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## Vertical integration and supplier finance

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## Working Papers

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### Vertical Integration and Supplier Finance

Erasmus Kersting,  
Holger Görg

No. 1894 | January 2014

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## **Vertical Integration and Supplier Finance**

Erasmus Kersting, and Holger Görg

Abstract:

We investigate the financial implications of a multinational firm's choice between outsourcing and integration from the perspective of the supplier. Using a simple model, we explore the extent to which an integrated supplier's access to finance, as well as its sources of funding, change relative to a firm supplying a multinational at arm's-length. The model predicts that integrated firms have better access to finance and cover a larger share of their costs using internal funds. Furthermore, improvements in a host country's level of financial development have less of an impact on the financial situation of integrated suppliers. We present empirical evidence from firm-level data for over 60 countries broadly supporting the predictions.

Keywords: Vertical Integration; Financial Constraints; Multinational companies.

JEL classification: F23; G32

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# 1 Introduction

There has been much interest in exploring the link between finance and trade recently, in particular in the wake of the financial crisis (e.g., Amiti and Weinstein, 2011, Chor and Manova, 2010, Bricongne, Fontagne, Gaulier, Taglioni, and Vicard, 2009, Greenaway, Guariglia, and Kneller, 2007). This research has clearly shown the importance of good access to finance for export activities of firms and, thus, greatly enhanced our ability to explain the international flow of goods, services and capital. Financial factors are also important for the activities of multinational enterprises (MNE), which are responsible for the lion's share of international trade. The way MNEs react to changes in financial development has important implications, for trade flows in general as well as for host country suppliers and governments. By definition operating in several countries, MNEs are able to "transmit" financial sophistication and enable integrated firms to access finance to a degree that local financial markets cannot provide.

This paper focuses on the relationship between a multinational enterprise and its host country suppliers. We investigate the implication of the decision by the MNE to vertically integrate or not with the supplier for the supplier's financial position. We develop a model of a multinational-supplier relationship that incorporates financial constraints as well as relationship-specific investment. Importantly, the choice of organizational form by the multinational also determines the extent to which the supplier can borrow to finance its operations. If the multinational integrates the supplier, access to finance is improved both through an improved standing with the local bank as well as an additional credit line directly from the multinational parent. *Ceteris paribus*, an integrated supplier is less likely to be credit constrained, uses internal funds to a larger and external funds to a smaller extent. The model also predicts that integrated suppliers will be less dependent on the quality of local financial institutions. Improvement in a country's financial sector will thus impact locally-owned firms relatively more than integrated ones. These predictions are in line with empirical evidence obtained from analysing firm level data for 64 countries.

While there has been some research on the relationship between finance and multinational operations, the link between vertical integration and the financial situation of the supplier has, to the best of our knowledge, largely been neglected.<sup>1</sup> We fill this gap in the literature. Our research question is not only of academic interest, however, but has also got wider implications for policy. Since access to finance is crucial for many aspects of firm activities (such as exporting, conducting R&D, investments etc.) an improvement in the financial position of host country suppliers is likely to benefit the host economy through an expansion of the suppliers' business operations.

Our paper touches on different strands of the literature. Most closely related to our work, Carluccio and Fally (2012) examine the impact of potentially financially constrained suppliers on multinational firms' sourcing decisions. The authors show that in countries with less developed financial sectors vertical FDI is more prevalent, especially in industries that are relatively more R&D intensive. Studying horizontal FDI rather than vertical relationships, Antràs, Desai and Foley (2009) show that the host country's level of investor protection also influences multinational behavior: in countries with higher quality investor protection one observes more arm's length technology transfers, a bigger share of activity financed by capital flows from the multinational parent, and smaller ownership shares by multinationals. We follow both of these studies in

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<sup>1</sup>Javorcik and Spatareanu (2009) are an interesting exception. They provide some descriptive evidence, based on their own survey, on the behavior of multinationals towards locally-owned suppliers. 31 out of 137 multinational enterprises surveyed in the Czech Republic in 2003 reported providing their suppliers with advance payments and financing. Also, a quarter of suppliers reported that being a MNE supplier helped them obtain a bank loan. The authors specifically limit their analysis to Czech (therefore non-integrated) suppliers, so the numbers are likely to present a lower bound of the extent of financial engagement between multinational parents and integrated suppliers.

applying the property-rights theory of the firm, which was introduced to the international trade literature by Antràs (2003). Our analysis is complementary, as we examine a different aspect of the interactions between multinational and supplier, namely the change in the supplier's financial situation. As a consequence, our empirical strategy relies on supplier data, while Carluccio and Fally and Antràs et al. use data on French and U.S. multinationals, respectively, to validate their model's predictions.

A number of papers starting with Harrison and McMillan (2003) and Harrison, Love, and McMillan (2004) investigate the implications of inward foreign direct investment (FDI) for financial constraints. In terms of local firms' financial circumstances, the effect of an increase in international capital inflows is ambiguous in theory. Harrison et al. (2004) find, using firm level data for 38 countries, that incoming foreign capital inflows alleviate financial constraints.<sup>2</sup> Splitting the sample along the line foreign/domestically-owned, the effect is stronger for foreign-owned firms, but significantly positive for both. While the authors are unable to examine the mechanisms with their data, this result suggests a possible sequence of events: First, the directly affected firm receives additional funds, which eases its financial constraint. Second, it borrows less from local banks, which, as a result, lend more to local firms. Third, as a direct result local firms' financial constraints are also eased. We present a model that formalizes the first two of these effects and provides related evidence. We show in our model that being integrated causes a supplier to be less financially constrained. In addition, it becomes less dependent on commercial banks, financing its operations with internal rather than external funds. Our results thus complement and expand on Harrison et al. (2004).

Another related strand of research shifts the focus directly on the multinational enterprise, asking how its activity depends on host country financial development. Aguiar and Gopinath (2005) show that cross-border mergers and acquisitions (M&A) increase when a country is hit with a negative liquidity shock. This kind of fire sale FDI is interpreted to arise because the multinational has superior access to finance relative to domestic firms, and integration is thus used to overcome liquidity shortages. Desai, Foley, and Hines (2004) argue along similar lines and document how multinational firms adjust their internal capital markets to compensate for the lack of financial depth in some countries of operation.

Finally, our work also contributes to the literature studying the effect of foreign ownership on local affiliates of multinational enterprises empirically. For example, Desai, Foley, and Forbes (2008) show that U.S. affiliates abroad are in a better position than local firms to raise output and sales in response to a sharp currency depreciation due to financing from their parent company. Local firms suffer from the fall in value of their collateral, whereas integrated firms employ their multinational parents' financial resources to expand.

Alfaro and Chen (2012) focus on the performance differential between locally- and foreign-owned firms and report that foreign ownership leads to better firm performance in times of financial crises. They explain this effect through the presence of vertical production linkages as well as financial linkages. Lacking affiliate-level data on financial transactions with the multinational parent, the authors compute industry-level measures of the intensity of financial linkages. By construction, this measure cannot consider differences in supplier financing arising from differences in organizational form across firms within the same industry. By contrast, our paper sheds direct light on the firm-level channels which cause the integrated supplier to be less constrained financially.

Raff and Trofimenko (2013) also examine the direct effect of foreign ownership on local affiliates. Their interest lies in the propensity of a firm to engage in international trade via exporting or importing. They consider 'foreign ownership' and 'access to finance' as different exogenous treatments. This represents a

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<sup>2</sup>Harrison and McMillan (2003) find the opposite, namely, that inward FDI exacerbates financial constraints for local firms. However, the paper uses data from only one country, Côte d'Ivoire, which the authors themselves admit is quite special.

marked difference to our analysis, which focuses on the relationship between integration by an MNE and subsequent changes in supplier finance. As a result, we consider 'access to finance' endogenous to the treatment of vertical integration.

To sum up, the literature has established a link between host country financial sector development and multinational choice of organization (arm's length production versus acquisition and integration) as well as a link between host country financial sector development and post-integration internal capital flows within the multinational firm. These insights inform several of our modeling decisions. Building on Carluccio and Fally (2012) and Antràs and Helpman (2008), we present a model that includes two options for final good firms located abroad regarding the cooperation with their suppliers in the host country. One option is to buy from the supplier without internalizing, which has the advantage of a bigger incentive for the supplier to invest effort. Alternatively, the foreign firm may internalize the supplier (vertical FDI), which decreases the supplier's efforts – but increases its access to finance. This is crucial if firms are financially constrained, which is more likely to be the case if they happen to be located in a country with a smaller financial sector. In contrast to Carluccio and Fally, our model allows for the mere process of integration to improve the supplier's borrowing ability in external capital markets (because of improved standing in the eyes of local banks) as well as to open up an internal capital market (because the multinational parent extends a line of credit).<sup>3</sup> Consequently, the model predicts that integrated suppliers have improved access to finance and will use more internal funds than locally owned firms, *ceteris paribus*. At the same time, a change in the host country's level of development of its financial sector will have a stronger impact on locally owned firms, as integrated firms are sheltered by the new financial ties with their multinational parents. These predictions are fully consistent with results from the earlier literature cited above.

We subject the predictions of the model to empirical evidence using firm-level data from the World Bank Enterprise Surveys for 64 countries. In particular, we focus on host country firms that are exporting (and perhaps importing), which suggests that they form a link in a larger production chain. Using propensity score matching and reweighting methods, we compare the effect of the treatment "foreign owned" on variables that reflect the firm's financial environment. We focus on i) the self-reported variable describing how much of an obstacle access to finance poses to the firm's operations, ii) the percentage of financing the firm obtains through own funds or retained earnings, iii) the percentage of financing the firm obtains through its owner. We find broad support in the data for the financial impact of vertical FDI predicted by the model.

The paper proceeds as follows. Section 2 outlines the details of our theoretical model, while Section 3 derives the empirical predictions. The empirical strategy is explained in Section 4, empirical results presented in Section 5. Section 6 concludes.

## 2 Model

The model is based on Carluccio and Fally (2012) (CF hereafter), who in turn base their work on the Antràs and Helpman (2008) model of global sourcing. It departs from CF in a number of ways. Most importantly, we allow for the organizational form to impact the supplier's access to finance: First, the share of surplus that can be used as collateral to secure loans is now a function of the country's level of financial

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<sup>3</sup>In the working paper version of their article, Carluccio and Fally (2010) mention working through various alternative assumptions regarding the nature of firm financial constraints and whether they change as a result of integration, without providing details. As pointed out above, there are several results in the literature showing that suppliers connected to MNEs enjoy preferential treatment by lenders (Javorcik and Spatareanu, 2009) and that multinationals channel funds to their subsidiaries if needed (Desai et al., 2004, Desai et al., 2008, Alfaro and Chen, 2012).

development as well as the supplier's ownership structure. A supplier that is owned by a large, widely-known multinational is likely to receive a different treatment when applying for loans than an otherwise comparable locally owned firm.<sup>4</sup> Second, integration in this model occurs without the negotiation of a transfer from supplier to multinational but instead directly introduces a second credit line to the supplier provided by the multinational parent. This mechanism represents the internal credit markets analyzed by Desai et al. (2004) and Desai et al. (2008). Because our interest lies in studying the extent to which integration helps suppliers overcome financial constraints, focusing on financial flows from multinational parent to integrated supplier is an obvious choice.

## 2.1 Production

There are two agents, a multinational firm labeled  $M$  and a supplier labeled  $S$ . The supplier produces an intermediate good that is traded to the multinational firm. The multinational subsequently turns the intermediate good into a final good and sells it. The market for final goods is imperfectly competitive, and there is a continuum of varieties of the final good.

Total revenues from final good sales are given by  $Y = A^{1-\rho}Q^\rho$ , where  $Q$  represents the total quantity produced and  $A$  is a demand factor. This expression can be derived from the Dixit-Stiglitz model of monopolistic competition with constant elasticity of substitution between goods. The elasticity of substitution is given by  $\sigma = \frac{1}{1-\rho} > 1$ .

The multinational transforms intermediate goods into final goods at the ratio of 1:1. The supplier produces intermediate goods using effort  $e$ , with one unit of effort producing one unit of intermediate goods.<sup>5</sup> The cost of one unit of effort is given by  $c$ . The expression for total revenue is thus simply given by

$$Y = A^{1-\rho}e^\rho$$

and total costs are

$$C = ce.$$

## 2.2 Organizational form and bargaining

The effort put forth by the supplier is not contractable. The supplier first chooses the level of  $e$ , and afterwards bargaining between the supplier and the multinational commences. Following CF, the bargaining scheme is assumed to be Nash bargaining with symmetric shares. In the case of agreement, each party receives half of the value of the partnership plus its outside option. For the supplier, the outside option is always zero because the input produced is specific and thus has no outside value. The outside option for the multinational depends crucially on the choice of organizational form: if the multinational has chosen to integrate the supplier (vertical FDI), the supplier does not hold the property rights and can thus not prevent the multinational from acquiring the intermediate goods. However, the multinational can only obtain a fraction  $(1 - \delta) < 1$  of the value of the supplier's efforts, due, for example, to the costs of replacing the supplier's management or engaging legal channels to secure the goods. Formally, the multinational's outside

<sup>4</sup>See Javorcik and Spatareanu (2009) for survey evidence documenting this effect.

<sup>5</sup>Note that there is only one kind of task, the 'complex' one. This simplifies the model and exposition. It also emphasizes the difference between integration and arm's length production by abstracting from all tasks that are in fact contractible. Of course, it renders us unable to generate predictions regarding the effect of differences in product complexity on the relationships studied, but that is not our focus.

option under integration is given by  $(1 - \delta) A^{1-\rho} e^\rho$ . If the supplier has not been integrated, the outside option is zero for both parties, because the effort is specific and sunk, but the multinational also has no claim on it.

### 2.3 Financial constraints

Financial markets do not work perfectly. In particular, the supplier may be financially constrained while the multinational is assumed to have superior access to finance. The supplier can receive funds from several sources in order to cover its costs  $C$ . First, there is initial liquid wealth which we denote by  $W$ . Second, the supplier can take out loans from local banks, which is denoted by  $L$ . Finally, there is the potential of direct financing from the multinational the supplier is engaged with. In the case of outsourcing this transfer is denoted by  $T$ , and may be positive or negative. If cooperation with the multinational generates sufficient rents to more than cover  $C$ , the multinational may extract a fee up-front which we can interpret along the lines of a licensing fee. The multinational may also choose to help finance the supplier while keeping the organizational form of outsourcing (negative  $T$ ). Alternatively, the multinational may integrate the supplier. In that case, no licensing fee is required. Instead, the multinational provides an additional credit line so that  $L$  now consists of loans taken out from commercial banks and from the multinational parent. Due to the assumption of superior access to finance by the multinational, the supplier will always borrow from its parent first. The supplier's budget constraint is thus given by

$$C = W + L - T$$

in the case of outsourcing, and only

$$C = W + L$$

in the case of integration. Let  $\alpha$  and  $\beta$  denote the loans from the multinational and commercial banks, respectively, so that  $\alpha + \beta = L$ . The amount the supplier can borrow is determined by three factors: the supplier's share of total revenue  $Y_S$ , the overall development of the country's financial sector  $\kappa$  and the organizational form of the supplier  $\mu^X$ ,  $X \in \{O, I\}$ , where  $O$  denotes outsourcing and  $I$  integration. The borrowing constraints are given by

$$L^O \leq \phi(\kappa, \mu^O) Y_S$$

and

$$L^I \leq (\phi(\kappa, \mu^I) + \gamma) Y_S.$$

The supplier can only borrow up to a fraction of the revenue arising from the business relationship with the multinational.<sup>6</sup> By modeling  $\phi$  to be a function of both the institutional environment of the country the supplier is located in and the organizational form, we allow the process of integration to change the supplier's financial circumstances. Formally, we assume  $\frac{\partial \phi}{\partial \kappa} > 0$  and  $\phi(\kappa, \mu^O) < \phi(\kappa, \mu^I)$ . Note the difference to CF, who focus solely on the country-specific  $\kappa$ .

Integrated suppliers can also borrow from their multinational parent up to a fraction  $\gamma$  of their share of the revenue. The additional credit line is immediately available once the supplier has been integrated by the multinational. It is completely exogenous and can be interpreted as representing the superior access to

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<sup>6</sup>This is a standard assumption of imperfect collateralization: in case of default, the bank would be unable to obtain the full value of the debtor's assets and thus reduces its exposure by limiting the fraction of total assets the borrower can collateralize.



finance by the multinational parent.

## 2.4 Timing

The timing is the same as in CF:

1. The multinational proposes a contract to the supplier  $(X, T)$ , where  $X$  is the organizational form (outsourcing  $O$  or integration  $I$ ) and  $T$  is the monetary transfer (if  $X = I$  there is no transfer  $T$ ).
2. Transfer  $T$  takes place in the case of outsourcing.
3. The supplier decides on the level of  $e$  and produces the intermediate good.
4. Nash bargaining takes place on the value of joint production.

## 2.5 Solution

Due to the standard structure of the model, we shorten the presentation. The bargaining outcomes are given by

$$\begin{aligned} Y_M^O &= \frac{1}{2} A^{1-\rho} e^\rho \\ Y_S^O &= \frac{1}{2} A^{1-\rho} e^\rho \end{aligned}$$

for outsourcing and

$$\begin{aligned} Y_M^I &= \left(1 - \frac{\delta}{2}\right) A^{1-\rho} e^\rho \\ Y_S^I &= \frac{\delta}{2} A^{1-\rho} e^\rho \end{aligned}$$

for the case of integration. The superscript denotes the organizational form ( $O$  for outsourcing and  $I$  for integration) and the subscript indicates multinational ( $M$ ) or supplier ( $S$ ). Note that integration leads to a bigger share of the revenue going to the multinational because the bargaining position of the supplier is weakened by the loss of property rights. As a result, the model predicts that the supplier chooses a lower level of effort in the case of integration. Formally, in the case of outsourcing the supplier solves the problem

$$\max_e \frac{1}{2} A^{1-\rho} e^\rho - ce$$

and thus chooses

$$e^O(c) = a\rho(2c)^{-\sigma},$$

where  $a = A\rho^{\sigma-1}$  is a constant that depends on demand factors and the substitutability of one final good variety for another. In the case of integration, the level of effort is given by

$$e^I(c) = a\rho\delta^\sigma(2c)^{-\sigma}.$$

Intuitively, the smaller the loss to the multinational from removing the current management after a disagreement and replacing it with a new one, the less bargaining power the supplier has under integration. At the extreme, when  $\delta$  goes towards zero, so does the effort by the supplier. As a next step, we find the optimal transfer offered by the multinational planning to outsource if the supplier is not financially constrained.

### 2.5.1 Outsourcing

If a supplier's financial constraint is non-binding, the up-front transfer  $T$  is simply determined by the participation constraint

$$T \leq Y_S^X(e^X) - C.$$

In the case of outsourcing, the result is

$$\bar{T}^O(c) = a \left( \frac{1 - \rho}{2} \right) (2c)^{1-\sigma}.$$

The bar above  $T$  denotes the value for the transfer conditional on the supplier being unconstrained. The higher the cost of one unit of effort for the supplier, the lower is the transfer the multinational can demand. The reason is that a higher cost translates into lower effort by the supplier, who thus receives a smaller rent that can be captured by the multinational.

Knowing what transfer is offered in the case of unconstrained suppliers, we are now in position to find the exact boundaries beyond which a supplier's wealth suffices to be unconstrained. Using the financial constraint given by

$$T \leq W + \phi(\kappa, \mu^O) Y_s^O - C,$$

we find

$$\bar{W}^O(c, \kappa) = \frac{1 - \phi(\kappa, \mu^O)}{2} a (2c)^{1-\sigma}.$$

Note that the probability of a supplier being financially constrained rises if the country has a relatively less developed financial sector or the costs of intermediate good production are high.

Should the supplier fall below this critical wealth level, the multinational will optimally adjust the level and potentially even the direction of the transfer  $T$ . Using again the financial constraint, which now binds, we get

$$T^O(W, \kappa, c) = W + a \left( \frac{\phi(\kappa, \mu^O) - \rho}{2} \right) (2c)^{1-\sigma}$$

This transfer can be negative, in which case it represents funding of the supplier by the multinational. As is obvious from the expressions, this is particularly likely if the level of financial sector development in the supplier's country is low (low  $\kappa$ ) and if the elasticity of substitution between final goods is high (high  $\rho$ ).

Profit by the multinational is given by

$$\bar{\Pi}^O(c) = a \left( 1 - \frac{\rho}{2} \right) (2c)^{1-\sigma}$$

if the supplier is not financially constrained, and by

$$\Pi^O(W, \kappa, c) = W + a \left[ \frac{1 + \phi(\kappa, \mu^O) - \rho}{2} \right] (2c)^{1-\sigma}$$

if the financial constraint is binding. Note that the supplier country's financial sector development has an impact on the multinational's profits only if the financial constraints are binding. Then, the multinational cannot extract the first-best transfer and thus faces lower profits.

### 2.5.2 Integration

If the multinational decides to integrate the supplier instead there will be no transfer  $T$ . Profit by the multinational will thus be simply equal to the surplus after bargaining,  $\bar{\Pi}_M^I(c) = Y_M^I = \left(1 - \frac{\delta}{2}\right) A^{1-\rho} e^\rho$ .<sup>7</sup> It is easy to show that the multinational will never choose to integrate if the supplier has sufficient wealth to be unconstrained under outsourcing ( $W > \bar{W}^O$ ). However, the lower the supplier's amount of initial liquidity, the more heavily weigh financial constraints. Therefore, we can find the level of  $W$  at which the multinational is indifferent between outsourcing and keeping the supplier financially constrained and independent on one hand and integrating the supplier and thus relieving the financial constraint (but lowering the supplier's efforts) on the other hand. It is implicitly defined by

$$\bar{\Pi}^I(c) = \Pi^O(W^{I/O}, \kappa, c).$$

This yields

$$W^{I/O} = a(2c)^{1-\sigma} \left[ \delta^{\sigma-1} \left(1 - \frac{\delta}{2}\right) - \frac{(1 + \phi(\kappa, \mu^O) - \rho)}{2} \right] < \bar{W}^O.$$

Becoming integrated opens up a new source of funds to the supplier: direct loans from the multinational parent. As shown above, this credit line is limited to a fraction  $\gamma$  of collateralizable revenue. An integrated supplier is credit-constrained if  $C \geq W + L^{\max}$ , where  $L^{\max} = (\phi(\kappa, \mu^I) + \gamma) Y_I^S$ . We denote the wealth cut-off level  $\bar{W}^I$ :

$$\bar{W}^I = a\delta^\sigma (2c)^{1-\sigma} \left[ \frac{\rho - \phi(\kappa, \mu^I) - \gamma}{2} \right].$$

Not surprisingly both the availability of direct credit from the multinational as well as the raised access to finance from integration lowers the threshold below which an integrated supplier would find themselves constrained. If one were to assume perfect capital markets for the multinational then  $\gamma$  need not be bounded. In that case, there are no financially constrained affiliates, since the availability of credit through their parents is limitless.<sup>8</sup>

If the supplier is constrained, the consequently sub-optimal level of effort  $\bar{e}$  is implicitly defined by

$$W + (\phi(\kappa, \mu^I) + \gamma) \frac{\delta}{2} A^{1-\rho} \bar{e}^\rho = c\bar{e}.$$

Then multinational profit is given by

$$\Pi^I(W, \kappa, c) = \left(1 - \frac{\delta}{2}\right) A^{1-\rho} \bar{e}^\rho.$$

<sup>7</sup>Note the difference to CF: In that model, after integration the multinational still extracts all of the surplus via the transfer  $T$ . This is not possible in this framework. In terms of optimal organizational form this is irrelevant, however, because outsourcing dominates integration in this range of supplier wealth levels in both cases.

<sup>8</sup>Carluccio and Fally (2010) mention having worked through several different assumptions regarding the implications of integration on the suppliers financial constraint as well, including perfect access to finance as a result of integration. They do not provide details, though.

In this case, financial sector development of both the supplier’s country (through  $\kappa$ ) as well as the multinational’s (through  $\gamma$ ) has an impact on the profit of the multinational.

To summarize, this model predicts different organizational forms depending on the supplier’s initial liquidity, holding everything else constant. At high levels of  $W$ , the multinational will choose outsourcing and extract the surplus with up-front transfers (licensing fees). As  $W$  falls below  $\bar{W}^O$ , those transfers shrink until the multinational finds itself providing up-front financing to a supplier to which it outsources. Then, the boundary  $W^{I/O}$  is reached and the multinational is indifferent between outsourcing and integrating the supplier, which implies lower effort but also improves the supplier’s financial position. At wealth levels below  $W^{I/O}$  integration is optimal. Crucially, as the supplier now finds itself with more credit in addition to a decreased need for funds (due to the decrease in effort because of the lost property rights), the credit line with the multinational will be used first. As  $W$  drops further, commercial banks are also used again until, for very low levels of  $W$ , the integrated supplier finds itself credit constrained and can thus not deliver the full amount of effort  $e$ .

### 3 Empirical Predictions

Our paper studies the relationship between organizational form, level of financial development and a supplier’s financial constraints. In particular, we are interested in the effect of becoming part of a multinational firm on the financial situation of the acquired supplier. In addition, we examine whether this effect depends on the level of financial sector development in the supplier’s country.<sup>9</sup> In terms of variables, we compare the extent to which the firm is financially constrained overall, the proportion of internal funds used by the supplier to cover costs, and the proportion of external funds used to cover costs for the cases of integrated and non-integrated suppliers. Before we describe our empirical strategy, we turn to a discussion of the model’s implications for each of these three variables.

#### 3.1 Access to Finance

The firm’s overall access to finance in this model is given by  $\phi$  in the case of outsourcing and  $\phi + \gamma$  if the supplier is integrated. It depends therefore on the country’s level of financial development  $\kappa$  as well as whether the firm’s ownership is domestic or foreign. Predictions 1 and 2 immediately follow.

##### **Prediction 1 (ACCESS TO FINANCE)**

*Integrated suppliers will be less constrained by lack of access to finance.*

##### **Prediction 2 (FINANCIAL DEVELOPMENT)**

*An increase in financial sector development will ease suppliers’ financial constraints regardless of ownership.*

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<sup>9</sup>In contrast, CF focus on the link between a country’s level of financial development and the choices of multinational firms with respect to affiliates in those countries. Their main predictions state that multinationals are more likely to import inputs from a country with a higher level of financial sector development. At the same time intrafirm trade, i.e. receiving inputs from an integrated supplier, is more likely if the supplier is located in a country with a low level of financial development. Both of these effects are stronger if the degree of complexity of the input is high. In summary, CF focus on the perspective of the multinational parent and consequently use data on multinational headquarters. We focus on the suppliers, instead.

### 3.2 Proportion of Working Capital Financed with Internal Funds

The supplier's budget constraint is given by  $C = W + L - T$ , where the presence of  $T$  and the contents of  $L$  depend on the organizational form. Under outsourcing, internal funds are given by  $W - T$ . Beginning with the case of financially constrained suppliers, we get

$$\begin{aligned}\frac{W - T^O(W, \kappa, c)}{C^O} &= a \left( \frac{\rho - \phi(\kappa, \mu^O)}{2} \right) (2c)^{1-\sigma} \frac{1}{a\rho 2^{-\sigma} c^{1-\sigma}} \\ &= 1 - \frac{\phi(\kappa, \mu^O)}{\rho}.\end{aligned}$$

For suppliers with liquidity sufficient not to be constrained we find

$$\begin{aligned}\frac{W - \bar{T}^O}{C^O} &= \left[ W - a \left( \frac{1 - \rho}{2} \right) (2c)^{1-\sigma} \right] \frac{1}{a\rho 2^{-\sigma} c^{1-\sigma}} \\ &= \frac{W}{C^O} + \left( 1 - \frac{1}{\rho} \right)\end{aligned}$$

In the case of suppliers under integration, internal funds are given by  $W + \alpha$ , since the loan obtained from the multinational parent also represents internal funds. We first focus on the case where the additional credit line from the multinational is sufficient to relieve the credit constraint. Then it must hold that  $W + L^{\max} > C$ , where  $L^{\max}$  is the biggest possible loan the supplier can take out, namely  $(\phi(\kappa, \mu^I) + \gamma) Y_S^I$ . It then follows that

$$\begin{aligned}L^{\max} &> L = C - W \\ \alpha &= \min [\gamma Y_S^I, C - W] \\ \beta &= L - \alpha\end{aligned}$$

Here  $\alpha$  and  $\beta$  represent the components of  $L$  that are borrowed from the multinational parent and the local banks, respectively. The second line states that the supplier will first cover its borrowing needs with credit from its multinational parent and only second with commercial bank loans. This assumption is easy to motivate keeping in mind that we already assumed that the multinational has better access to finance than the supplier and can thus deliver funds to its affiliate at a lower cost than an external bank. Monitoring costs might also be lower within a firm than between external contract partners.

Let us first consider the case where  $(C - W) < \gamma Y_S^I$ . This implies that all of the supplier's borrowing needs can be met using internal funds. Consequently, we get

$$\frac{W + \alpha}{C^I} = \frac{W + L}{C^I} = \frac{C^I}{C^I} = 1.$$

For these firms, integration implies that no external funds are required and the share of internal funds used to finance working capital is 100 percent.

Let us now consider the other extreme, where borrowing needs still exceed total credit. In this case we have

$$\frac{W + \alpha}{C^I} = 1 - \frac{\beta}{C^I} = 1 - \frac{\phi(\kappa, \mu^I)}{C^I} = 1 - \frac{\phi(\kappa, \mu^I)}{\rho}.$$

Note that this case mirrors the constrained supplier under outsourcing, with the exception that the integrated

supplier can borrow more as a result of the change in ownership.

Lastly, we consider the case where borrowing needs exceed the credit granted by the multinational parent but are still low enough to keep the financing constraint slack, i.e.  $L^{\max} > (C - W) > \gamma Y_S^I$ :

$$\frac{W + \alpha}{C^I} = \frac{W + \gamma Y_S^I}{C^I} = \frac{W}{C^I} + \frac{\gamma}{\rho}.$$

One can show that  $\frac{W}{C^I} + \frac{\gamma}{\rho}$  is strictly greater than  $1 - \frac{\phi(\kappa, \mu^I)}{\rho}$ . In other words, as we move from constrained to unconstrained the share of costs covered with internal funds increases monotonically from  $1 - \frac{\phi(\kappa, \mu^I)}{\rho}$  to 1.

Assuming  $W = W^{I/O}$ , the internal funds share depends on the organizational form and the country's financial sector development as summarized in Prediction 3:

**Prediction 3 (INTERNAL FUNDS SHARE)**

*If integration lifts the supplier's financial constraints, the proportion of costs that is covered using internal funds is larger if the supplier is integrated.*

*For suppliers that use any external funding, the internal funds share decreases with financial development.*

*This effect is weakened if the supplier is integrated.*

### 3.3 Proportion of Working Capital Financed with External Funds

The only alternative to internal funds are loans from commercial banks. Therefore, the shares can be easily computed using the results from the last section. Beginning with the case of outsourcing, we get

$$\frac{L^O}{C^O} = \frac{\phi(\kappa, \mu^O)}{\rho}$$

for financially constrained suppliers and

$$\frac{\bar{L}^O}{C^O} = \frac{1}{\rho} - \frac{W}{a\rho 2^{-\sigma} c^{1-\sigma}}$$

for unconstrained ones. In the case of integrated suppliers we again differentiate between the three cases i) suppliers whose borrowing needs are met by the new credit line from the multinational parent ii) suppliers who are still constrained even after integration and iii) those inbetween. Loans from commercial banks  $\beta$  are now only a part of  $L$  (the other part being loans from the multinational parent, which count as internal funds).

For case i) we get

$$\frac{\beta}{C^I} = 0,$$

for case ii)

$$\frac{\beta}{C^I} = \frac{\phi(\kappa, \mu^I) Y_S^I}{C^I} = \frac{\phi(\kappa, \mu^I)}{\rho}$$

and, finally, for case iii)

$$\frac{\beta}{C^I} = 1 - \left( \frac{W}{C^I} + \frac{\gamma}{\rho} \right) = \frac{L^I}{C^I} - \frac{\gamma}{\rho}.$$

Parallel to the previous section one can show that  $0 < \frac{L^I}{C^I} - \frac{\gamma}{\rho} < \frac{\phi(\kappa, \mu^I)}{\rho}$ . The more liquidity the integrated supplier has, the smaller the share of financing it receives from local banks.

Our empirical prediction is thus the inverse of Prediction 3:

**Prediction 4** (EXTERNAL FUNDS SHARE)

*If integration lifts the supplier’s financial constraints, the proportion of costs that is covered using bank loans is smaller if the supplier is integrated.*

*For suppliers that use any external funding, the external funds share increases with financial development.*

*This effect is weakened if the supplier is integrated.*

## 4 Empirical Methodology

The theoretical model, thus, predicts that there is a relationship between the ownership status of the supplier – i.e., whether it is part of a foreign multinational or not – and aspects of its financial status. We now turn to look at some empirical evidence related to these theoretical ideas. To do so, we take a host country perspective and compare the financial status of suppliers that are foreign owned – i.e., are part of a foreign multinational – and suppliers that are independent and owned by domestic owners.

More specifically, we take data from the World Bank Enterprise Survey for 64 emerging economies and developing countries. The list of countries included in the sample is provided in the Appendix Table A1.<sup>10</sup> The data set does not directly identify suppliers. Our assumption is that in our sample of countries all exporting, foreign owned firms (which are part of a multinational) supply intermediates to the multinational parent abroad, at least to some extent. In order to identify a control group of domestically owned suppliers (which are not part of a multinational), we only consider domestic firms which export part of their output. The idea is that those firms export intermediates to firms located abroad akin to the foreign owned exporters.<sup>11</sup> An alternative method to identify suppliers uses the four-digit ISIC code of the main product produced by the firm. Using Appendix 2 of Sturgeon and Memedovic (2011), we identify firms that are in purely intermediate goods sectors. Unfortunately, this reduces our sample considerably because a large number of ISIC codes encompasses both intermediate and final goods, preventing us from definitively categorizing all intermediate goods firm. As a consequence, we choose the characterization based on exporter status as our primary approach.<sup>12</sup>

We then compare the financial status of the two types of firms – foreign affiliates and independent domestic firms. The model predicts that integrated suppliers will be less financially constrained and will rely

<sup>10</sup>The surveys were carried out at different times in the 2006 - 2011 period. We generally have one survey year per country. In some cases, data are available for two survey years. However, these two survey years do not constitute a panel, but two independent cross sections. We control for the different time periods in the estimation using year dummies. The survey years are included in Table A1.

<sup>11</sup>In a robustness check, we further limit the sample both for treatment and control to firms that export and import some of their inputs, as these are even more likely to be firms that are part of global production networks.

<sup>12</sup>The results using the small sample of ISIC code identified intermediate goods producing firms are in fact stronger than the ones reported in the main text and are available upon request.

more on internal funds (and less on bank loans) than unaffiliated firms. The World Bank Enterprise Surveys provide proxies for these aspects of the financial status, which we exploit in the empirical analysis. In order to gauge financial constraints, we use a firm’s response to a question as to whether access to finance is an obstacle to firm operations. This question is answered on a scale from 0 (no obstacle), 1 (minor obstacle), 2, 3 and 4 (very severe obstacle). Also, the data provide information on the firms’ shares of cost covered with internal funds and external funds (bank loans).

Table 1 presents a simple comparison of means for the two groups of firms, foreign-owned affiliates and domestic suppliers. We see that, on average, foreign owned firms are less likely to report that access to finance is problematic, which is in line with the idea that they are less financially constrained. They also report higher use of internal funds and lower use of bank loans to cover costs. This preliminary evidence is, thus, in line with our hypotheses developed earlier.<sup>13</sup>

However, Table 1 also shows that foreign-owned and domestic firms differ along a range of other firm characteristics. The former are, on average larger, more skill intensive, younger and more productive. They also tend to have experienced lower growth rates of sales and employment over the three years prior to the survey. This suggests that, in order to identify an effect of foreign ownership on aspects of financial status, we need to control appropriately for these differences in firm characteristics.

One way to achieve this is propensity score matching. The purpose of matching is to pair each foreign-owned firm with one or a number of domestic-owned suppliers on the basis of some observable variables, in such a way that the domestic firms’ financial status can generate the counterfactual for the foreign firm.<sup>14</sup> This type of matching procedure is preferable to randomly or indiscriminately choosing the comparison group, because it is less likely to induce estimation bias by picking firms with markedly different characteristics.

Since matching involves foreign and domestic owned firms across a number of observable characteristics (e.g., productivity, size, skill-intensity, industry characteristics etc.), it is desirable to perform the matching on the basis of a single index that captures all the information from those variables. We adopt the method of propensity score matching which suggests the use of the probability of receiving treatment (foreign ownership in the present context) conditional on those characteristics, to reduce the dimensionality problem. Accordingly, we first identify the probability (or propensity score) of being foreign owned using a probit model

$$P(\textit{Foreign}_i = 1) = F(X_i, d_i)$$

where  $X$  is a vector of covariates observed in the same or previous time period. This vector consists of a number of firm characteristics, namely size, age, skill intensity (and their squared terms), productivity, employment growth, sales growth. The estimation also includes a vector  $d$  with dummy variables for industries, geographical region and survey year.

In a first step, we calculate a standard matching estimate, i.e., the average treatment effect based on kernel matching. That is, we calculate the difference between the outcome variables for the treated and control group firms, where the observations for the latter are weighted by their propensity score.

We also use a propensity score reweighting estimator due to Hirano, Imbens, and Ridder (2003). This estimator uses the propensity score to weight observations in a regression framework. Specifically, Hirano et al. (2003) show that reweighting by the inverse of the propensity score, rather than the true propensity

<sup>13</sup>The variables are defined in Table B1 in Appendix B.

<sup>14</sup>Propensity score matching has been quite popular in the international trade literature, in particular when looking at foreign ownership. See, for example, Arnold and Javorcik (2009) and Girma and Görg (2007).



score, leads to an efficient estimate of the average treatment effects on the treated. We opt for this estimator since Busso, DiNardo, and McCrary (2009) show that propensity score reweighting estimators typically outperform propensity score matching estimators.<sup>15</sup> Also, the propensity score reweighting approach allows for including additional regressors in the estimation, the so-called covariates adjustment, in order to avoid any bias in the matching estimate.

We consider a weighted least squares estimation of the regression function

$$Y_i = \beta_0 + \beta_1 * Foreign_i + \beta_2 * Z_i + e_i$$

where  $Y_i$  is the financial status of the firm and  $Z$  is a vector of covariates. The error term  $e$  is clustered at the country level.

Intuitively, the propensity score reweighting method adjusts for differences between groups of firms by assigning greater (lower) weights to control group firms that are more (less) similar to treated firms. Since our aim is to estimate the average treatment effects on the foreign firms, we want to find control groups of domestic supplier firms that are as close as possible to the treated firms. To this end, we weight each foreign firm by 1 and each domestic supplier firm by  $P^*/(1 - P^*)$ , where  $P^*$  is the conditional probability of being foreign-owned, i.e. our propensity score index.

## 5 Estimation

### 5.1 Propensity Score Estimation

The propensity score is estimated using a simple probit estimator. The results are reported in Table 2. In line with the summary stats presented above, a firm is more likely to be foreign owned the more productive it is, the larger, more skill intensive, and the younger it is. Also, firms that experienced high sales or employment growth in the past three years are less likely to be foreign owned.

Based on the estimated propensity scores we impose the common support condition to ensure that any combination of characteristics observed in the group of treated firms can also be observed among the group of domestic firms. Thus, we restrict our attention to the group of domestic firms that fall within the support of the propensity score distribution of the group of foreign firms. In addition, we carry out a balancing test to check that the propensity score is successful in controlling for differences in observable characteristics across treated and domestic firms. The tests proceed by dividing the observations into 9 blocks within which there are no statistically significant differences in the mean propensity score between treated and control group firms. We then test that within these blocks, there are no statistically significant differences between foreign and domestic firms in terms of the covariates included in the vector  $X$ . These tests are passed.<sup>16</sup>

### 5.2 Standard propensity score matching estimates

The results from the standard propensity score matching, based on Kernel matching are reported in Table 3. We find that, as suggested by our theoretical model, suppliers that are part of a foreign multinational are less likely to report that access to finance is an obstacle to their operations. This is in line with the

<sup>15</sup>Guadalupe, Kuzmina, and Thomas (2012) is a recent paper using propensity score reweighting estimation in the international trade literature.

<sup>16</sup>The tests are not reported here to save space, but are available from the authors upon request.

suggestion that they are less financially constrained than the control group of domestic suppliers. The point estimate implies that the average multinational scores 0.18 units lower on the score between 1 - 4 than a comparable domestic firm. We also find that the group of foreign owned firms relies more on internal funds, rather than bank loans, for covering their costs. The estimates suggest that the foreign owned firms' ratio of internal funds as a share of costs is roughly 10 percentage points higher for multinational affiliates than purely domestic suppliers. Their share of bank loans is, by contrast, around 6 percentage points lower.

### 5.3 Results from the propensity score reweighting estimations

The results thus far are in line with our theoretical predictions. We now move on to estimation results from reweighting regressions with covariates adjustment. These are likely to provide more reliable estimates than simple propensity score matching. Also, this approach allows us to provide some further evidence related to Predictions 3 and 4 developed above, which state that there is an interaction between the supplier status and the level of financial development in the country. In order to test for this, we interact our foreign ownership dummy with an indicator of financial development of the country. We choose private credit divided by GDP as our measure of financial development, using data from Beck, Demirgüç-Kunt, and Levine (2000). We also include this variable on its own in the regression. Table 4 reports the results of the baseline regressions. As can be seen, the coefficients on the foreign ownership dummy on their own are similar to the simple matching results reported above in terms of their signs. However, the magnitude is substantially reduced, as is the statistical significance of the estimates.

The signs on the financial development variable are in line with Prediction 2. Our model predicts that financial constraints of firms are lower the better is the level of financial development. This is indicated by the negative coefficient on financial development in column 1. The model also predicts that the share of internal funds should be lower, and the level of bank finance accordingly higher for suppliers that use external finance (irrespective of ownership) with improvements in financial development. This is mirrored in the data, as the coefficients for private credit over GDP in columns 2 and 3 show. Moreover, these effects of financial development should be weakened for foreign owned suppliers. This is again indicated by our regression results, as we find a positive coefficient on the interaction of foreign ownership and financial development in column (2) (albeit statistically insignificant) and negative and statistically significant coefficient in column 3.

Our theoretical model only considers the choice of a multinational to vertically integrate or not, and does not allow for different degrees of ownership. However, one may argue that the theory fits best to fully owned foreign affiliates which convey full control on the multinational parent. Our data set also provides us with information on the actual share of foreign ownership, which we exploit in an extension. We repeat the empirical exercise, now separately for fully foreign owned affiliates and joint ventures with some foreign ownership.

This implies that we now have different treatment variables, either full ownership (FO) or joint ventures (JV). For both treatment groups, we use the control group (as previously) of domestic suppliers. We then firstly match FO firms with the control group based on a propensity score obtained from a probit regression of the probability to be FO conditional on the same set of covariates. The results of the propensity score reweighting exercise are reported in Table 5. We then carry out a similar exercise for JV firms and domestic suppliers as control. The results of the reweighting regression are reported in Table 6. It is clear that there are strong differences between these two treatments. We find that the results we established above only

hold for vertically integrated suppliers that are fully owned by the foreign parent and not for joint ventures. Indeed, the coefficient estimates appear stronger both in terms of statistical significance and magnitude in Table 5 compared to Table 6.

Focusing on fully owned affiliates in Table 5, one can see that the positive effect of foreign ownership on internal funds usage is larger in absolute magnitude and statistically more significant than the negative effect on external funds usage (as is the case in Table 4). In light of our model this suggests that integration provides additional sources of internal funds while not always alleviating financial constraints sufficiently to make bank finance unnecessary. Note also that the data supports the prediction of a stronger effect of financial sector development on the external funds usage of domestic relative to foreign owned suppliers, as indicated by the interaction term. In order to aid the interpretation of the interaction, Figure 1 depicts the predicted external funds share (point estimate and 95 percent confidence interval) at different levels of private credit over GDP for the cases of outsourcing and full foreign ownership. It is clear that the external funds share increases less with increasing financial development for foreign owned firms, as suggested by the model.

In a further extension, we consider a more stringent criterium for a firm to be considered a supplier. While in the analysis thus far we consider any firm that exports some of its output as a potential supplier to firms abroad, we now limit the definition further and only consider firms that both export their output and import some of their inputs. There are two reasons for doing so. The first is that domestic firms that both export and import may be more likely to be involved in international production networks, hence, they may also be more likely to be suppliers. The second reason is that by also considering imports we are eliminating a further aspect of firm heterogeneity, as it is generally the case that firms that both export and import are more productive than firms that only export (Bernard, Jensen, Redding, and Schott, 2007). We, therefore, redo the analysis with the narrower treatment and control groups. We only consider fully foreign owned firms. The results of the reweighting regression are provided in Table 7. As one can see, the results do not differ strongly from those reported in Table 5.

## 6 Conclusions

This paper looks at the implications of a multinational firm's choice between outsourcing and vertical integration for the suppliers financial position. We, firstly, develop a simple model which we use to explore the extent to which an integrated supplier's access to finance, as well its sources of funding, change relative to a firm supplying a multinational at arm's-length. The model predicts that integrated firms have better access to finance and cover a larger share of their costs using internal funds. Furthermore, improvements in a host country's level of financial development have less of an impact on the financial situation of integrated suppliers. We, secondly, use firm-level data for over 60 countries from the World Bank Enterprise Surveys to investigate the empirical relevance of the theoretical predictions. Using a propensity score reweighting estimation framework, we compare the financial position of foreign affiliates and comparable domestic suppliers. We find broad support in the data for the financial impact for the suppliers predicted by the model.

Besides filling a gap in the academic literature our findings also have potential policy implications. Access to finance is crucial for many aspects of sophisticated firm activities with highly uncertain outcomes, such as exporting, conducting R&D or investing in other innovative activities. Hence, an improvement in the financial position of a host country firm through integration with a multinational may, through improved access to finance, benefit the host economy through an expansion of suppliers' business activities.

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Figure 1: Predictive Margins of Organizational Forms

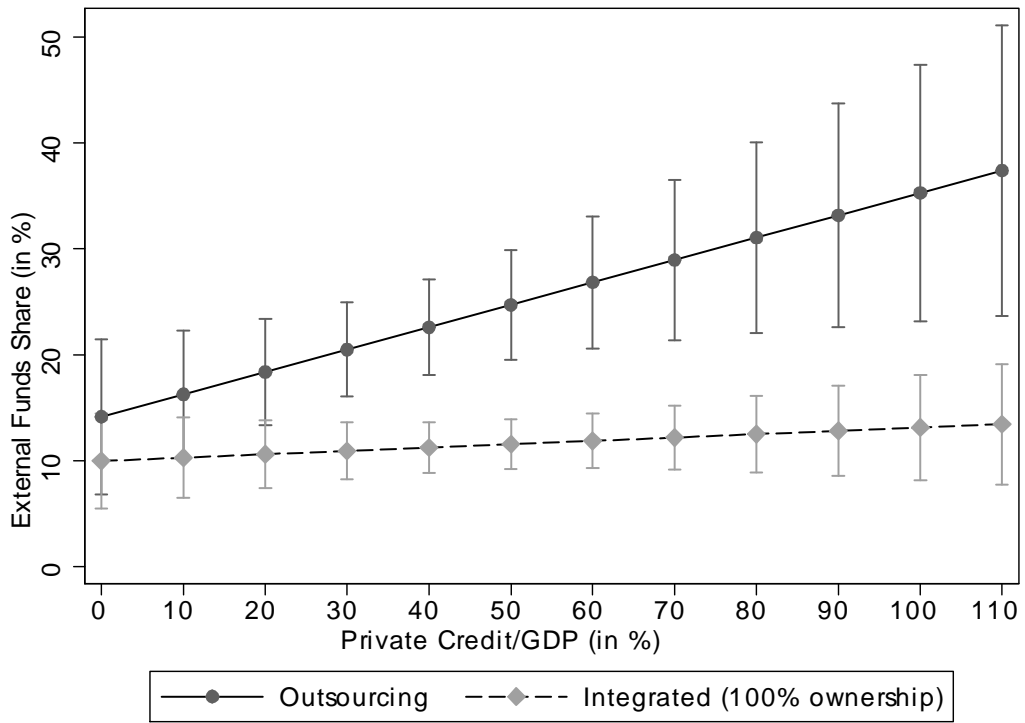


Table 1: Summary Statistics – Comparisons of means

Variable	domestic			foreign		
	Obs	Mean	Std.Dev.	Obs	Mean	Std.Dev.
access to finance	3367	1.550	1.314	1090	1.238	1.273
internal_funds	2815	52.64	35.98	958	62.30	36.44
bank_funds	2028	21.83	27.25	738	16.85	26.62
skill_share	3367	0.625	0.327	1090	0.672	0.319
prod_ratio	3367	1.715	1.458	1090	2.268	1.826
age	3367	3.068	0.718	1090	2.956	0.825
sales_growth	3367	0.084	0.184	1090	0.073	0.177
empl_growth	3367	0.030	0.109	1090	0.024	0.111
employees	3367	232.6	678.8	1090	428.6	899.5

Table 2: Propensity score estimation

Dependent variable is <i>forowned</i>	Coef.	Std.Err.	$P >  z $
<i>prod_ratio</i>	0.127***	0.013	0.000
<i>age</i>	-1.248***	0.183	0.000
$(age)^2$	0.153***	0.030	0.000
<i>skill_share</i>	-0.059	0.306	0.847
$(skill\_share)^2$	0.293	0.263	0.265
<i>sales_growth</i>	-0.409***	0.129	0.001
<i>empl_growth</i>	-0.716***	0.213	0.001
<i>employees</i>	0.674***	0.090	0.000
$(employees)^2$	-0.036***	0.009	0.000

The dependent variable is binary. Probit estimation. \*\*\* $p < .01$  The specification includes dummies (coefficients not reported) for year, industry and geographic region.



Table 3: Standard propensity score matching estimates (ATT)

	Matching estimate	Standard error
Access to finance	-0.183***	0.045
Internal funds	9.914***	1.602
Bank funds	-6.451***	1.351

Standard errors based on bootstrapping. Kernel matching.

Table 4: Reweighting Equations

	(1) Access to finance	(2) Internal funds	(3) Bank funds
<i>foreign_owned</i>	-0.0992 (-0.95)	5.893** (2.22)	-0.0428 (-0.02)
<i>fin_dev</i>	-0.00760** (-2.23)	-0.164* (-1.71)	0.208** (2.55)
<i>foreign_owned</i> × <i>fin_dev</i>	-0.00160 (-0.65)	0.0731 (0.84)	-0.150* (-1.96)
<i>skill_share</i>	0.0489 (0.52)	4.405 (1.60)	-4.777** (-2.60)
<i>prod_ratio</i>	-0.0800** (-4.96)	0.374 (0.70)	0.0429 (0.13)
<i>age</i>	-0.0114 (-0.24)	-3.160** (-2.24)	3.082* (1.84)
<i>sales_growth</i>	-0.144 (-1.02)	-1.469 (-0.22)	0.359 (0.05)
<i>empl_growth</i>	0.177 (0.66)	-7.355 (-1.14)	17.30** (2.98)
<i>employees</i>	-0.116** (-5.00)	0.121 (0.12)	1.029 (1.47)
N	4457	3822	2806
Number of Countries	64	48	41

z statistics based on country clustered standard errors in parantheses. \* p<.1, \*\* p<.05

Table 5: Reweighting Equations, fully owned foreign firms only

	(1) Access to finance	(2) Internal funds	(3) Bank funds
<i>foreign_owned_fully</i>	-0.236** (-2.01)	9.976** (2.72)	-4.163 (-1.32)
<i>fin_dev</i>	-0.00689** (-2.01)	-0.150 (-1.44)	0.211** (2.42)
<i>foreign_owned_fully</i> × <i>fin_dev</i>	-0.000928 (-0.33)	0.0929 (1.02)	-0.180* (-1.97)
<i>skill_share</i>	-0.0190 (-0.16)	4.614 (1.58)	-5.110** (-2.91)
<i>prod_ratio</i>	-0.0656** (-3.71)	0.269 (0.39)	0.148 (0.38)
<i>age</i>	-0.106** (-2.07)	-2.674* (-1.92)	2.120 (1.28)
<i>sales_growth</i>	-0.195 (-1.06)	-9.261 (-1.28)	7.801 (1.22)
<i>empl_growth</i>	0.382 (1.11)	-6.773 (-0.75)	21.48** (3.37)
<i>employees</i>	-0.0984** (-3.25)	0.522 (0.42)	1.255* (1.83)
N	3905	3357	2450
Number of Countries	62	46	39

z statistics based on country clustered standard errors in parantheses. \* p<.1, \*\* p<.05

Table 6: Reweighting Equations, joint venture foreign firms only

	(1)	(2)	(3)
	Access to finance	Internal funds	Bank funds
<i>foreign_owned_jv</i>	0.0329 (0.28)	2.078 (0.72)	3.080 (1.12)
<i>fin_dev</i>	-0.00822** (-2.43)	-0.191** (-2.23)	0.218** (2.84)
<i>foreign_owned_jv</i> × <i>fin_dev</i>	-0.00221 (-0.96)	0.0187 (0.21)	-0.0644 (-1.10)
<i>skill_share</i>	0.119 (0.92)	4.039 (1.24)	-4.170 (-1.60)
<i>prod_ratio</i>	-0.0908** (-4.90)	0.0360 (0.08)	0.343 (0.69)
<i>age</i>	0.0658 (1.16)	-1.703 (-1.03)	1.994 (1.04)
<i>sales_growth</i>	-0.0980 (-0.59)	8.848 (1.12)	-8.714 (-1.06)
<i>empl_growth</i>	0.00256 (0.01)	-8.775 (-1.00)	11.89 (1.60)
<i>employees</i>	-0.133** (-4.31)	-0.550 (-0.40)	0.965 (1.08)
N	3892	3291	2389
Number of Countries	64	48	41

z statistics based on country clustered standard errors in parantheses. \* p<.1, \*\* p<.05

Table 7: Reweighting Equations, fully owned firms, different sample

	(1) Access to finance	(2) Internal funds	(3) Bank funds
<i>foreign_owned_fully</i>	-0.324** (-2.44)	11.12** (3.00)	-6.088** (-2.06)
<i>fin_dev</i>	-0.00614 (-1.66)	-0.147 (-1.49)	0.195** (2.46)
<i>foreign_owned_fully</i> × <i>fin_dev</i>	-0.000409 (-0.12)	0.0898 (1.20)	-0.154* (-2.02)
<i>skill_share</i>	0.0113 (0.08)	4.009 (1.13)	-4.250** (-2.13)
<i>prod_ratio</i>	-0.0528** (-2.89)	0.0110 (0.02)	0.159 (0.40)
<i>age</i>	-0.0919 (-1.64)	-3.312** (-2.31)	1.400 (0.79)
<i>sales_growth</i>	-0.275 (-1.55)	-5.899 (-0.71)	7.474 (1.05)
<i>empl_growth</i>	0.465 (1.26)	-9.231 (-1.07)	24.66** (3.57)
<i>employees</i>	-0.112** (-3.41)	0.463 (0.36)	1.471** (1.80)
N	3238	2810	2036
Number of Countries	62	46	38

z statistics based on country clustered standard errors in parantheses. \* p<.1, \*\* p<.05

Only firms that import inputs as well as export their output are considered.

## 7 Appendix A

Table A1: List of countries and number of firms

Country	Freq.	Percent	# foreign owned	Survey year(s)
Albania	8	0.18	4	2007
Argentina	439	9.85	103	2006, 2010
Armenia	9	0.20	2	2009
Belarus	15	0.34	3	2008
Bolivia	51	1.14	7	2006, 2010
Bosnia and Herzegovina	45	1.01	4	2009
Botswana	19	0.43	11	2006, 2010
Brazil	85	1.91	20	2009
Bulgaria	115	2.58	23	2007
Cameroon	16	0.36	9	2009
Chile	180	4.04	65	2010
Colombia	262	5.88	38	2006, 2010
Costa Rica	67	1.50	27	2010
Côte d'Ivoire	7	0.16	2	2009
Croatia	111	2.49	19	2007
Dominican Republic	25	0.56	9	2010
Ecuador	75	1.68	19	2006, 2010
El Salvador	151	3.39	34	2006, 2010
Estonia	36	0.81	18	2009
Georgia	12	0.27	5	2008
Ghana	24	0.54	9	2007
Guatemala	138	3.10	20	2006, 2010
Guinea	10	0.22	1	2006
Honduras	38	0.85	8	2006, 2010
Indonesia	79	1.77	17	2009
Jamaica	14	0.31	7	2010
Kazakhstan	7	0.16	3	2009
Kenya	121	2.71	34	2007
Macedonia, FYR	35	0.79	9	2009
Madagascar	41	0.92	25	2009
Mali	23	0.52	3	2007, 2010
Mauritania	9	0.20	3	2006
Mauritius	29	0.65	5	2009
Mexico	311	6.98	76	2006, 2010
Moldova	27	0.61	9	2009
Mongolia	22	0.49	5	2009
Montenegro	6	0.13	2	2009
Namibia	18	0.40	9	2006

Country	Freq.	Percent	# foreign owned	Survey year(s)
Nepal	16	0.36	1	2009
Nicaragua	34	0.76	8	2006, 2010
Pakistan	65	1.46	6	2007
Panama	27	0.61	5	2006, 2010
Paraguay	51	1.14	8	2006, 2010
Peru	300	6.73	73	2006, 2010
Philippines	170	3.81	102	2009
Romania	19	0.43	8	2009
Russian Federation	63	1.41	9	2009
Senegal	26	0.58	5	2007
Serbia	61	1.37	9	2009
Slovak Republic	30	0.67	7	2009
Slovenia	58	1.30	14	2009
South Africa	139	3.12	38	2007
Sri Lanka	17	0.38	1	2011
Swaziland	20	0.45	12	2006
Tanzania	24	0.54	6	2006
Trinidad and Tobago	33	0.74	5	2010
Turkey	166	3.72	9	2008
Uganda	21	0.47	9	2006
Ukraine	57	1.28	12	2008
Uruguay	134	3.01	22	2006, 2010
Vietnam	195	4.38	71	2009
Yemen	6	0.13	1	2010
Zambia	36	0.81	36	2007
Total	4,457	100.00	1,209	

## 8 Appendix B

Table B1: Definition of Variables

<b>Variable</b>	<b>Definition</b>
foreign_owned	Dummy variable that is equal to one if the percentage of ownership by foreigners is strictly positive
fin_dev	Ratio of private credit held by banks to GDP
skill_share	The share of skilled production workers in the total number of production workers
prod_ratio	A firm's sales per worker relative to the median firm's sales per worker in the same country-industry cell
age	Age of the firm in years, logged
sales_growth	Average annual percentage growth in total sales over the last three years
empl_growth	Average annual percentage growth in total employment over the last three years
employees	Total number of employees, logged
access_to_finance	Dummy variable that takes on the value of 1 if the firm reported finance to be a "very severe obstacle" or a "major obstacle"
internal_funds	Share of internal funds used to finance the firm's working capital (in percent)
bank_funds	Share of bank loans used to finance the firm's working capital (in percent)