3.2 Foreign Acquiring Firm's Problem Under Full Ownership

With the important concepts defined, we now describe the problem of the foreign acquiring firm. We assume that foreign acquiring firms are financially unconstrained due to greater access to external or internal funds, and can manage firms more efficiently than domestic owners.[15] A foreign firm can buy a share, α_j, in the industry j domestic target , where $\alpha_j \in [0, 1]$. When the firm is acquired in its entirety ($\alpha_j = 1$), the foreigner has to procure the local input L_j herself and pays a price $p^F > p^D$ due to her absolute disadvantage in its procurement. The acquisition of any positive share of ownership requires a fixed cost Γ, interpreted as search costs. The productivity of the firm under the foreign owner is $\phi A_{j,2}$, with $\phi > 1$. There is no uncertainty or asymmetric information about ϕ and Γ. The value of a domestic firm in industry j under full foreign ownership ($\alpha_j = 1$) is given by

$$V_j^{F,1} \equiv \max_{I_j,\ L_j} \{\pi_{j,1} - I_j + \phi A_{j,2} F(I_j, L_j) - p^F L_j - \Gamma\}. \tag{3.4}$$

Let $V_j^{D,1}$ be the payoff to the domestic owner of the firm when the foreign entity acquires it fully. This payoff has to be at least $V_j^{D,0}$, so that

$$V_j^{D,1} \geq V_j^{D,0} \tag{3.5}$$

to ensure the participation of the domestic owner in the full acquisition. If S_j^1 is the surplus generated from a full acquisition, defined as

$$S_j^1 \equiv V_j^{F,1} - V_j^{D,0}, \tag{3.6}$$

a full foreign acquisition is feasible and optimal when $S_j^1 \geq 0$, and the participation constraint

[15] 98% of the acquiring firms in our sample come from countries with well-developed financial markets.

of the domestic owner is satisfied, i.e., the domestic owner gets a positive fraction of S_j^1. We first graphically examine the conditions under which foreign acquisitions take place for the simpler case of $\alpha_j = 1$. This provides all the necessary intuition about the link between the likelihood of a foreign acquisition and the target's liquidity without the confounding effects of the price differential $P^F - P^D$ that the foreign firm must take into account while choosing between full and partial ownership. We analyze the determination of α_j in a later section.

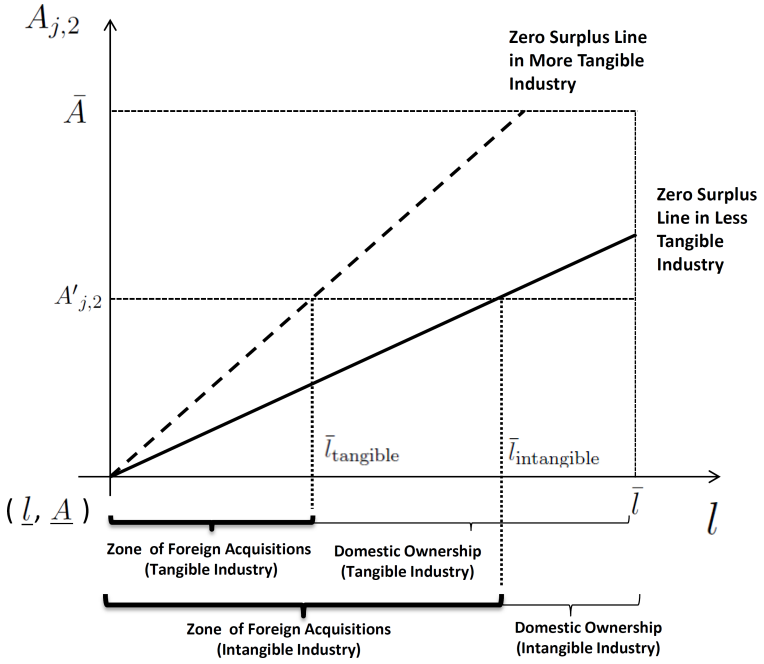

Figure 1: Zone of Foreign Acquisition with Different Asset Tangibility

Notes: Liquidity is plotted on the horizontal axis and second period productivity on the vertical axis. The dotted line plots the locus of points that yield zero surplus for foreign acquisitions in tangible industries. The solid line shows the same locus for intangible industries. The supports of liquidity and productivity are $[\underline{l}, \bar{l}]$ and $[\underline{A}, \bar{A}]$. The figure also shows the cut-offs $\bar{l}_{\text{intangible}}$ and $\bar{l}_{\text{tangible}}$ as functions of an arbitrary level of productivity $A'_{j,2}$, as described in the text.

Figure 1 plots the locus of points which yield zero surplus for a full foreign acquisition ($S_j^1 = 0$) for two industries with different levels of asset tangibility. The horizontal and vertical axes show the liquidity and productivity levels of the target. The zero-surplus line for the industry with the higher tangibility is distinguished by the dotted line, while the solid line shows the industry with lower tangibility.[16] For any given level of productivity $A'_{j,2}$, we can then define a sequence of liquidity

[16]The upward slopes of the $S_j^1 = V_j^{F,1} - V_j^{D,0} = 0$ lines are a reflection of two assumptions. First, the higher productivity multiple $\phi > 1$ for the foreign firm means that $V_j^{F,1}$ increases faster than $V_j^{D,0}$ when productivity is higher. Second, the foreign firm being financially unconstrained means that $V_j^{F,1}$ is independent of the target's liquidity, while the domestic firm being financially constrained means that $V_j^{D,0}$ is increasing in liquidity (since greater liquidity allows the domestic firm to be closer to its optimal investment level). In essence, then, the upward slope of

cut-offs $\bar{l}_j$ indexed by industry, depending on the asset tangibility of the industry. In particular, Figure 1 shows two such cut-offs $\bar{l}_j$, with $j = \{\text{tangible, intangible}\}$. These cut-offs depict which firms in the two industries shall remain under domestic control, and which shall pass into foreign hands. Of all the firms with productivity $A'_{j,2}$, those above $\bar{l}_{\text{tangible}}$ and $\bar{l}_{\text{intangible}}$ optimally remain under domestic control in the tangible and intangible industry respectively, because $S_j^1 \geq 0$ when l lies above these cut-offs. Those below $\bar{l}_{\text{tangible}}$ and $\bar{l}_{\text{intangible}}$ pass optimally into foreign control in tangible and intangible industries respectively, because $S_j^1 \geq 0$ if l lies in those regions. Targets in this case have insufficient liquidity to exceed the surplus of a foreign acquirer.

To summarize the main insights of this section, target firms that have liquidity in the interval $l \in [\underline{l}, \bar{l}_{\text{tangible}}]$ become the targets of foreign acquisitions in industries with tangible assets; in intangible industries, the relevant liquidity region is $l \in [\underline{l}, \bar{l}_{\text{intangible}}]$. Of particular significance is the relative position of these two cut-offs: $\bar{l}_{\text{tangible}} < \bar{l}_{\text{intangible}}$.

One final point to note here is that since $\tau_{jc} = \tau_c + \tau_j$, an increase in the parameter τ_c has the effect of increasing the tangibility of assets across all sectors j of the economy. Hence financial development, captured by an increase in τ_c, will have the effect of lowering the cut-offs $\bar{l}_j$ in all industries.

3.3 Sectoral Differences in the Likelihood of Foreign Acquisitions

In this section, we explore the effect of the external finance dependence and asset tangibility of a sector on the likelihood of a foreign acquisition in that sector. Because the analysis is conducted for a country with a given level of domestic financial development, τ_c, we dispense with the country subscript in τ_{jc} in this section. Also, the theoretical results on the effect of external finance dependence take the level of asset tangibility as fixed, and vice versa. This is done so that the predictions of the model can be matched closely to our empirical analysis where we control for both these variables in the regressions, and are thus interested in their partial effects on the dependent variables of interest.

As noted before, $G_j(l)$ denotes the cumulative distribution function of liquidity across domestic firms in industry j, conditional on a particular value of asset tangibility τ_j. We define N_j as

the $S_j^1 = 0$ lines shows that the divergence between $V_j^{F,1}$ and $V_j^{D,0}$ caused by marginal increases in productivity has to be compensated by higher liquidity to keep S_j^1 fixed at 0. The relative slopes of the $S_j^1 = 0$ lines for the tangible and intangible industry can be understood as follows. Recall that the target firm under domestic ownership faces a constraint on its investment, $(1 - \tau_{jc})I_{ij} \leq \pi_{j,1}$, that depends on τ_{jc}. In particular, a firm characterized by a higher τ_{jc} is less likely to be facing a binding constraint, for any value of its productivity. Thus the value under domestic ownership, $V_j^{D,0}$, is higher for firms with higher τ_{jc}. Thus the $S_j^1 = 0$ line for an tangible industry lies to the left of that for an intangible industry because a domestic firm in a tangible industry needs a lower level of liquidity (which means a lower first period profit in this set up) to make the same level of investment. In other words, $V_j^{D,0}$ rises faster in liquidity for an industry with greater asset tangibility because more of that liquidity can be pledged to financiers, enabling higher investment. Thus, the increment in liquidity required by a domestic firm to match $V_j^{F,1}$ is lower for a firm in a tangible industry. Hence the slope of the $S_j^1 = 0$ is steeper for a tangible industry than for an intangible industry.

the proportion of firms acquired by foreigners when the industry distribution of liquidity is G_j, conditional on a value of asset tangibility. That is,

$$N_j = \int_{\underline{l}}^{\bar{l}_j} dG_j(l). \tag{3.7}$$

The upper limit of the integral, $\bar{l}_j$, which is the liquidity value below which foreign acquisitions are feasible and optimal in industry j, depends on asset tangibility as shown in the previous section. Note that N_j will differ across industries with different external finance dependence, holding fixed the asset tangibility, because $G_j(l)$ differs across these industries.

We first derive the relationship between the likelihood of a foreign acquisition and the external finance dependence of a sector by considering two sectors j and j', where the first is more external finance dependent. We find that a greater proportion of firms in industry j will be acquired by foreign firms than in industry j'.

Proposition 1 ***More foreign acquisitions in external finance dependent sectors***
For any two sectors j and j', if $P_{j'}(\pi_1)$ f.o.s.d. $P_j(\pi_1)$ then $N_j \geq N_{j'}$.

The likelihood of a foreign acquisition is higher in a sector of the economy that is more dependent on external finance.

Proof: Follows from a simple application of the definition of first order stochastic dominance. Because $G_{j'}(l_j) \leq G_j(l_j) \; \forall \; l_j$, $N_j - N_{j'} = \int_{\underline{l}}^{\bar{l}_j} dG_j(l) - \int_{\underline{l}}^{\bar{l}_j} dG_{j'}(l) = \Big(G_j(l_j) - G_{j'}(l_j)\Big) \geq 0$. ■

The intuition for this result is apparent from Figure 2. The liquidity cut-off $\bar{l}_j$ is fixed for a given degree of asset tangibility of a sector, while the liquidity distributions, $G_{j'}(l_j)$ f.o.s.d. $G_j(l_j)$, differ across the two industries. The vertical intercepts of the curves G_j and $G_{j'}$ at the cut-off $\bar{l}_j$ shows the mass of foreign acquisitions in the two industries. As is apparent, $N_j \geq N_{j'}$. Thus, there are a greater proportion of foreign acquisitions in external finance dependent sectors. A more external finance dependent sector has a larger mass of target firms at lower values of liquidity because $P_{j'}(\pi_1)$ f.o.s.d. $P_j(\pi_1)$. Because foreign acquirers buy firms that are liquidity constrained, they are more likely to buy in sectors that are external finance dependent.

Next, we show that there is a negative relationship between the mass of foreign acquisitions in a sector and the degree of tangibility of that sector's assets. Formally,

Proposition 2 ***Fewer foreign acquisitions in tangible sectors***
For any two sectors j and j', if $\tau_j \geq \tau_{j'}$ then $N_j \leq N_{j'}$.

The likelihood of a foreign acquisition is higher in a sector of the economy that has fewer tangible assets.

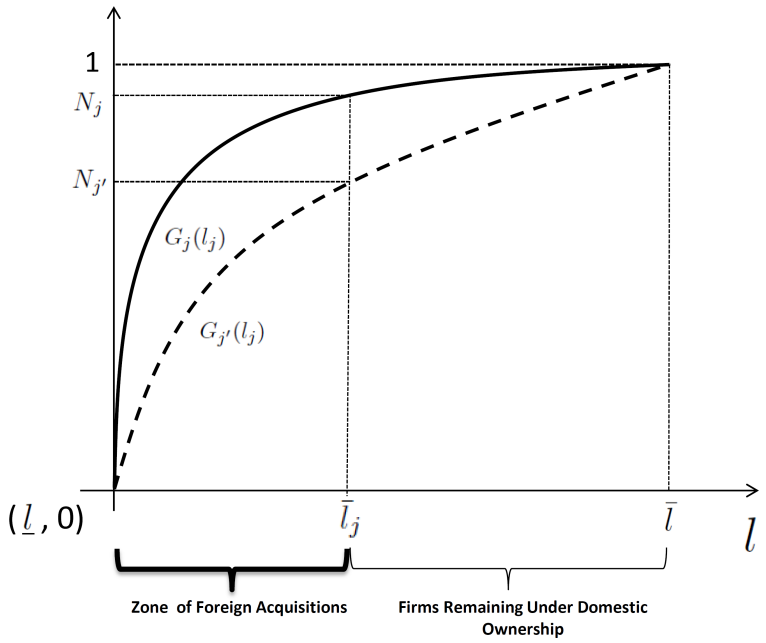

Figure 2: More foreign acquisitions in external finance dependent sectors

Notes: Liquidity is plotted on the horizontal axis and the corresponding cumulative proportion of domestic firms on the vertical axis. The figure shows the liquidity cut-off $\bar{l}_j$ conditional on the level of asset tangibility and an arbitrary productivity $A'_{j,2}$, as described in the text. The solid line $G_j(l_j)$ shows the cumulative distribution of domestic firm liquidity in a more external finance dependent industry j, while the dotted line $G_{j'}(l_j)$ shows the same distribution for a less external finance dependent industry j'. The support of liquidity is $[\underline{l}, \bar{l}]$.

Proof: Follows from the observation that if $\tau_j \geq \tau_{j'}$, then $\bar{l}_j \leq \bar{l}_{j'}$ and $G_j(l_j) \leq G_{j'}(l_j)\ \forall\ l_j$. Then, $N_j - N_{j'} = \int_{\underline{l}}^{\bar{l}_j} dG_j(l) - \int_{\underline{l}}^{\bar{l}_{j'}} dG_{j'}(l) = \int_{\underline{l}}^{\bar{l}_j} dG_j(l) - \int_{\underline{l}}^{\bar{l}_{j'}} dG_j(l) + \int_{\underline{l}}^{\bar{l}_{j'}} dG_j(l) - \int_{\underline{l}}^{\bar{l}_{j'}} dG_{j'}(l) = \left(G_j(\bar{l}_j) - G_j(\bar{l}_{j'})\right) - \left(G_j(\bar{l}_{j'}) - G_{j'}(\bar{l}_{j'})\right) \leq 0.$ ■

The intuition for this result can be easily grasped by inspecting Figure 3, which shows the liquidity cut-offs for tangible and intangible sectors derived in the previous section. For simplicity, the diagram only shows the cumulative distribution of firm level liquidity G_j for the tangible sector. Assume for the moment that G_j is the same in the two industries. The vertical intercepts of the curve G_j at the two cut-offs then show the mass of foreign acquisitions in the two industries. As is apparent, $N_j \leq N_{j'}$ in this case. This distance is the first term, $\left(G_j(\bar{l}_j) - G_j(\bar{l}_{j'})\right)$, in the last equality of the proof. In addition, since the cumulative distribution of firm liquidity in the intangible sector itself lies to the left of that in the tangible sector, the number of foreign acquisitions is even higher than shown in the diagram. The intuition for this result is that domestic firms with more tangible assets are less likely to be liquidity constrained, and hence less likely to be acquired by foreign firms.

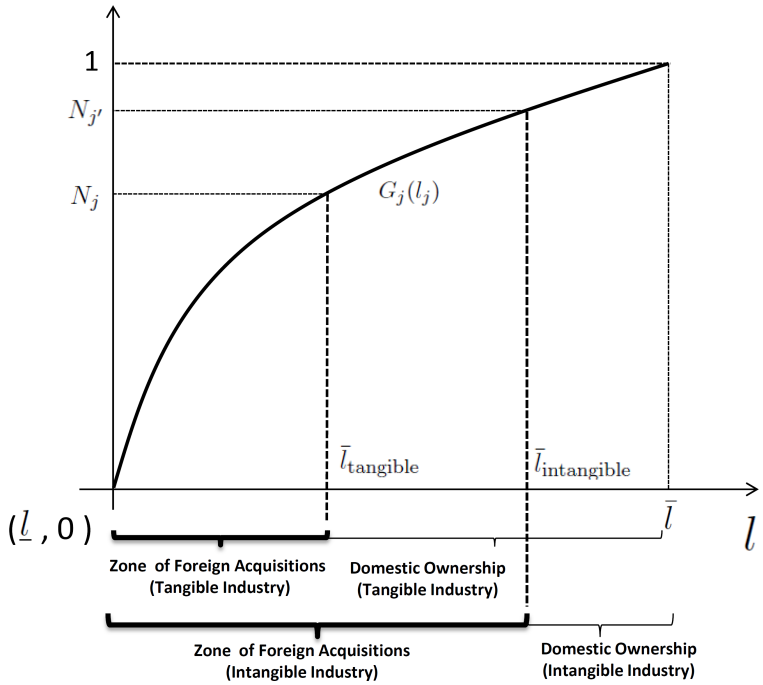

Figure 3: Fewer foreign acquisitions in tangible sectors

Notes: Liquidity is plotted on the horizontal axis and the corresponding cumulative proportion of domestic firms on the vertical axis. The figure shows the cut-offs $\bar{l}_{\text{intangible}}$ and $\bar{l}_{\text{tangible}}$ conditional on an arbitrary level of productivity $A'_{j,2}$, as described in the text. The solid line $G_j(l_j)$ shows the cumulative distribution of domestic firm liquidity, which is assumed to be the same for the tangible and intangible industry. The support of liquidity is $[\underline{l}, \bar{l}]$.

3.4 Sectoral Differences in Foreign Ownership Structure

In this section we embed the models of contracting and ownership under joint provision of inputs (see Eswaran and Kotwal, 1985; Asiedu and Esfahani, 2001, for example) in our setup of liquidity constrained target firms to study the optimal ownership structure chosen by foreign acquirers.[17] The foreign firm might choose to acquire partial ownership because it finds direct procurement of the local input at the price p^F too costly. In this case, it buys a share $\alpha_j < 1$ of the domestic firm in industry j, while the remaining share $(1 - \alpha_j)$ is retained by the domestic owner. The domestic owner is assumed to provide all of the local input, L_j, which it procures at a price $p^D < p^F$, for any $(1 - \alpha_j) > 0$. The foreign owner provides all of the capital, I_j.[18] The foreign firm chooses its own optimal equity stake and the amount to invest. The trade-off it faces is to extract as much

[17] Asiedu and Esfahani (2001) study ownership structure in greenfield FDI projects, focussing on the role of partner-specific inputs in determining ownership structure. The outside option of the domestic firm, which is normalized to zero, does not play any role in their paper. In contrast, the liquidity-dependent outside option of the domestic owner is central to our analysis and results.

[18] Extending the model to have the inputs provided by both parties in differing shares would be straightforward, but would add complexity without adding much insight.

of the project's surplus as possible while providing the domestic agent enough incentive to provide the local input and give up partial ownership.

Under partial foreign ownership, the payoffs for the foreign entity and the domestic owner are given by

$$R_j^{F,\alpha_j} = -P + \alpha_j\Big(\pi_{j,1} + \phi_j A_{j,2} F(I_j, L_j)\Big) - I_j - \Gamma \tag{3.8}$$

and

$$R_j^{D,\alpha_j} = P + (1-\alpha_j)\Big(\pi_{j,1} + \phi_j A_{j,2} F(I_j, L_j)\Big) - p^D L_j, \tag{3.9}$$

respectively. P is interpreted as the acquisition price paid by the foreign acquirer to the domestic owner.[19] To simplify the problem, we follow Asiedu and Esfahani (2001) in assuming P to be a fixed proportion κ of the foreign acquirer's share in the gross output of the acquired firm, so that

$$P = \kappa\alpha_j\Big(\pi_{j,1} + \phi_j A_{j,2} F(I_j, L_j)\Big). \tag{3.10}$$

The parameter κ can be thought of as summarizing the features of the market for corporate control that affect the price paid in acquisitions, such as the thickness of the market and other institutional or regulatory details.[20]

The timing of the process that takes place within period 1 is as follows. In the first stage, the foreign acquirer offers to buy a share α of the firm for the price P. If the domestic target accepts this offer, we move to the second stage in which investment and local input procurement decisions are made by the foreign and domestic owners respectively. Output is then produced and profits distributed according to equity shares in period 2. Focussing on the two stages in period 1, we work backwards from the second stage involving the input decisions. We assume a non-cooperative input provision game between the foreign acquirer and domestic co-owner and solve for the Nash-equilibrium levels of inputs provided. Since the steps involved are quite standard in the literature (see Eswaran and Kotwal, 1985; Asiedu and Esfahani, 2001), we simply outline these below while relegating the details to the Appendix.

The foreign acquirer maximizes R_j^{F,α_j} with respect to I_j taking L_j as given, while the domestic co-owner maximizes R_j^{D,α_j} with respect to L_j taking I_j as given.[21] The first order conditions to this pair of input choice problems gives reactions functions $I_j = I_j(L_j, \alpha_j)$ and $L_j = L_j(I_j, \alpha_j)$. From these we can solve for the Nash-equilibrium levels of inputs supplied in the form of functions $I_j = I_j(\alpha_j)$ and $L_j = L_j(\alpha_j)$. The optimal inputs provided are functions of the equity stake α_j. Intuitively, these depend on the equity shares because varying ownership of the revenue stream changes the incentives to provide the input. Anticipating this outcome in the second stage, the for-

[19] For any value of P, the sum of the payoffs is equal to the profits of the acquired entity: $R_j^{F,\alpha_j} + R_j^{D,\alpha_j} = \pi_{j,1} + \phi_j A_{j,2} F(I_j, L_j) - p^D L_j - I_j - \Gamma$.

[20] This precise form of the restriction on the acquisition price is assumed for simplicity.

[21] We assume that the domestic co-owner is not liquidity constrained when it provides only the local input because payment for these inputs are expected after the realization of revenues in period 2.

eign acquirer in the first stage takes these incentive compatible input decisions as given and chooses the optimal ownership share, α_j, while satisfying the participation constraint of the domestic owner. Formally, her optimization problem in the first stage can be written as,

$$V_j^{F,\alpha_j} \equiv \max_{\alpha_j} \Big\{ \alpha_j(1-\kappa)\Big(\pi_{j,1} + \phi_j A_{j,2} F(I_j(\alpha_j), L_j(\alpha_j))\Big) - I_j(\alpha_j) - \Gamma \Big\} \tag{3.11}$$

subject to the domestic agent's participation constraint (**PC**),

$$V_j^{D,\alpha_j} \equiv (1-\alpha_j(1-\kappa))\Big(\pi_{j,1} + \phi_j A_{j,2} F(I_j(\alpha_j), L_j(\alpha_j))\Big) - p^D L_j(\alpha_j) \geq V_j^{D,0}. \tag{3.12}$$

Let us first consider the solution of this problem when PC is slack. It is insightful to first examine the case when the domestic firm has no first period profits ($\pi_{j,1} = 0$), and hence no liquidity. In this case, no stand-alone investment is possible by the firm and the value $V_j^{D,0} = 0$. The PC of the domestic agent in this case could be satisfied even for a small effective share ζ. However, we show in the Appendix that in this case it is actually optimal for the domestic agent to be given an effective share $\zeta = \beta_L$, which corresponds to the importance of the local input in production. This result is quite standard in the literature (see Eswaran and Kotwal, 1985; Asiedu and Esfahani, 2001) and arises because each agent has to be motivated to provide inputs through adequate equity shares. If $\pi_{j,1} > 0$, it is actually optimal to lower the share of the domestic agent to $\zeta < \beta_L$. Intuitively, when there are positive first period profits $\pi_{j,1}$ which the acquirer shares, the loss to the foreign acquirer from giving additional stake to the domestic agent is $-\pi_{j,1}$ at the margin. To balance this loss, the acquirer is willing to sacrifice efficiency by lowering the stake of the domestic agent marginally, requiring $\zeta < \beta_L$. Thus in the slack PC case, the effective share of the domestic agent is *falling* in $\pi_{j,1}$. It is shown in the Appendix that this share is insensitive to τ_{jc}. Note here that if the first period profits are kept entirely by the domestic co-owner, we would get the result that the optimal ownership stake chosen by the acquirer is insensitive to $\pi_{j,1}$, since $\pi_{j,1}$ would then not show up in the problem of the acquirer except through lowering the reservation value of the domestic agent by the amount $\pi_{j,1}$.

The more interesting case for our purposes occurs when PC binds. The solution to the problem in this case leads to the following proposition.

Proposition 3 ***Larger foreign stakes in less liquid sectors***
When PC binds, $\frac{\mathrm{d}\alpha}{d\tau_{jc}} < 0$ *and* $\frac{\mathrm{d}\alpha}{d\pi_{j,1}} < 0$.

Larger foreign stakes are more likely in sectors of the economy that are less liquid, i.e., those that are more dependent on external finance and have fewer tangible assets.

Proof: See Appendix. ■

When PC binds, the effective stake ζ given to the domestic owner is higher for higher values of $\pi_{j,1}$ and τ_{jc}. Alternately, the actual share of the foreign acquire, α_j, is lower. The intuition for this result is straightforward. Giving the domestic co-owner a larger equity share amounts to giving her a larger part of the surplus of the acquisition. Since the outside option of retaining full ownership is higher for the domestic owner in sectors that are more liquid, which are the less external finance dependent and tangible sectors (Lemma 1), the domestic owner has to be left with a larger share in these sectors. Alternately, less liquid sectors see larger foreign ownership stakes.

When the local input is a large proportion of the total inputs used in production, PC may be slack at the optimally high share $(1 - \alpha_j)$ necessitated by the importance of the local input. But when the local input is a lower proportion of total inputs, yet the price differential $(p^F - p^D)$ is large so that full foreign ownership is not profitable, the foreign owner is obliged to transfer more resources to the domestic co-owner in the form of a larger ownership share. The difference $(p^F - p^D)$ being large and the share of the local input in production being low is a plausible one for emerging-market economies. We can think of the local input as a stand-in for factors that do not comprise a large share of input costs when procured at the price P^D, yet are not easily substitutable and expensive to procure for a foreigner. In the spirit of the model, these could be political contacts or institutional expertise about factor and product markets that make a local co-owner indispensable to the foreign acquirer in emerging-market economies.

3.5 The Effect of Financial Development

So far in the analysis we assumed that the level of domestic financial development in the country of the target was fixed, or equivalently, that the industries under consideration were located in the same country. Since the seminal work of Rajan and Zingales (1998), it has been known that financial development has differential effects across industries depending on the financial characteristics of their underlying technology. In this section, we examine this issue in the context of brownfield FDI across sectors. In our model, industries can differ in terms of two financial characteristics: their dependence on external finance and the tangibility of their assets. As explained earlier, since domestic financial development and sectoral asset tangibility are isomorphic and substitutable by the assumptions of our model, any interaction between them is automatically ruled out.[22] In other words, the interaction effects between financial development and sectoral asset tangibility follow trivially from functional form assumptions. Thus we shall only comment on these interaction effects later from an empirical point of view. Therefore, from the point of view of the theory, it is more interesting to ask if financial development will have different effects in sectors that differ in their external finance dependence.

Differences in financial development in the model are captured by the parameter τ_c, which affects the asset tangibility $\tau_{jc} = \tau_c + \tau_j$ of all sectors in an economy. Changes in τ_c will have two effects

[22]This is because $\tau_{jc} = \tau_c + \tau_j$. Thus increases in τ_c by assumption has larger effects when τ_j is larger.

that were described earlier in Sections 3.1 and 3.2. To recapitulate, an increase in τ_c will shift the distribution of liquidity in each sector j of the economy towards higher liquidity values, for a given degree of external finance dependence. In addition, the liquidity cut-offs below which full foreign acquisitions are optimal for each τ_c will be $\bar{l}_{jc} \leq \bar{l}_{jc'}$, where $\tau_c \geq \tau_c'$. In order to make these two effects precise, and to distinguish between the effects of *simultaneous* differences in external finance dependence and financial development on sectoral liquidity distributions, we make a distributional assumption about liquidity. Specifically, we assume that the distribution of liquidity in sector j and country c is Pareto of the form $G_{jc}(l) = 1 - \left(\frac{\underline{l}_{jc}}{l}\right)^{\rho_j}$ for $l \geq \underline{l}_{jc}$, where $\underline{l}_{jc} = \frac{\pi}{(1-\tau_{jc})}$ is the lower bound for the support of liquidity in industry j, country c.[23] The shape parameter ρ_j captures the external finance dependence of a sector. Higher ρ_j values correspond to greater external finance dependence since higher ρ_j Pareto distributions are stochastically dominated by lower ρ_j ones. Following Rajan and Zingales (1998), ρ_j is assumed to be the same across countries for a particular sector j.

Proposition 4 ***Financial Development Affects Least Liquid Sectors Most***
Let $N_{jc} = \int_{\underline{l}_{jc}}^{\bar{l}_{jc}} dG_{jc}(l) = 1 - \left(\frac{\underline{l}_{jc}}{\bar{l}_{jc}}\right)^{\rho_j}$ *be the proportion of foreign acquisitions when the industry distribution of liquidity is* G_{jc}*. Then: (i)* $\frac{dN_{jc}}{d\tau_c} < 0$*; and (ii)* $\frac{dD}{d\rho_j} > 0$ *if* $\ln\bar{l}_{jc} < \ln\underline{l}_{jc} + \frac{1}{\rho_j}$*, where* $D \equiv \left|\frac{dN_{jc}}{d\tau_c}\right|$.

Financial development lowers the likelihood of foreign acquisitions. This effect is larger in more external finance dependent sectors above a minimum level of financial development.

Proof: See Appendix. ■

The first part of this result simply states that financial development reduces the likelihood of foreign acquisitions across all sectors. This is intuitive. Financial development, by increasing the tangibility of domestic assets across all sectors relaxes credit constraints of domestically owned firms, making foreign acquisitions less likely across the board. Figure 4 depicts an episode of financial development that shifts the liquidity cut-off below which foreign acquisitions occur from $\bar{l}_{jc'}$ to $\bar{l}_{jc}$.[24] As a result, the likelihood of foreign acquisitions drops in both sectors, from A' to

[23] The Pareto distribution of liquidity arises from the underlying Pareto distribution of first period profits: If $\Pi_j(\pi_{j,1}) = 1 - \left(\frac{\underline{\pi}}{\pi_{j,1}}\right)^{\rho_j}$ for $\pi_{j,1} \geq \underline{\pi}$ is the distribution of first period profits in industry j, the distribution of liquidity $l_{jc} = \frac{\pi_{j,1}}{(1-\tau_{jc})}$ can be shown to be $G_{jc}(l) = 1 - \left(\frac{\underline{l}_{jc}}{l}\right)^{\rho_j}$. In terms of the notation used for Proposition 2, we can also rewrite this distribution as $G_{jc}(l) = 1 - \frac{1}{(1-\tau_{jc})^{\rho_j}}\left(\frac{\underline{l}}{l}\right)^{\rho_j}$ for $l \geq \underline{l} \equiv \underline{\pi}$, where $\underline{\pi}$ is the lower bound for the support of first period profits, same across all industries j and countries c. The assumption of a Pareto distribution follows the recent literature on heterogenous firms in international trade (see Ghironi and Melitz, 2005; Chaney, 2008; Helpman et al., 2008; Arkolakis et al., 2012, for example) that characterizes firm level variables such as productivity and profits by Pareto distributions. These have been shown to be empirically plausible while convenient from an analytical point of view.

[24] For expositional simplicity it does not depict the shift in the liquidity distributions caused by financial develop-

B' in the less external finance dependent sector j', and from A to B in the more external finance dependent sector j. The second result, that domestic financial development has larger effects in external finance dependent sectors only above a certain level of financial development can also be seen in Figure 4. It shows that whether the effect of financial development is more prominent in the more external finance dependent sector depends on the position of the initial cut-off $\bar{l}_{jc'}$. In the figure, the gap between two sectors with different level of external finance dependence goes down, i.e., financial development lowers the likelihood of foreign acquisitions by more in the more external finance dependent sector. But note that if the initial cut-off were higher, i.e., the initial level of financial development were lower, we could have actually had a widening of the gap between the two sectors. The intuition becomes clear upon inspection of Figure 4. If the country in question is at a very low level of financial development (so that $\bar{l}_{jc'}$ is close to $\bar{l}$), even firms with relatively more internal funds get purchased by foreign acquirers. In this situation, financial development lowers the likelihood of foreign acquisitions by more in the less external finance dependent sector, simply because there are more firms at higher values of internal funds in those sectors. The opposite is true when financial development is initially high, as is depicted in the diagram. This analysis is insightful because it shows that the effect of financial development on the likelihood of foreign acquisitions depends critically on the precise firm-level distribution of liquidity within an industry.

What is the effect of financial development on the size of foreign ownership stakes? Note that the proof of Proposition 3 simply stated that foreign stakes are smaller when τ_{jc} is smaller. Since $\tau_{jc} = \tau_c + \tau_j$, this could result from a change in financial development. Thus a trivial corollary of Proposition 3 is that domestic financial development should lead to smaller foreign stakes. We end this section with a summary of our theoretical predictions. The model has three sets of testable predictions about the relationship between foreign acquisition activity, and external finance dependence and asset tangibility of the target firm's industry in emerging markets.

(i) Likelihood of foreign acquisitions: Foreign acquisitions are more likely in sectors that are more external finance dependent and possess fewer tangible assets.

(ii) Ownership structure: The ownership structure chosen by foreign acquirers — how much of the domestic target firm it purchases — depends positively on external finance dependence and negatively on asset tangibility.

(iii) Financial development: Domestic financial development in the country of the target reduces the likelihood of foreign acquisitions. This effect is stronger in more external finance dependent sectors, but only above a threshold level of financial development. Domestic financial development should also reduce the size of foreign ownership stakes.

ment. The intuition remains unchanged for this more complicated case that is taken into account analytically in the proof of Proposition 4.

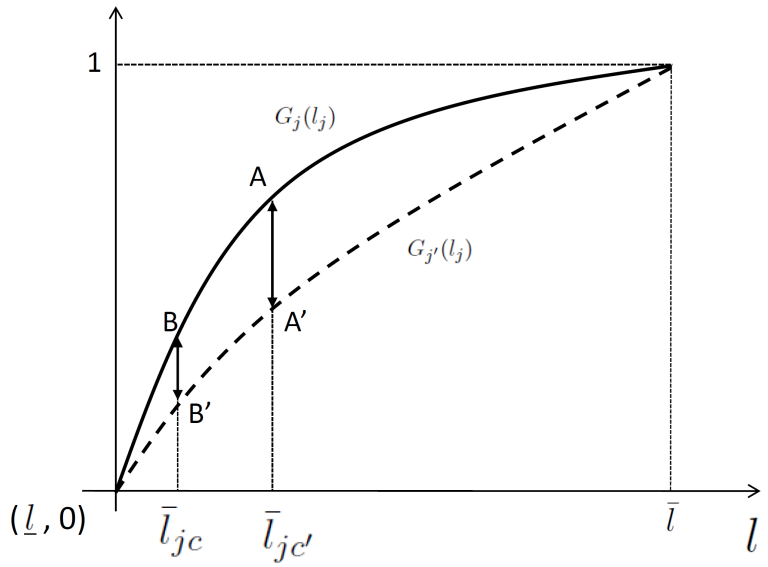

Figure 4: Financial Development and External Finance Dependence

Notes: Liquidity is plotted on the horizontal axis and the corresponding cumulative proportion of domestic firms on the vertical axis. The figure shows the liquidity cut-offs $\bar{l}_{jc'}$ and $\bar{l}_{jc}$ for an initial low level of financial development and a final higher level of financial development (conditional on the level of asset tangibility and an arbitrary productivity $A'_{j,2}$, as described in the text). The solid line $G_j(l_j)$ shows the cumulative distribution of domestic firm liquidity in a more external finance dependent industry j, while the dotted line $G_{j'}(l_j)$ shows the same distribution for a less external finance dependent industry j'. The support of liquidity is $[\underline{l}, \bar{l}]$.

4 Empirical Results

In this section, we test the hypotheses dictated by our theory of liquidity-driven FDI (Section 4.1) and examine the sensitivity of the results to the inclusion of other covariates theory suggests are important for explaining FDI flows (Section 4.2). We then investigate the role that financial development plays in shaping the effect of external finance dependence on FDI (Section 4.3), the sensitivity of the results to the estimation method used, and the exclusion of financial-sector FDI from the sample to control for the possible endogeneity of financial development to such flows (Section 4.4). The main conclusions of the empirical exercise are unaffected by using alternative empirical specifications and taking account of the role of financial-sector FDI.[25]

Throughout the section, we report the standardized beta coefficients obtained from linear probability regressions. Doing so permits us to compare directly the relative magnitude of each of the covariates and draw conclusions about the overall importance of each for the probability of a foreign acquisition and its average size. Results using nonlinear methods, reported in the online appendix,

[25]Furthermore, the results are generally insensitive to changes in the sample of countries included in the estimation. For example, omitting China from the cross-section of countries does not greatly affect the coefficient estimates. See Tables A13 to A16b in the online appendix.

do not change our empirical conclusions.

4.1 Foreign Acquisitions, External Finance Dependence, and Asset Tangibility

From the perspective of the model, the two main variables of interest are external finance dependence and asset tangibility at the industry level. The external finance dependence variable is from Rajan and Zingales (1998). They calculate the ratio of capital expenditures minus cash flow from operations to capital expenditures. The measure is calculated for each industry using U.S. data from the 1980s. Using an indicator of external finance dependence based on U.S. data for industries located in countries other than the United States assumes that it reflects intrinsic technological features of these industries. Because U.S. financial markets are well developed, external finance dependence should reflect the demand for credit rather than its supply. In other words, the key assumption is that the supply of credit in the United States is flat and that the data for equilibrium levels of capital expenditures are solely related to the demand for credit.

The data on asset tangibility are from Braun (2003). Asset tangibility is defined as the ratio of the value of net property, plant, and equipment to total assets for each industry. Each industry's tangibility level is calculated as the median tangibility of all U.S.-based active companies in the industry contained in the Compustat database between 1986 and 1995. It summarizes the relative availability of hard assets at the industry level that can be used as collateral (see Braun, 2003). Using the U.S. asset tangibility data assumes that they reflect the pure collateral value of industry-specific assets rather than supply-side considerations.

We first run a set of regressions that test the model's two main predictions with country×year fixed effects and no other controls. This regression enables us to examine whether the results are sensitive to factors that vary across countries and over time. The country×year fixed effects could proxy for macroeconomic fundamentals such as GDP growth and changes in the exchange rate; financial crises that occurred in certain country-year pairs (e.g., the 1997-98 Asian financial crisis); or slowly evolving country characteristics such as barriers to FDI, financial development, or the quality of institutions. The standard errors here and throughout are clustered at the country×industry level.[26]

Table 5 reports the results for the relationship between the probability of foreign acquisitions and their average size and asset tangibility and external finance dependence. The regressions are:

$$P(D^F_{kjct} = 1 \mid \cdot) = \beta_{ct}\boldsymbol{\delta}_{ct} + \beta_1 extfindep_j + \beta_2 assettangibility_j + \epsilon_{kjct} \tag{4.1}$$

[26] Alternatively, we could have clustered at the industry level, but doing so would have resulted in 20 clusters. Simulations conducted by Cameron and Miller (forthcoming) suggest that, in general, more clusters is better than fewer clusters to obtain appropriately sized tests. Results reported in the online appendix show that the results reported here are not sensitive to clustering at the industry level and, in some cases, result in more statistically significant coefficient estimates.

$$fracacq_{kjct} = \beta_{ct}\boldsymbol{\delta}_{ct} + \beta_1 extfindep_j + \beta_2 assettangibility_j + \epsilon_{kjct} \tag{4.2}$$

where k, j, c, and t stand for transaction, industry, country, and time. The dependent variable in the first regression is a dummy D^F_{kjct} that assumes a value of 1 if the acquisition is foreign and 0 otherwise. The dependent variable in the second regression is the fraction acquired of the domestic firm in the transaction ($fracacq_{kjct}$). In addition to the country $\times$ year dummies contained in the vector $\boldsymbol{\delta}_{ct}$, the regressions include asset tangibility and external finance dependence. Theory suggests the following hypotheses regarding the signs of the coefficients β_1 and β_2 in the regressions above: $\beta_1 > 0$ and $\beta_2 < 0$.

The estimated coefficients associated with asset tangibility and external finance dependence reported in the first two columns of the table provide evidence in favor of the model's predictions. Column (1), which reports the coefficients of interest for equation 4.1, shows that the probability of a foreign acquisition is positively associated with external finance dependence and negatively related to asset tangibility. Both estimates are statistically significant at the 1% level. Column (2), which reports the coefficients of interest for equation 4.2, shows that the average size of foreign acquisitions is also positively associated with external finance dependence and statistically significant at the 1% level. Although the estimated coefficient associated with asset tangibility is negative, just as the model suggests, it is imprecisely estimated and not statistically significant at conventional levels.

It is possible that country-pair specific trade costs, relative country size, or other bilateral gravity factors play a role in driving these results. To control for such effects, we include country-pair and year fixed effects in the regression where the dependent variable is the fraction of the target acquired (equation 4.2) and examine the sensitivity of the results to this assumption.[27] The regression is:

$$fracacq_{kjct} = \beta_{c,c'}\boldsymbol{\delta}_{c,c'} + \beta_t\boldsymbol{\delta}_t + \beta_1 extfindep_j + \beta_2 assettangibility_j + \epsilon_{kjct} \tag{4.3}$$

where $\boldsymbol{\delta}_{c,c'}$ represents the country-pair fixed effects and $\boldsymbol{\delta}_t$ the time fixed effects. As before, we expect $\beta_1 > 0$ and $\beta_2 < 0$. The estimates in column (3) of Table 5 are similar to those obtained in the second column. The estimated coefficient associated with external finance dependence is significant at the 1% level while that for asset tangibility remains statistically insignificant.

Column (4) reports the estimates for equation 4.2 with country$\times$year fixed effects for the sub-sample of domestic acquisitions. The results indicate that neither asset tangibility nor external finance dependence are important determinants of domestic acquisitions in emerging markets. The estimated coefficients not only become smaller in economic terms than those obtained in the sub-sample of foreign acquisitions, but neither one of them is statistically significant. These findings are

[27] We do not estimate the specification in column (1) using country-pair fixed effects because the likelihood of a foreign acquisition is perfectly correlated with them. It is therefore not possible to control for bilateral gravity factors in the model reported in the first column of the table.

also consistent with the model. It predicts that the force driving the correlation between the size of the stake acquired and external finance dependence is the difference in the absolute advantage of foreign acquiring firms and that of their domestic targets. The foreign acquirer has an advantage in the provision of liquidity whereas the domestic target has one in the provision of the local input. Because domestic acquirers are on average similar to domestic targets, the model predicts that we should not observe a correlation between ownership structure and external finance dependence in domestic acquisitions.

Overall, the evidence in favor of the role for external finance dependence is the strongest. External finance dependence is positively associated with both the likelihood of a foreign acquisition and the average size of the acquisition. By contrast, the evidence regarding the importance of asset tangibility is more mixed. Asset tangibility is negatively associated with the probability of foreign acquisition, just as the model predicts, but it is not systematically related to the average size of a foreign acquisition, though the point estimates are of the correct sign even in the latter case.

4.2 The Theory of Liquidity-Driven FDI and Alternative Explanations

Our model of liquidity-driven FDI relating external finance dependence and asset tangibility to the probability of a foreign acquisition and the average size of foreign acquisitions omits other possible determinants of FDI in emerging markets. To examine how empirically controlling for these other determinants affects the regression estimates, we incorporate the variables suggested by four alternative explanations: (1) the classic proximity-concentration theories of horizontal FDI (see Krugman, 1983, among others); (2) vertical FDI based on locational advantages in emerging markets caused by lower factor prices (see Markusen, 1984; Helpman and Krugman, 1985, among others); (3) the incomplete-contracting, property-rights theory of the boundaries of multinational corporations (see Antràs, 2003); and (4) the cream-skimming hypothesis of FDI (see Razin and Sadka, 2007, among others).

In addition to these explanations, there are theories of horizontal FDI with firm heterogeneity that relate the distribution of industry productivity in the source country to the decision to locate production abroad (see Helpman et al., 2004; Nocke and Yeaple, 2007, 2008). Such explanations rely on the stylized fact that larger firms tend to be more productive and, hence, export more. FDI is therefore more likely in sectors with less productivity dispersion across firms. But the principal focus of our analysis is the characteristics of target firms in emerging markets that make them more likely to be acquired by a foreign firm. In that respect, the dispersion of productivity in the source country is not relevant to the central point of this paper. For this reason, we do not examine the determinants suggested by this type of explanation in the empirical exercise.

Proximity-concentration based theories of horizontal FDI predict that FDI is more likely in industries that have lower plant level fixed costs and whose products are associated with higher variable trade costs (see Brainard, 1997). When such costs are higher, foreign firms optimally

choose to circumvent them in order to take advantage of economies of scale. To control for these types of costs, we use data on average tariffs at the two digit SIC industry level obtained from the World Bank's *World Integrated Trade Solution* database.[28] Theories of vertical FDI also suggest including a measure of labor intensity in the target sector to control for the locational advantage of FDI in emerging markets because of the lower level of wages. To control for this type of locational advantage, we include the capital-labor ratio at the industry level used in Antràs (2003).

The third set of covariates we include are suggested by the theory of MNC boundaries proposed by Antràs (2003). He shows that a model of international trade with incomplete contracts and a preference for variety explains that, across industries, the share of intrafirm imports in total U.S. imports is higher for more capital-intensive exporting industries. The model pins down the boundaries of the international firm and suggests that FDI is more likely in capital-intensive industries. In addition to the capital-labor ratio at the industry level, Antràs (2003) uses two further industry-level controls — research and development (R&D) expenditures as a fraction of sales and advertising expenditures as a fraction of sales — that are especially important in the context of our model as they may be correlated with asset tangibility or external finance dependence. It is conceivable, for example, that asset tangibility or external finance dependence are simply acting as proxies for technologically advanced industries in which developed market firms might have an advantage. Using advertising and R&D intensity as controls can effectively address these concerns.

The fourth explanation that we take account of is the cream-skimming hypothesis — namely, that foreign acquirers generally purchase more productive firms (see Razin and Sadka, 2007, for a theoretical model). To test whether countries and industries that are relatively more productive are targeted more often by foreign acquirers, we use the measure of industry-level productivity relative to that of the United States from Levchenko and Zhang (2011) for each of the countries in the sample.[29]

What is more, we control for four lagged macroeconomic aggregates at the country level: the change in the nominal exchange rate (quarterly) to control for exchange rate effects on FDI (Froot, 1991); the use of IMF credit and loans as a percentage of a countrys quota (quarterly) to control for aggregate liquidity effects related to financial crises (see Aguiar and Gopinath, 2005; Alquist et al.,

[28]These data are available at the following web address: http://wits.worldbank.org/. We are not aware of data on industry specific freight costs for the set of country pairs in the sample. The results in Table 5 with country-pair and year fixed effects show that the model's predictions hold up even when we partially account for the effects of trade costs. It controls for the effect of time-invariant components of bilateral trade costs between the country in which the target is located and the one in which the acquirer is located as well as any trends in transportation costs over time. This specification would obviously miss the effect of industry specific trade costs. However, in order to confound our results, the trade costs would have to be significantly correlated with external finance dependence and asset tangibility, which seems implausible.

[29]As Asia comprises a large part of our sample, it is also possible that the probability of a foreign acquisition depends on whether the industry supplies intermediate goods to firms based in developed markets, as many Asian companies do. To control for this possibility we use the measure of upstreamness of industries computed by Chor et al. (2012) as an additional covariate. The conclusions reported below remain unaffected. These results are available in the online appendix.

2014); real GDP per capita (annual) to control for the overall level of development of a country; and real GDP growth (annual) to control for normal business cycle variation in acquisition activity (Erel et al., 2012).[30] The estimated coefficients for these variables are not reported for brevity.

To test the liquidity-based theory of FDI against the alternatives, we estimate the following regressions:

$$P(D^F_{kjct} = 1 \mid \cdot) = \beta_c \boldsymbol{\delta}_c + \beta_t \boldsymbol{\delta}_t + \beta_1 extfindep_j + \beta_2 assettangibility_j + \boldsymbol{FDI\ controls}'_{jct}\boldsymbol{\eta} + \boldsymbol{controls}'_{c,t-4}\boldsymbol{\gamma} + \beta_4 fracaft_k + \epsilon_{kjct} \quad (4.4)$$

and

$$fracacq_{kjct} = \beta_c \boldsymbol{\delta}_c + \beta_t \boldsymbol{\delta}_t + \beta_1 extfindep_j + \beta_2 assettangibility_j + \boldsymbol{FDI\ controls}'_{jct}\boldsymbol{\eta} + \boldsymbol{controls}'_{c,t-4}\boldsymbol{\gamma} + \epsilon_{kjct}, \quad (4.5)$$

where $\boldsymbol{\delta}_c$ and $\boldsymbol{\delta}_t$ are country and year dummies; $\boldsymbol{FDI\ controls_{jct}}$ is the vector of controls for alternative theories of FDI; $\boldsymbol{controls}_{c,t-4}$ is the vector of lagged country-level macroeconomic controls; and $fracaft_k$ is the percentage of the target firm owned after the end of transaction k. We include the fraction owned by the acquiring firm after a transaction in the likelihood regression to control for the size of the acquisition.[31] As before, our coefficients of interest are β_1 and β_2, and we expect $\beta_1 > 0$ and $\beta_2 < 0$.

The results are summarized in Table 6, which reports standardized beta coefficients for comparison of the relative magnitudes of the marginal effects associated with each theory of FDI. Columns (1) and (2) present the estimates of regression 4.4, first without the vector of controls $\boldsymbol{FDI\ controls_{jct}}$ and then with the vector of controls. Column (1) shows that the initial results regarding the probability of a foreign acquisition reported in Table 5 are robust to the inclusion of the macroeconomic controls. The results reported in column (2) indicate that external finance dependence is a more economically important determinant of the industry-level likelihood of a foreign acquisition than the covariates suggested by some of the other theories of FDI we consider. For example, comparing the estimated coefficients of log(Scale) and tariff indicates that the effect of liquidity, as captured by external finance dependence, is roughly 50% larger than each of these factors. The estimated coefficients associated with the capital-labor ratio, the R&D-sales ratio, and the advertising-sales ratio are comparable in magnitude to that for external finance dependence, although none of them is statistically significant at conventional levels.

Columns (3) and (4) present the estimates obtained from regression 4.5. The results here are

[30] The data are from the IMF's *International Financial Statistics* and the Central Bank of the Republic of China.

[31] This need not be the same as the fraction acquired in a particular transaction if the acquiring firm already owned a partial stake in the target firm. The results are not sensitive to using the fraction acquired in the transaction, indicating that the prior relationship between the target and the acquirer does not affect the results.

even starker. Liquidity at the industry level is a more economically significant determinant of ownership structure than any of the other alternative covariates. One caveat is that the alternative theories that we test for, while having clear predictions about the likelihood of FDI in different sectors, do not make explicit predictions about the size of the ownership stake acquired. So there is no clear theoretical guidance on the relative importance of each of the determinants when it comes to the regressions explaining the size of acquisitions. However, our results suggest that at least one of our preferred proxies for industry liquidity, external finance dependence, has economically large and statistically significant correlation with the size of acquisitions in the direction predicted by theory. Columns (5) and (6) present estimates of regression 4.5 for the subsample of domestic acquisitions. Consistent with the results in Table 5, the ownership structure in domestic acquisitions is unrelated to the liquidity variables.

To get a sense of the economic significance of the results in columns (1)-(4), consider the thought experiment of going from the least external finance dependent sector (tobacco) to the most (drugs) while holding the other determinants of FDI constant. This implies, for the average firm in the two industries considered, an increase in the probability of a foreign acquisition of 18.5 percentage points, and an increase of 36.7 percentage points in the average size of a foreign acquisition.[32]

4.3 The Role of Domestic Financial Development

The theory predicts that domestic financial development in the country of the target reduces the likelihood of foreign acquisitions, and that this effect is stronger in more external finance dependent sectors. Table 7 tests these predictions. It reports the regression results from specifications that are similar to those reported in columns (1) and (2) in Table 6, but that now include two alternative measures of domestic financial development of the emerging market where the transaction occurred — private bond market capitalization and private credit — as well as their interaction with asset tangibility and external finance dependence. We use these two measures of financial development because they correspond to the notion of financial development in the model, which is the development of intermediated finance.[33] The set of controls is otherwise unchanged from Table 6. The

[32]These calculations use the coefficient estimates from the regression that relies on the nonstandardized variables reported in columns (2) and (4) of Table A10 in the online appendix. Industry 21 (Tobacco) has the lowest external finance dependency value: -0.4512, while the highest is industry 38 (instruments) with 0.961. Given a non-standardized coefficient of 0.131 in Table A10, column (2), a difference of 1.4122 in the external finance dependence value between sector 21 and 38 gives a change in probability of 0.131 x 1.4122 = 18.5 percentage points. Using column (4) of the same table, a difference of 1.4122 in the external finance dependence value between sector 21 and 38 gives a change in ownership of 0.260 x 1.4122 = 36.7 percentage points.

[33]Both indicators of domestic financial development are expressed relative to GDP and were obtained from the World Bank's *Financial Structure Database*. We experimented with alternative measures such as stock market capitalization and liquid liabilities as percentages of GDP but do not report these results for brevity. Our main conclusions remain unchanged when we use these measures.

regression results reported in Table 7 are based on the following equation:

$$P(D^F_{kjct} = 1 \mid \cdot) = \beta_c \boldsymbol{\delta}_c + \beta_t \boldsymbol{\delta}_t + \beta_1 extfindep_j + \beta_2 assettangibility_j + \beta_3 financialdev_{ct} + \boldsymbol{interaction}'_{\boldsymbol{jct}} \boldsymbol{\theta} + \beta_4 fracaft_k + \boldsymbol{controls}'_{c,t-4} \boldsymbol{\gamma} + \epsilon_{kjct} \quad (4.6)$$

where $\boldsymbol{interaction_{jct}}$ is the vector of the two interaction terms. Because the individual variables are standardized and due to the presence of interaction terms, the estimated coefficients associated with external finance dependence, asset tangibility, and financial development have specific interpretations. The coefficient on external finance dependence, for example, shows its marginal effect on the likelihood of a foreign acquisition at the sample mean of the financial development measure. The coefficient on financial development shows its marginal effect on the likelihood of a foreign acquisition when both external finance dependence and asset tangibility are fixed at their respective sample means.

Our theory suggests the following restrictions on the signs of the coefficients: $\beta_1 > 0$, $\beta_2 < 0$ (assuming that financial development up to the mean level does not completely offset the effects of liquidity constraints); $\beta_3 < 0$ (financial development lowers the likelihood of foreign acquisitions for the mean industry, in terms of other characteristics); and the interaction term in the vector $\boldsymbol{\theta}$ associated with external finance dependence is negative (the negative effect of financial development on the likelihood of foreign acquisitions should be higher in external finance dependent sectors). As explained earlier, the theoretical sign of the interaction effect between asset tangibility and financial development depends entirely on functional form assumptions. In our baseline theory, such effects are ruled out by our assumption that $\tau_{jc} = \tau_c + \tau_j$, purely for the sake of algebraic convenience. Thus we do not take an a priori stand on the sign of this interaction coefficient. Instead, we shall attempt to interpret and suggest possible explanations for its sign and magnitude.

Columns (1) and (2) report the coefficient estimates for the regression above when using private bond market capitalization to GDP and private credit to GDP, respectively. The coefficients β_1 and β_2 have the expected signs: Higher levels of asset tangibility are associated with a lower probability of a foreign acquisition, and higher levels of external finance dependence are associated with a higher probability of a foreign acquisition at the mean level of financial development. Both estimated coefficients are statistically significant at the 1% level. These results obtain when using either measure of the level of financial development. When we standardize the domestic financial development variables by their 10th and 25th percentile values rather than their mean, the effects of external finance dependence and asset tangibility becomes both economically and statistically more significant. These results are reported in Tables A21 and A22 in the online appendix. This evidence suggests that the effect of domestic financial development on the probability of a foreign acquisition are largest for lower levels of domestic financial development.

For industries at the mean level of external finance dependence and asset tangibility, the coef-

ficients on both measures of domestic financial development are statistically insignificant at conventional levels. They also possess different signs, with the coefficient on private credit having the sign predicted by theory. However, note that these coefficients show the marginal effect of financial development at the mean of external finance dependence and asset tangibility. The large and statistically significant coefficients on the interaction terms suggest that the effects of financial development can be larger in industries that are more external finance dependent than average. These interaction terms are discussed below, but before doing so, we can use the estimated coefficients for the non-standardized variables (reported in Tables A9 to A12b in the online appendix) to get a better sense of the economic significance of these results. Let us consider the effect, in the mean industry, of going from the lowest level of financial development to the highest level on the probability of a foreign acquisition and its average size. According to the private credit to GDP measure of financial development, Peru ranks the lowest (19.0%) and Malaysia the highest (114.9%). These values imply that if Peru increased its level of financial development to that of Malaysia, the probability of a foreign acquisition would decrease by about 2.0 percentage points, all else equal. In both calculations, we fix Peru's level of asset tangibility and its level of external financial dependence at their average levels, 0.33 and 0.16. The average size of a foreign acquisition in Peru would decrease by about 4.6 percentage points. Thus the effects of financial development are quite small compared to the effects of the sectoral factors when we consider the mean industry in terms of external finance dependence and asset tangibility.

The model suggests that the sign of the coefficient on the interaction between domestic financial development and external finance dependence will be negative above a minimum level of financial development. The empirical results show that this is the case, suggesting that most of our countries are above this threshold. In contrast to the coefficient on the financial development measures by themselves, their interaction terms with external finance dependence are always statistically significant with the correct sign. The signs of the coefficients mean that the effect of domestic financial development on the likelihood of foreign acquisitions is sharper (more negative) in more external finance dependent sectors. The empirical finding about the sign of the interaction coefficient of domestic financial development and asset tangibility can be interpreted as follows. Since the estimated coefficient is positive, it means that financial development has the least effect — in terms of reducing the likelihood of foreign acquisitions — on sectors that have more tangible assets. This finding is intuitive: Since such sectors are already possessed with assets of higher tangibility, financial development affects them relatively less. Note however that the statistical significance of this coefficient depends on the specific measure of domestic financial development used. Columns (4) and (5) of the same table add the controls for the alternative theories of FDI. This reduces the statistical significance of the results reported above. However, the signs of the coefficients remain consistent across the columns and with the results reported in earlier sections.

Columns (1) and (2) in Tables 8a report the results for the regressions of the fraction acquired

in foreign acquisitions on the same set of covariates as in equation (4.6):

$$fracacq_{kjct} = \beta_c \boldsymbol{\delta}_c + \beta_t \boldsymbol{\delta}_t + \beta_1 extfindep_j + \beta_2 assettangibility_j + \beta_3 financialdev_{ct} + \boldsymbol{interaction}'_{\boldsymbol{jct}} \boldsymbol{\theta} + \boldsymbol{controls}'_{c,t-4} \boldsymbol{\gamma} + \epsilon_{kjct}, \quad (4.7)$$

except for the variable $fracaft_k$, which controlled for the size of the acquisition in regression (4.6). Our theory suggests the following restrictions on the signs of the coefficients: $\beta_1 > 0$, $\beta_2 < 0$ (as in regression 4.5), and $\beta_3 < 0$ (financial development lowers the size of foreign acquisitions for the mean industry).

Our results for β_1 and β_2 mirror our earlier findings where we did not control for the level of financial development. The regression estimates obtained using both measures of domestic financial development show that the size of a foreign acquisition is positively associated with external finance dependence. Moreover, both estimated coefficients are statistically significant at standard levels, a finding consistent with the model. There is, however, no statistically significant relationship between the size of a foreign acquisition and asset tangibility, even though the coefficient is of the predicted sign. The analysis thus provides further evidence in favor of the importance of external finance dependence as a driver of the size of foreign acquisitions. Columns (3) and (4) show that this conclusion is robust to controlling for the other determinants of FDI. The coefficient β_3 is the correct negative sign in all cases but one (for private credit with FDI controls). However it is always statistically insignificant, suggesting that domestic financial development is not a quantitatively important determinant of the size of foreign acquisitions.

The model suggests that the ownership structure in domestic acquisitions should not be sensitive to the liquidity measures, and we verified this prediction in the last two columns of Tables 5 and 6. To ensure that the result holds while controlling for financial development, we estimate the regressions with the size of the stake acquired on the subsample of domestic acquisitions. Table 8B reports the results. They indicate that there is no statistically significant relationship between the size of domestic acquisitions and the industry-level characteristics for domestic acquisitions. These results can be explained through the lens of the model. The key trade-off between retaining some of the surplus and motivating the domestic agent does not exist in domestic acquisitions because the domestic acquirer with access to liquidity has advantages along two dimensions: It is able to provide the local input and scarce capital to the target. For these reasons domestic acquisitions are less sensitive to the industry-level liquidity characteristics.

4.4 Sensitivity Analysis

In this subsection, we examine the extent to which the main conclusions about the industry-level determinants of the likelihood and size of foreign acquisitions are sensitive to alternative specifications.

4.4.1 The Endogeneity of Financial Development with Respect to Financial-Sector Acquisitions

Since FDI by financial sectors firms, or domestic financial sector M&A activity, might promote financial market development in emerging-market economies, it is possible that the regression results we obtain in support of the theory are affected by the simultaneity of these two variables. In this subsection, we analyze whether the results are sensitive to the possible endogeneity of domestic financial development with respect to financial-sector acquisitions by re-estimating the benchmark regressions using the subset of acquisitions in which the acquirer is not based in the finance, insurance and real estate (FIRE) sector. We omit these acquisitions because they are more likely to be related to domestic financial-market development than the non-FIRE foreign acquisitions, especially those that occur in the manufacturing sector.

Tables A1 to A4b in the online appendix show that the main results of the empirical investigation remain intact when we omit financial acquirers. The results reported in Table A3 in the online appendix indicate that dependence on external finance is positively correlated and that asset tangibility is negatively correlated with the probability of a foreign acquisition in a non-FIRE sector, just as we find in the full sample of foreign acquisitions. What is more, the economic and statistical significance of the estimated coefficients obtained using this subsample is comparable to that in the full sample. For example, comparing the marginal effects of external finance dependence across the two samples reveals that in the non-FIRE sector a one-standard deviation change in external finance dependence has the same size effect on the probability of a foreign acquisition in the non-FIRE subsample as it does in the full sample of foreign acquisitions. This statement applies with equal force to the estimated coefficients associated with asset tangibility obtained using the non-FIRE subsample.

Similarly, Table A4a in the online appendix shows that the main conclusions about the relationship between external finance dependence and the average size of foreign acquisitions are not sensitive to excluding financial sector acquisitions from the sample. And the lack of statistical significance of the estimated coefficients reported in Table A4a in the online appendix suggests that the economic forces important for foreign acquisitions are less important for non-FIRE domestic acquisitions. Overall, the results do not appear to be colored by the presence of endogeneity stemming from the relationship between FDI (or domestic financial sector M&A activity) and domestic financial market development.

4.4.2 Robustness to Alternative Estimation Methods

All the results presented so far assumed that the empirical relationships generated by the mechanisms outlined in the model were linear, which is, of course, a strong assumption given that the relationships we estimate include two limited dependent variables. To verify that the empirical results are robust to this choice, we re-estimate the regressions predicting the likelihood of foreign

acquisitions using logit regressions and the ownership structure regressions using generalized linear regressions. The estimates are provided in Tables A5 to A8a in the online appendix. They show that the main conclusions remain unchanged when we use these alternative non-linear estimates.

5 Conclusion

In this paper we propose a new mechanism — the financial liquidity differential between domestic and foreign firms — that drives both the likelihood and ownership structure of brownfield FDI. We provide a theoretical framework that allows us to study the industry-level implications of firm-level liquidity, and derive a set of testable implications that we take to the data. We use a data set of cross-border and domestic acquisitions in the manufacturing sector of fifteen emerging-market economies between 1990 and 2007 to test the predictions of our model. We find strong evidence that firms in external finance dependent sectors and sectors with lower asset tangibility are more likely to be targets of foreign acquisitions. Conditional on entry, larger foreign ownership stakes are more likely in external finance dependent sectors. Importantly, the ownership structure chosen by domestic acquiring firms is insensitive to the level of external finance dependence of the target industry, which provides additional evidence that the mechanism we identify drives the result. A comparison with existing theories of FDI and ownership structure based on technology and endowment differences reveals that the liquidity channel is at least as important quantitatively as the determinants suggested by other theories. We also find that domestic financial development plays a mitigating role in this regard, though its effects are most quantitatively significant for the least liquid sectors. Based on this evidence, we conclude that industry-level liquidity, as proxied by external finance dependence and asset tangibility, plays a key role in determining FDI, and this is especially true in countries where domestic financial markets are less developed.

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References

M. Aguiar and G. Gopinath. Fire-Sale Foreign Direct Investment and Liquidity Crises. *Review of Economics and Statistics*, 87:439–452, 2005.

Heitor Almeida and Murillo Campello. Financial Constraints, Asset Tangibility, and Corporate Investment. *Review of Financial Studies*, 20(5):1429–1460, 2007.

Heitor Almeida, Murillo Campello, and Dirk Hackbarth. Liquidity Mergers. *Journal of Financial Economics*, 102(3):526–558, 2011.

Ron Alquist, Rahul Mukherjee, and Linda Tesar. Fire Sale FDI or Business as Usual? *Iheid Working Paper*, 2014.

Pol Antràs. Firms, Contracts, And Trade Structure. *The Quarterly Journal of Economics*, 118(4): 1375–1418, 2003.

Pol Antràs, Mihir Desai, and C Fritz Foley. Multinational Firms, FDI Flows and Imperfect Capital Markets. *Quarterly Journal of Economics*, 124(3), 2009.

Costas Arkolakis, Arnaud Costinot, and Andrés Rodríguez-Clare. New Trade Models, Same Old Gains? *American Economic Review*, 102(1):94–130, 2012.

Jens Matthias Arnold and Beata S Javorcik. Gifted Kids or Pushy Parents? Foreign Direct Investment and Plant Productivity in Indonesia. *Journal of International Economics*, 79(1): 42–53, 2009.

Elizabeth Asiedu and Hadi Salehi Esfahani. Ownership Structure in Foreign Direct Investment Projects. *Review of Economics and Statistics*, 83(4):647–662, 2001.

Thorsten Beck. Financial Development and International Trade: Is There a Link? *Journal of international Economics*, 57(1):107–131, 2002.

Nicolas Berman and Jérôme Héricourt. Financial Factors and the Margins of Trade: Evidence from Cross-Country Firm-Level Data. *Journal of Development Economics*, 93(2):206–217, 2010.

Garrick Blalock and Paul J Gertler. Welfare Gains from Foreign Direct Investment Through Technology Transfer to Local Suppliers. *Journal of International Economics*, 74(2):402–421, 2008.

S Lael Brainard. An Empirical Assessment of the Proximity-Concentration Trade-Off Between Multinational Sales and Trade. *American Economic Review*, 87(4):520–544, 1997.

M. Braun. Financial Contractibility and Asset Hardness. *Harvard University Working Paper*, 2003.

A. C. Cameron and D. L. Miller. A Practioner's Guide to Cluster-Robust Inference. *Journal of Human Resources*, forthcoming.

Thomas Chaney. Distorted Gravity: The Intensive and Extensive Margins of International Trade. *The American Economic Review*, 98(4):1707–1721, 2008.

Han Ping Chor, Luke Davin, Pol Antras, Thibault Fally, and Russell Hillbery. Measuring the Upstreamness of Production and Trade Flows. *American Economic Review Papers and Proceedings*, 102(3):412–416, 2012.

I. Erel, R. C. Liao, and M. S. Weisbach. Determinants of Cross-Border Mergers and Acquisitions. *Journal of Finance*, 67(3), 2012.

Isil Erel, Yeejin Jang, and Michael S Weisbach. Do Acquisitions Relieve Target Firms Financial Constraints? *The Journal of Finance*, 2014.

Mukesh Eswaran and Ashok Kotwal. A Theory of Contractual Structure in Agriculture. *American Economic Review*, 75, 1985.

Kenneth A Froot. Exchange Rates and Foreign Direct Investment: An Imperfect Capital Markets Approach. *The Quarterly Journal of Economics*, 1991.

Fabio Ghironi and Marc J Melitz. International Trade and Macroeconomic Dynamics with Heterogeneous Firms. *The Quarterly Journal of Economics*, 120(3):865–915, 2005.

Josef Hadar and William R Russell. Rules for Ordering Uncertain Prospects. *The American Economic Review*, 59(1):25–34, 1969.

Josef Hadar and William R Russell. Stochastic Dominance and Diversification. *Journal of Economic Theory*, 3(3):288–305, 1971.

Oliver Hart and John Moore. A Theory of Debt Based on the Inalienability of Human Capital. *The Quarterly Journal of Economics*, 109(4):841–879, 1994.

Elhanan Helpman and Paul Krugman. Market Structure and Foreign Trade, 1985.

Elhanan Helpman, Marc J Melitz, and Stephen R Yeaple. Export Versus FDI with Heterogeneous Firms. *American Economic Review*, 94(1):300–316, 2004.

Elhanan Helpman, Marc Melitz, and Yona Rubinstein. Estimating Trade Flows: Trading Partners and Trading Volumes. *The Quarterly Journal of Economics*, 123(2):441–487, 2008.

Beata Smarzynska Javorcik. Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers Through Backward Linkages. *American Economic Review*, pages 605–627, 2004.

Keyu Jin. Industrial Structure and Capital Flows. *The American Economic Review*, 102(5):2111–2146, 2012.

Paul Krugman. The New Theories of International Trade and the Multinational Enterprise. *The multinational corporation in the 1980s*, pages 57–73, 1983.

Andrei A Levchenko and Jing Zhang. The Evolution of Comparative Advantage: Measurement and Welfare Implications. Technical report, National Bureau of Economic Research, 2011.

Ross Levine. Finance and Growth: Theory and Evidence. *Handbook of economic growth*, 1:865–934, 2005.

Kalina Manova. Credit Constraints, Equity Market Liberalizations and International Trade. *Journal of International Economics*, 76(1):33–47, 2008.

James R Markusen. Multinationals, Multi-Plant Economies, and the Gains from Trade. *Journal of international economics*, 16(3):205–226, 1984.

S.B. Moeller, F.P. Schlingemann, and R.N. Stulz. Wealth Destruction on a Massive Scale? A Study of Acquiring-Firm Returns in the Recent Merger Wave. *Journal of Finance*, 60:757–782, 2005.

Volker Nocke and Stephen Yeaple. Cross-Border Mergers and Acquisitions vs. Greenfield Foreign Direct Investment: The Role of Firm Heterogeneity. *Journal of International Economics*, 72(2): 336–365, 2007.

Volker Nocke and Stephen Yeaple. An Assignment Theory of Foreign Direct Investment. *The Review of Economic Studies*, 75(2):529–557, 2008.

R.G. Rajan and L. Zingales. Financial Dependence and Growth. *American Economic Review*, 1998.

Assaf Razin and Efraim Sadka. Corporate Transparency, Cream-Skimming and FDI. *European Economic Review*, 51(5):1263–1276, 2007.

UNCTAD. World Investment Report, 2005. URL http://unctad.org/en/Docs/wir2005_en.pdf.

UNCTAD. World Investment Report, 2008. URL http://unctad.org/en/Docs/wir2008_en.pdf.

UNCTAD. World Investment Report, 2014. URL http://unctad.org/en/PublicationsLibrary/wir2014_en.pdf.

WBES. Obtaining Finance in Latin America and the Caribbean. *Latin America and the Caribbean Series Note*, (5), 2013. URL http://www.enterprisesurveys.org/~/media/FPDKM/EnterpriseSurveys/Documents/Topic-Analysis/Obtaining-Finance-in-LAC.pdf.

Mahmut Yasar and Catherine J Morrison Paul. International Linkages and Productivity at the Plant Level: Foreign Direct Investment, Exports, Imports and Licensing. *Journal of International Economics*, 71(2):373–388, 2007.

7 Appendix: Proofs and Tables

Proof of Lemma 1: To get analytical results we assume a Cobb-Douglas production function of the form $F(I_j, L_j) = I_j^{\beta_I} L_j^{\beta_L}$ with $\beta_I + \beta_L < 1$. We assume decreasing returns in the inputs to get a determinate scale of production. The decreasing returns in capital and the local input could be due to the presence of a third set of inputs, such as local infrastructure provided by the government, as in Asiedu and Esfahani (2001).

The value $V_j^{D,0}$ solves:

$$V_j^{D,0} \equiv \max_{I_j,\ L_j} \{\pi_{j,1} - I_j + A_{j,2} I_j^{\beta_I} L_j^{\beta_L} - p^D L_j\}$$

subject to

$$I_j \leq \frac{\pi_{j,1}}{(1-\tau_{jc})} \equiv l_j$$

The maximization problem with respect to L_j gives:

$$L_j = \left(\frac{A_{j,2} \beta_L I_j^{\beta_I}}{p^D} \right)^{\frac{1}{1-\beta_L}}$$

Inserting this back into the expression for $V_j^{D,0}$ and assuming that the firm is liquidity constrained so that $I_j = \frac{\pi_{j,1}}{1-\tau_{jc}}$, we have

$$V_j^{D,0} = -\frac{\tau_{jc}}{1-\tau_{jc}} \pi_{j,1} + \left(\beta_L^{\frac{\beta_L}{1-\beta_L}} - \beta_L^{\frac{1}{1-\beta_L}} \right) \left[\frac{A_{j,2}}{p^{D\beta_L}} \left(\frac{\pi_{j,1}}{1-\tau_{jc}} \right)^{\beta_I} \right]^{\frac{1}{1-\beta_L}}.$$

One can rewrite the expression for $V_j^{D,0}$ in terms of liquidity, l_j, and $\pi_{j,1}$:

$$V_j^{D,0} = \pi_{j,1} - l_j + \left(\beta_L^{\frac{\beta_L}{1-\beta_L}} - \beta_L^{\frac{1}{1-\beta_L}} \right) \left[\frac{A_{j,2}}{p^{D\beta_L}} l_j^{\beta_I} \right]^{\frac{1}{1-\beta_L}}.$$

Taking the partial derivative with respect to l_j gives:

$$\frac{\partial V_j^{D,0}}{\partial l_j} = -1 + \frac{\beta_I}{1-\beta_L} \left(\beta_L^{\frac{\beta_L}{1-\beta_L}} - \beta_L^{\frac{1}{1-\beta_L}} \right) \left[\frac{A_{j,2}}{p^{D\beta_L}} \right]^{\frac{1}{1-\beta_L}} l_j^{-\frac{1-\beta_I-\beta_L}{1-\beta_L}}.$$

This expression is positive as long as

$$l_j < \left[A_{j,2} \beta_I^{1-\beta_L} \beta_L^{\beta_L} p^{D^{-\beta_L}} \right]^{\frac{1}{1-\beta_I-\beta_L}} = I_j^*$$

. Here $I_j^* = \left[A_{j,2} \beta_I^{1-\beta_L} \beta_L^{\beta_L} p^{D^{-\beta_L}} \right]^{\frac{1}{1-\beta_I-\beta_L}}$, is the first-best investment level. Therefore, $V_j^{D,0}$ is

increasing in l_j as long as the liquidity constraint is binding.

The total derivative of $V_j^{D,0}$ with respect to $\pi_{j,1}$ is:

$$\frac{dV_j^{D,0}}{d\pi_{j,1}} = \frac{\partial V_j^{D,0}}{\partial \pi_{j,1}} + \frac{\partial V_j^{D,0}}{\partial l_j}\frac{dl_j}{d\pi_{j,1}} = 1 + \frac{\partial V_j^{D,0}}{\partial l_j}\frac{1}{1-\tau_{jc}} > 0,$$

because the partial derivative is positive (as shown above). Note, that in fact $\frac{dV_j^{D,0}}{d\pi_{j,1}} > 1$. The total derivative of $V_j^{D,0}$ with respect to τ_{jc} is:

$$\frac{dV_j^{D,0}}{d\tau_{jc}} = \frac{\partial V_j^{D,0}}{\partial \tau_{jc}} + \frac{\partial V_j^{D,0}}{\partial l_j}\frac{dl_j}{d\tau_{jc}} = \frac{\partial V_j^{D,0}}{\partial l_j}\frac{\pi_{j,1}}{(1-\tau_{jc})^2} > 0. \quad \blacksquare$$

Proof of Proposition 3: The proof proceeds in three steps. We first solve for the Nash-equilibrium level of inputs provided by each firm in the second stage game as described in the body of the paper. We then use these input supplies as given and solve the first stage maximization problem of the foreign acquirer. In the last step we show how the value of the foreign and domestic agents move when the participation constraint binds, which gives our main result.

Second stage Nash-equilibrium level of inputs: As before we assume decreasing returns in the inputs provided by the private foreign and domestic agents to be able to solve for an optimal pair of inputs (I_j, L_j). Under partial foreign ownership, the payoffs for the foreign entity and the domestic owner are then given by

$$R_j^{F,\alpha_j} = -P + \alpha_j\Big(\pi_{j,1} + \phi_j A_{j,2} I_j^{\beta_I} L_j^{\beta_L}\Big) - I_j - \Gamma$$

and

$$R_j^{D,\alpha_j} = P + (1-\alpha_j)\Big(\pi_{j,1} + \phi_j A_{j,2} I_j^{\beta_I} L_j^{\beta_L}\Big) - p^D L_j,$$

Using the assumed form of the transfer, the payoffs can be written as

$$R_j^{F,\alpha_j} = (1-\zeta)\Big(\pi_{j,1} + \phi_j A_{j,2} I_j^{\beta_I} L_j^{\beta_L}\Big) - I_j - \Gamma$$

and

$$R_j^{D,\alpha_j} = \zeta\Big(\pi_{j,1} + \phi_j A_{j,2} I_j^{\beta_I} L_j^{\beta_L}\Big) - p^D L_j.$$

where $\zeta = 1 - \alpha_j(1-\kappa)$ is the effective share of the domestic agent in the acquired firm's revenues. Maximizing with respect to I_j and L_j gives the reactions functions:

$$I_j = L_j^{\frac{\beta_L}{1-\beta_I}} [\beta_I(1-\zeta)\phi_j A_{j,2}]^{\frac{1}{1-\beta_I}}$$

and

$$L_j = I_j^{\frac{\beta_I}{1-\beta_L}} [\frac{\beta_L \zeta \phi_j A_{j,2}}{p^D}]^{\frac{1}{1-\beta_L}}.$$

The Nash-equilibrium levels of inputs supplied are:

$$I_j(\alpha_j) = \psi_I \zeta^{\frac{\beta_L}{1-\beta_I-\beta_L}} (1-\zeta)^{\frac{1-\beta_L}{1-\beta_I-\beta_L}}$$

and

$$L_j(\alpha_j) = \psi_L \zeta^{\frac{1-\beta_I}{1-\beta_I-\beta_L}} (1-\zeta)^{\frac{\beta_I}{1-\beta_I-\beta_L}}.$$

where

$$\psi_I = \beta_L^{\frac{\beta_L}{1-\beta_I-\beta_L}} \beta_I^{\frac{1-\beta_L}{1-\beta_I-\beta_L}} (\phi_j A_{j,2})^{\frac{1}{1-\beta_I-\beta_L}} P^{D-\frac{\beta_L}{1-\beta_I-\beta_L}}$$

and

$$\psi_L = \beta_L^{\frac{1-\beta_I}{1-\beta_I-\beta_L}} \beta_I^{\frac{\beta_I}{1-\beta_I-\beta_L}} (\phi_j A_{j,2})^{\frac{1}{1-\beta_I-\beta_L}} P^{D-\frac{1-\beta_I}{1-\beta_I-\beta_L}}.$$

First stage problem of the foreign acquirer: The dependence of the optimal I_j and L_j on $\zeta = 1-\alpha_j(1-\kappa)$ means that they can be expressed as functions of α_j. Plugging in these values into the production function, the optimization problem of α_j for the foreign acquirer can be written as:

$$V_j^{F,\alpha_j} \equiv \max_{\zeta} \Big\{ (1-\zeta)\pi_{j,1} + (\psi - \psi_I)(\zeta^{\frac{\beta_L}{1-\beta_I-\beta_L}} (1-\zeta)^{\frac{1-\beta_L}{1-\beta_I-\beta_L}}) - \Gamma \Big\}$$

subject to

$$V_j^{D,\alpha_j} \equiv \zeta\pi_{j,1} + (\psi - p^D\psi_L)(\zeta^{\frac{1-\beta_I}{1-\beta_I-\beta_L}} (1-\zeta)^{\frac{\beta_I}{1-\beta_I-\beta_L}}) \geq V_j^{D,0},$$

where $\psi = \phi_j A_{j,2} {\psi_I}^{\beta_I} {\psi_L}^{\beta_L}$ and $\zeta = 1-\alpha_j(1-\kappa)$. Note that for $0 < \kappa < 1$ the Karush-Kuhn-Tucker conditions for maximizing with respect to ζ or α_j are the same as long as we assume that there is an interior solution for α_j.

The Lagrangian for this problem is:

$$\mathbb{L} = \mathbb{F}(\zeta) + \lambda \mathbb{G}(\zeta),$$

where

$$\mathbb{F}(\zeta) = (1-\zeta)\pi_{j,1} + (\psi - \psi_I)(\zeta^{\frac{\beta_L}{1-\beta_I-\beta_L}} (1-\zeta)^{\frac{1-\beta_L}{1-\beta_I-\beta_L}}) - \Gamma$$

and

$$\mathbb{G}(\zeta) = \zeta\pi_{j,1} + (\psi - p^D\psi_L)(\zeta^{\frac{1-\beta_I}{1-\beta_I-\beta_L}} (1-\zeta)^{\frac{\beta_I}{1-\beta_I-\beta_L}}) - V_j^{D,0}.$$

Assuming an interior solution for α_j (and hence $\zeta = 1-\alpha_j(1-\kappa)$), the first order necessary

conditions for a maximum are:

$$\begin{aligned}\mathbb{F}_\zeta &= -\lambda \mathbb{G}_\zeta \\ \mathbb{G}(\zeta) &\geq 0, \quad \lambda \geq 0, \quad \lambda.\mathbb{G}(\zeta) = 0,\end{aligned}$$

where

$$\mathbb{F}_\zeta = -\pi_{j,1} + \frac{\zeta^{\frac{\beta_L}{1-\beta_I-\beta_L}}(1-\zeta)^{\frac{1-\beta_L}{1-\beta_I-\beta_L}}(\psi-\psi_I)(\frac{\beta_L}{\zeta} - \frac{1-\beta_L}{1-\zeta})}{1-\beta_I-\beta_L},$$

and

$$\mathbb{G}_\zeta = \pi_{j,1} + \frac{\zeta^{\frac{1-\beta_I}{1-\beta_I-\beta_L}}(1-\zeta)^{\frac{\beta_I}{1-\beta_I-\beta_L}}(\psi-P^D\psi_L)(\frac{1-\beta_I}{\zeta} - \frac{\beta_I}{1-\zeta})}{1-\beta_I-\beta_L}.$$

`Case 1 (non-binding constraint):` When the constraint is slack, $\lambda = 0$, so that the optimal ζ solves $\mathbb{F}_\zeta = 0$. First note that when $\psi > \psi_I$, the second term in $\mathbb{F}_\zeta$ is positive only when $\zeta < \beta_L$. It is useful to consider the solution to this problem when $\pi_{j,1} = 0$. This corresponds to a situation when the effective share of the domestic agent should be given only by her relative importance in terms of input provision, since all the surplus from the acquisition in this accrues from production in period 2. The solution to $\mathbb{F}_\zeta = 0$ when is $\pi_{j,1} = 0$ is simply $\zeta = \beta_L$, which confirms this intuition. Now consider a small increase in $\pi_{j,1}$. To keep $\mathbb{F}_\zeta$ at 0, the second term has to be positive, i.e., we will need $\zeta < \beta_L$. Intuitively, the loss to the foreign acquirer from giving additional stake to the domestic agent is $-\pi_{j,1}$ at the margin. To balance this, the second term, which shows the marginal benefit accruing to the acquirer of giving a bit more stake to the domestic agent (through optimal input provision), should be positive. This would require $\zeta < \beta_L$. Thus in the case the participation constraint is non-binding, the effective share of the domestic agent is falling in $\pi_{j,1}$ and insensitive to τ_{jc}.

`Case 2 (binding constraint):` When the constraint binds the optimal ζ solves $\mathbb{G}(\zeta) = 0$. Note that $\lambda = -\frac{\mathbb{F}_\zeta}{\mathbb{G}_\zeta} > 0$ as long as at the relevant ζ, $\mathbb{F}_\zeta < 0$, i.e., the acquisition surplus accruing to the foreign agent is decreasing in the effective share of the domestic agent, and $\mathbb{G}_\zeta > 0$, i.e., the acquisition surplus accruing to the domestic agent, $\mathbb{G}(\zeta)$, is increasing in her effective share ζ.

In this case, $\mathbb{G}(\zeta) = 0 \Rightarrow \mathbb{G}_{\pi_{j,1}} \mathrm{d}\pi_{j,1} + \mathbb{G}_\zeta \mathrm{d}\zeta - \frac{dV_j^{D,0}}{d\pi_{j,1}} \mathrm{d}\pi_{j,1} = 0 \Rightarrow (\mathbb{G}_{\pi_{j,1}} - \frac{dV_j^{D,0}}{d\pi_{j,1}})\mathrm{d}\pi_{j,1} + \mathbb{G}_\zeta \mathrm{d}\zeta = 0 \Rightarrow \frac{\mathrm{d}\zeta}{\mathrm{d}\pi_{j,1}} = -\frac{(\mathbb{G}_{\pi_{j,1}} - \frac{dV_j^{D,0}}{d\pi_{j,1}})}{\mathbb{G}_\zeta} > 0$, since $\mathbb{G}_{\pi_{j,1}} = \zeta < 1$ and $\frac{dV_j^{D,0}}{d\pi_{j,1}} > 1$ (the latter was shown earlier in the proof of Lemma 1). Thus, $\frac{\mathrm{d}\alpha}{d\pi_{j,1}} = \frac{\mathrm{d}\zeta}{d\pi_{j,1}} \frac{\mathrm{d}\alpha}{\mathrm{d}\zeta} < 0$, since $\frac{\mathrm{d}\alpha}{\mathrm{d}\zeta} = \frac{1}{\kappa - 1} < 0$. In words, the optimal equity share of the foreign acquirer declines in first period profit $\pi_{j,1}$ of the domestic firm. Thus larger foreign stakes are more likely in external finance dependent sectors, i.e., those with lower $\pi_{j,1}$.

Similarly, $\mathbb{G}(\zeta)=0 \Rightarrow \mathbb{G}_{\tau_{jc}}\mathrm{d}\tau_{jc}+\mathbb{G}_{\zeta}\mathrm{d}\zeta-\frac{dV_j^{D,0}}{d\tau_{jc}}\mathrm{d}\tau_{jc}=0 \Rightarrow \mathbb{G}_{\zeta}\mathrm{d}\zeta-\frac{dV_j^{D,0}}{d\tau_{jc}}\mathrm{d}\tau_{jc}=0 \Rightarrow \frac{\mathrm{d}\zeta}{\mathrm{d}\tau_{jc}}=-\frac{-\frac{dV_j^{D,0}}{d\tau_{jc}}}{\mathbb{G}_{\zeta}}>0$, since $\mathbb{G}_{\tau_{jc}}=0$ and $\frac{dV_j^{D,0}}{d\tau_{jc}}>0$ (the latter was shown earlier in the proof of Lemma 1). Thus, $\frac{\mathrm{d}\alpha}{d\tau_{jc}}=\frac{\mathrm{d}\zeta}{d\tau_{jc}}\frac{\mathrm{d}\alpha}{\mathrm{d}\zeta}<0$. In words, the optimal equity share of the foreign acquirer declines in asset tangibility τ_{jc} of the domestic firm's industry, as well as domestic financial development. Thus larger foreign stakes are more likely in intangible sectors and financially less developed countries, i.e., those with lower τ_{jc}. ■

Proof of Proposition 4: Taking the derivative of $N_{jc}=\int_{\underline{l}_{jc}}^{\bar{l}_{jc}} dG_{jc}(l)=1-\left(\frac{\underline{l}_{jc}}{\bar{l}_{jc}}\right)^{\rho_j}$ with respect to τ_c we get:

$$\frac{dN_{jc}}{d\tau_c}=-\rho_j\Big(\frac{\underline{l}_{jc}}{\bar{l}_{jc}}\Big)^{\rho_j}\Big(\frac{1}{1-\tau_{jc}}+\frac{1}{\bar{l}_{jc}}\Big|\frac{d\bar{l}_{jc}}{d\tau_{jc}}\Big|\Big),$$

which is unambiguously negative. Note that we could have replaced $\frac{d\bar{l}_{jc}}{d\tau_{jc}}$ with $\frac{d\bar{l}_{jc}}{d\tau_c}$ in the proof since $\frac{d\tau_{jc}}{d\tau_c}=1$ from $\tau_{jc}=\tau_c+\tau_j$. Denoting the absolute value of this derivative by $D\equiv\left|\frac{dN_{jc}}{d\tau_c}\right|$, we have

$$\ln D=\ln\rho_j+\rho_j\ln\Big(\frac{\underline{l}_{jc}}{\bar{l}_{jc}}\Big)+\ln\Big(\frac{1}{1-\tau_{jc}}+\frac{1}{\bar{l}_{jc}}\Big|\frac{d\bar{l}_{jc}}{d\tau_{jc}}\Big|\Big).$$

Taking the derivative with respect to ρ_j we have

$$\frac{1}{D}\frac{dD}{d\rho_j}=\underbrace{\frac{1}{\rho_j}}_{>0}+\underbrace{\ln\Big(\frac{\underline{l}_{jc}}{\bar{l}_{jc}}\Big)}_{<0}.$$

Since $\rho_j>0$ and $\frac{\underline{l}_{jc}}{\bar{l}_{jc}}<1$, $\frac{d\ln D}{d\rho_j}>0$ when $\ln\bar{l}_{jc}<\ln\underline{l}_{jc}+\frac{1}{\rho_j}$. Since the cut-off $\bar{l}_{jc}$ is falling in financial development, this happens when the initial level of financial development is above a certain cut-off value. ■

Table 1: Transactions by Country Origin of Target

		No. of Transactions					Share of Foreign Acquirers			
		1990-94	1995-99	2000-04	2005-07	Total	1990-94	1995-99	2000-04	2005-07
Latin America										
	Argentina	58	228	142	38	466	0.66	0.58	0.48	0.45
	Brazil	103	394	311	89	897	0.40	0.57	0.48	0.43
	Chile	21	63	57	30	171	0.76	0.65	0.46	0.53
	Mexico	147	202	184	86	619	0.59	0.64	0.60	0.72
	Peru	10	40	19	12	81	0.20	0.53	0.16	0.50
	Total	339	927	713	255	2,234	0.54	0.59	0.50	0.55
Asia										
	China	75	328	928	901	2,232	0.64	0.50	0.34	0.36
	India	48	32	115	738	933	0.56	0.25	0.30	0.28
	Indonesia	33	74	76	31	214	0.45	0.57	0.47	0.16
	Malaysia	115	396	427	400	1,338	0.14	0.11	0.06	0.09
	Philippines	12	66	60	28	166	0.67	0.44	0.40	0.21
	Singapore	125	210	105	172	612	0.36	0.28	0.28	0.31
	South Korea	30	154	294	451	929	0.47	0.62	0.33	0.11
	Thailand	39	129	166	102	436	0.44	0.53	0.27	0.22
	Vietnam	5	8	13	13	39	0.40	0.75	0.62	0.46
	Total	482	1,397	2,184	2,836	6,899	0.40	0.37	0.28	0.25
South Africa		103	383	149	64	699	0.15	0.29	0.41	0.44
All Countries		924	2,707	3,046	3,155	9,832	0.42	0.43	0.34	0.28

Notes: The data are from SDC Thompson, as described in the text. The table reports the total number of domestic and foreign transactions and the share of foreign transactions by the country origin of the target.

Table 2: Foreign Transactions by Country Origin of Acquirer

	No. of Transactions					Share of Foreign Acquisitions
	1990-94	1995-99	2000-04	2005-07	Total	
United States	148	439	299	277	1,163	0.34
Europe	135	464	411	310	1,320	0.38
Asia	68	194	239	189	690	0.20
of which						
Japan	30	105	99	73	307	0.09
Hong Kong	38	85	136	111	370	0.11
Australia, Canada, and New Zealand	37	63	62	51	213	0.06
Other	3	13	18	46	80	0.02
All Countries	391	1,173	1,029	873	3,466	

Notes: The data are from SDC Thompson, as described in the text. The table reports the total number of foreign transactions and the share of foreign transactions relative to the total number of foreign and domestic transactions by the country origin of the acquirer.

Table 3a: Manufacturing Acquisitions by Industry of Acquirer

	Acquiring Firm SIC Category	Domestic		Foreign		
		Freq.	Percent	Freq.	Percent	Total
0	Agriculture, Forestry, and Fishing	84	1.3%	22	0.6%	106
1	Mining and Construction	148	2.3%	67	1.9%	215
2	Manufacturing (food,textiles petroleum)	1,793	28.2%	1,178	34.0%	2,971
3	Manufacturing (rubber, electronics)	1,769	27.8%	1,323	38.2%	3,092
4	Transport and Communications	139	2.2%	55	1.6%	194
5	Wholesale and Retail	230	3.6%	123	3.6%	353
6	Finance, Insurance, and Real Estate	1,958	30.8%	596	17.2%	2,554
7	Services (hotels, amusement)	155	2.4%	64	1.9%	219
8	Services (education, legal, other)	85	1.3%	38	1.1%	123
9	Public Administration	5	0.1%	-	-	5
	Total	6,366	100.0%	3,466	100.0%	9,832

Notes: The data are from SDC Thompson, as described in the text. The table reports the total number of domestic and foreign transactions and the share of foreign transactions by the country origin of the target.

Table 3b: Manufacturing Acquisitions by Industry of Target

	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%

Notes: The data are from SDC Thompson, as described in the text. The table reports the total number of domestic and foreign transactions and the share of foreign transactions by the country origin of the target.

Table 4a: Distribution of Fractions Acquired in Manufacturing Acquisitions

	Domestic		Foreign		
Share	Freq.	Percent	Freq.	Percent	Total
$\leq 10\%$	427	6.7%	171	4.9%	598
$10-20\%$	523	8.2%	210	6.1%	733
$20-30\%$	473	7.4%	207	6.0%	680
$30-40\%$	329	5.2%	147	4.2%	476
$40-50\%$	295	4.6%	137	4.0%	432
$50-60\%$	520	8.2%	359	10.4%	879
$60-70\%$	396	6.2%	198	5.7%	594
$70-80\%$	210	3.3%	81	2.3%	291
$80-90\%$	247	3.9%	125	3.6%	372
$90-100\%$	192	3.0%	90	2.6%	282
100%	2,754	43.3%	1,741	50.2%	4,495
Total	6,366	100.0%	3,466	100.0%	9,832
Share $\geq 10\%$	5,939	93.3%	3,295	95.1%	9,234
Share $\geq 50\%$	4,319	67.9%	2,594	74.9%	6,913

Notes: The data are from SDC Thompson, as described in the text. The table reports the total number of domestic and foreign transactions and the share of foreign transactions by the country origin of the target.

Table 4b: Mean and Median Share Acquired in Manufacturing Acquisitions

	Target Firm SIC Cateogry	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%

Notes: The data are from SDC Thompson, as described in the text. The table reports the total number of domestic and foreign transactions and the share of foreign transactions by the country origin of the target.

Table 5: Foreign Acquisitions and Country and Year Fixed Effects

	(1)	(2)	(3)	(4)
Ext. Fin. Dep.	0.026***	0.033***	0.026***	-0.002
	(0.007)	(0.009)	(0.009)	(0.006)
Asset Tang.	-0.020***	-0.006	-0.008	-0.000
	(0.006)	(0.007)	(0.008)	(0.006)
Observations	9,832	3,466	3,466	6,366
R-squared	0.1736	0.1915	0.2408	0.1510
Macroeconomic Controls	No	No	No	No
Country × Year Fixed Effects	Yes	Yes	No	Yes
Country Pair and Year Fixed Effects	No	No	Yes	No

Notes: The table reports the point estimates of the standardized coefficients obtained from regressing the foreign acquisition dummy and the average stake acquired in the foreign and domestic subsamples on country and time fixed effects. The dependent variable is the foreign acquisition dummy in column (1), the fraction acquired in foreign acquisitions in columns (2) and (3), and the fraction acquired in domestic acquisitions in column (4). In the regression with the foreign acquisition dummy as the dependent variable, the fraction owned after is included as a covariate. The regressions are Equations (4.1), (4.2) and (4.3) in the text. The dependent variable is not standardized. Standardized coefficient estimates are reported with standard errors clustered at the country×industry level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 6: Alternative Theories

	(1)	(2)	(3)	(4)	(5)	(6)
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)
Observations	9,489	5,549	3,286	2,057	6,203	3,492
R-squared	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

Notes: The table reports the point estimates of the standardized coefficients obtained from regressing the foreign acquisition dummy and the fraction acquired on a set of covariates. The dependent variable is the foreign acquisition dummy in columns (1) and (2) and the fraction acquired in columns (3) to (6). Columns (3) and (4) only consider the subsample of foreign acquistion. Columns (5) and (6) consider the subsample of domestic acquisition. The dependent variable is not standardized. Standardized coefficient estimates are reported with standard errors clustered at the country×industry level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. The coefficient estimates for the macroeconomic controls lagged four quarters are omitted from the table to conserve space.

Table 7: What Factors Determine the Likelihood of a Foreign Acquisition?

	(1)	(2)	(3)	(4)
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. × Priv. Bond	-0.016***		-0.012**	
	(0.006)		(0.005)	
Asset Tang. × Priv. Bond	0.014**		0.007	
	(0.007)		(0.006)	
Private Credit		-0.025		-0.005
		(0.025)		(0.032)
Ext. Fin. Dep. × Priv. Credit		-0.023***		-0.017*
		(0.008)		(0.009)
Asset Tang. × Priv. Credit		0.010		0.008
		(0.006)		(0.007)
Tech. Rel. to U.S.			-0.010	-0.005
			(0.012)	(0.011)
K/L			0.020	0.020
			(0.031)	(0.029)
log(Scale)			-0.013	-0.013
			(0.020)	(0.019)
log(R&D/Sales)			0.029	0.028
			(0.026)	(0.025)
log(Adv./Sales)			-0.023**	-0.025**
			(0.011)	(0.010)
Tariff			0.017	0.016
			(0.012)	(0.013)
Observations	9,489	9,489	5,549	5,549
R-squared	0.1211	0.1215	0.1395	0.1397
Macroeconomic Controls	Yes	Yes	Yes	Yes
Country and Year Fixed Effects	Yes	Yes	Yes	Yes

Notes: The table reports the point estimates of the standardized coefficients obtained from regressing the foreign acquisition dummy on a set of covariates. The regression is Equation (4.4) in the text. Columns (1) and (3) use private bond market capitalization as a measure of financial development, while columns (2) and (4) use private credit. The dependent variable is not standardized. Standardized coefficient estimates are reported with standard errors clustered at the country×industry level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. The coefficient estimates for the macroeconomic controls lagged four quarters are omitted from the table to conserve space.

Table 8a: What Factors Determine the Average Stake Size in Foreign Acquisitions?

	(1)	(2)	(3)	(4)
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. × Priv. Bond	-0.003		-0.001	
	(0.008)		(0.009)	
Asset Tang. × Priv. Bond	-0.001		0.005	
	(0.006)		(0.005)	
Private Credit		-0.024		0.042
		(0.027)		(0.046)
Ext. Fin. Dep. × Priv. Credit		-0.008		-0.007
		(0.008)		(0.010)
Asset Tang. × Priv. Credit		-0.004		0.008
		(0.008)		(0.009)
Tech. Rel. to U.S.			-0.015	-0.015
			(0.011)	(0.011)
K/L			0.043	0.043
			(0.030)	(0.031)
log(Scale)			-0.021	-0.022
			(0.022)	(0.023)
log(R&D/Sales)			-0.030	-0.030
			(0.027)	(0.027)
log(Adv./Sales)			0.022*	0.022*
			(0.012)	(0.012)
Tariff			-0.026*	-0.025
			(0.015)	(0.015)
Observations	3,286	3,286	2,057	2,057
R-squared	0.1237	0.1245	0.1351	0.1357
Macroeconomic Controls	Yes	Yes	Yes	Yes
Country and Year Fixed Effects	Yes	Yes	Yes	Yes

Notes: The table reports the point estimates of the standardized coefficients obtained from regressing the fraction acquired in the susbample of foreign acqusitions on a set of covariates. The regression is Equation (4.4) in the text. Columns (1) and (3) use private bond market capitalization as a measure of financial development, while columns (2) and (4) use private credit. The dependent variable is not standardized. Standardized coefficient estimates are reported with standard errors clustered at the country×industry level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. The coefficient estimates for the macroeconomic controls lagged four quarters are omitted from the table to conserve space.

Table 8B: What Factors Determine the Average Stake Size in Domestic Acquisitions?

	(1)	(2)	(3)	(4)
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. × Priv. Bond	0.006		0.001	
	(0.007)		(0.006)	
Asset Tang. × Priv. Bond	-0.001		-0.003	
	(0.007)		(0.011)	
Private Credit		-0.060***		-0.105***
		(0.021)		(0.034)
Ext. Fin. Dep. × Priv. Credit		0.004		-0.001
		(0.007)		(0.007)
Asset Tang. × Priv. Credit		0.007		0.006
		(0.006)		(0.006)
Tech. Rel. to U.S.			0.018**	0.019**
			(0.009)	(0.008)
K/L			0.048	0.044
			(0.031)	(0.030)
log(Scale)			-0.038	-0.034
			(0.024)	(0.023)
log(R&D/Sales)			-0.006	-0.007
			(0.022)	(0.022)
log(Adv./Sales)			-0.002	-0.003
			(0.014)	(0.014)
Tariff			0.034***	0.028***
			(0.009)	(0.009)
Observations	6,203	6,203	3,492	3,492
R-squared	0.1029	0.1045	0.1466	0.1491
Macroeconomic Controls	Yes	Yes	Yes	Yes
Country and Year Fixed Effects	Yes	Yes	Yes	Yes

Notes: The table reports the point estimates of the coefficients obtained from regressing the fraction acquired in the susbample of domestic acqusitions on a set of covariates. The regression is Equation (4.4) in the text. Columns (1) and (3) use private bond market capitalization as a measure of financial development, while columns (2) and (4) use private credit. The dependent variable is not standardized. Standardized coefficient estimates are reported with standard errors clustered at the country×industry level. ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. The coefficient estimates for the macroeconomic controls lagged four quarters are omitted from the table to conserve space.

Table 9a: Summary Statistics of the Macroeconomic Covariates

	Real GDP p. c.		Real GDP growth		Ch. in nom. XRT		IMF credits & loans		Private bonds		Private credit	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Latin America												
Argentina	9,918	1,818	3.0	5.8	8.0	76.4	249.6	114.1	4.6	2.3	19.7	4.7
Brazil	7,504	890	2.5	2.1	15.3	39.6	116.7	189.1	9.6	2.9	34.1	5.4
Chile	9,568	1,116	5.5	3.1	1.2	5.1	15.9	40.5				
Mexico	10,084	922	3.5	2.9	2.1	7.4	229.6	192.6	6.7	4.9	20.8	5.5
Peru	4,395	732	6.0	4.3	1.9	4.0	103.8	52.5	2.4	1.3	18.7	5.3
Asia												
China	4,339	963	10.4	1.6	0.0	3.1	0.0	0.8	9.3	3.3	105.3	11.5
India	2,317	377	8.3	1.7	0.2	3.1	6.4	24.5	1.5	0.8	36.0	5.5
Indonesia	3,272	426	5.0	4.3	4.5	15.6	182.5	167.5	1.7	0.4	34.0	14.9
Malaysia	9,221	769	6.2	4.0	0.4	4.6	0.0	0.0	40.7	11.7	114.4	17.6
Philippines	3,437	435	3.8	2.0	1.9	7.2	112.6	49.9	0.4	0.3	38.4	8.4
Singapore	27,584	6,053	7.1	3.4	−0.3	2.8	0.0	0.0	14.7	3.2	99.2	11.5
South Korea	21,147	3,838	4.9	3.5	−0.2	10.0	163.1	399.3	52.6	6.6	85.6	10.8
Thailand	6,377	754	4.2	4.7	1.4	9.7	89.2	127.5	10.1	1.9	113.4	24.4
Vietnam	2,000	401	7.6	1.1	0.0	0.0	71.4	34.5			48.8	21.4
South Africa	5,790	411	2.7	1.8	2.4	5.9	19.6	20.1	13.6	2.9	114.3	17.1

Notes: Real GDP is the output-side real GDP at chained PPPs in millions of 2005 USD from the Penn World Tables. Real GDP per capita is real GDP divided by the population in millions, and real GDP growth is the year-over-year percent change. The change in the nominal exchange rate is the quarter-to-quarter percent change of the national currency per USD end of period exchange rate. IMF credit and loans are the total liabilities as a percentage of each country's quota. The exchange rate data and the IMF credit and loans data are from the IMF International Financial Statistics database. Private bond market capitalization and private credit are expressed relative to GDP. Both indicators were obtained from the most recent edition of the World Bank's *Financial Structure Database*.Statistics are weighted by the number of observations.

Table 9B: Summary Statistics of the Industry-Level Dependent Variables and Covariates

	Ext. Fin. Dep.		Asset Tang.		Tech. rel. to US		K/L		log(R&D/Sales)		log(Adv./Sales)		Tariff	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Latin America														
Argentina	0.21	0.17	0.32	0.09	0.196	0.276	4.55	0.49	−4.69	1.02	−3.89	0.84	0.10	0.06
Brazil	0.25	0.18	0.31	0.09	0.154	0.152	4.52	0.46	−4.37	0.98	−4.12	0.88	0.13	0.05
Chile	0.20	0.15	0.33	0.10	0.063	0.064	4.52	0.55	−4.77	1.05	−3.99	0.84	0.08	0.02
Mexico	0.24	0.18	0.32	0.09	0.031	0.039	4.48	0.50	−4.58	0.99	−4.04	0.84	0.15	0.05
Peru	0.16	0.10	0.33	0.07	0.033	0.047	4.62	0.38	−5.00	0.84	−3.62	0.61	0.12	0.03
Asia														
China	0.29	0.18	0.29	0.08	0.001	0.002	4.48	0.49	−4.13	0.96	−4.15	0.80	0.12	0.07
India	0.27	0.17	0.30	0.08	0.002	0.004	4.42	0.58	−4.31	1.05	−4.09	0.79	0.20	0.10
Indonesia	0.20	0.20	0.31	0.07	0.001	0.001	4.53	0.47	−4.54	0.96	−3.98	0.94	0.08	0.05
Malaysia	0.27	0.20	0.31	0.09	0.004	0.008	4.33	0.53	−4.51	1.05	−4.27	0.87	0.08	0.07
Philippines	0.19	0.16	0.32	0.08	0.005	0.007	4.59	0.43	−4.67	0.91	−3.79	0.69	0.07	0.04
Singapore	0.35	0.23	0.27	0.09			4.32	0.42	−4.17	0.97	−4.25	0.78	0.00	0.00
South Korea	0.33	0.21	0.27	0.09			4.42	0.45	−3.97	0.85	−4.25	0.75	0.09	0.09
Thailand	0.26	0.18	0.32	0.09	0.001	0.001	4.40	0.54	−4.47	0.97	−4.06	0.80	0.13	0.09
Vietnam	0.15	0.17	0.30	0.08	0.000	0.001	4.32	0.65	−5.24	0.92	−3.43	0.47	0.17	0.12
South Africa	0.28	0.21	0.29	0.09	0.106	0.091	4.37	0.51	−4.38	1.03	−4.07	0.83	0.06	0.06

Notes: Statistics are weighted by the number of observations.

Table 10: Correlations of covariates

	Ext. Fin. Dep.	Asset Tang.	Priv. Bond	Priv. Credit	T. Rel. to U.S.	K/L	log(Scale)	$\log\left(\frac{R\&D}{Sales}\right)$	$\log\left(\frac{Adv.}{Sales}\right)$	Tariff
Ext. Fin. Dep.	1									
Asset Tang.	-0.331	1								
Private Bond	0.056	0.016	1							
Private Credit	0.149	-0.111	0.443	1						
Tech. Rel. to U.S.	-0.205	0.075	-0.137	-0.309	1					
K/L	-0.357	0.238	-0.113	-0.072	0.074	1				
log(Scale)	-0.125	0.195	-0.115	-0.047	0.052	0.879	1			
log(R&D/Sales)	0.449	-0.465	-0.045	0.119	-0.259	0.407	0.459	1		
log(Adv./Sales)	-0.361	0.098	-0.100	-0.097	0.227	0.185	-0.003	-0.370	1	
Tariff	-0.030	0.034	-0.273	-0.280	0.036	-0.222	-0.107	-0.294	-0.020	1

Notes: The table reports correlation of the standardized variables for the sample used in table 7, columns (3) and (4).