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Foreign Ownership and the Export and Import Propensities of Developing-Country Firms

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Abstract

This paper uses micro-data from the World Bank Enterprise Surveys 2002-2006 to investigate how foreign ownership affects the likelihood of manufacturers in developing countries to export and/or import both directly and indirectly. Applying propensity score matching to control for differences across firms in terms of labor productivity and other characteristics, we find that foreign ownership raises the propensity of a firm to export by over 17 and the propensity to import by more than 13 percentage points. The effects are even bigger for countries with the lowest per-capita income and institutional quality.

JEL classification: F12, F14, F23, O19

Keywords: international trade, multinational enterprise, foreign direct investment, foreign ownership, development, intermediation

1 Introduction

Access to world markets is generally considered to be one of the necessary conditions for sustained economic growth and poverty reduction in developing countries (see WTO 2001). But while much has been written on the nexus between international market access and growth at the aggregate level,¹ we still have little systematic evidence at the micro level on how firms in developing countries actually connect with foreign customers and suppliers, and on the factors that may help them do so. The current paper focuses on one such factor, namely foreign ownership, and uses micro-data from the World Bank Enterprise Surveys to determine how foreign ownership affects the propensity of manufacturing firms to engage in exporting and/or importing.

It is a well established stylized fact that firms generally face substantial barriers, or “fixed costs”, when accessing export and import markets (Roberts and Tybout 1997). In the case of developing countries there is reason to believe that these barriers are especially large relative to firms’ own capacity to overcome them, and that firms therefore depend on external support. First, firms in less developed countries are less likely to have the technological and organizational know-how and the foreign contacts to identify potential customers, negotiate contracts, and to meet to these customers’ needs. Moreover, given a lack of contacts and know-how they are less likely to be able to identify overseas suppliers of intermediate goods and to negotiate contracts.² Second, developing countries tend to have poorly developed financial markets, providing limited financing opportunities for firms (see, for instance, Beck 2002). Foreign owners may help on both fronts, providing know-how and contacts as well as better access to external finance, thus

¹See, for instance, Frankel and Romer (1999). The large literature on the role of trade in alleviating poverty in developing countries is surveyed by Winters et al. (2004).

²Keesing (1983) explains how developing country firms have been able to export consumer goods with the help of overseas buyers that provided contacts and, more precisely, technical, logistical and management capabilities. See also Feenstra and Hamilton (2006) for a detailed discussion of the trade strategies of firms in South Korea and Taiwan.

allowing firms to more easily jump the barriers to exporting or importing. While foreign ownership is only one way to organize this outside support, it is likely to be an important one (see also Markusen and Trofimenko 2009).

Foreign ownership may thus be viewed as helping firms with the intermediation of international trade. That is, in foreign-owned firms the activities associated with exporting and importing, including finding buyers or sellers, negotiating contracts, providing financing and insurance, etc., are likely to be internalized, i.e., carried out within the firm and therefore not directly observable. We would hence expect foreign-owned firms not only to have a higher overall export or import propensity, but also to rely more on direct and less on indirect trade through independent intermediaries than local firms.

Our analysis proceeds in two steps, namely by building a simple theoretical model to guide our empirical analysis, and then using propensity score matching to determine the effect of foreign ownership. In the theoretical model, barriers to trade take the form of a fixed trade cost, and firms are heterogeneous in terms of their productivity (or own capacity to pay for this fixed cost). Firms that are not productive enough to pay for it on their own may get help from foreign ownership or reduce the fixed cost by using an independent intermediary. The model predicts that foreign ownership unambiguously raises the propensity of a firm to trade directly, but may raise or lower the propensity to trade indirectly depending on the firm's productivity.

We use the well suited World Bank Enterprise Survey data 2002-2006 for our empirical analysis. While they are only available in a cross section, the data contain a good deal of information on the export and import activities of firms across a wide range of countries and industries, as well as detailed information on the individual firms that we can use as controls. Importantly, the dataset also contains information on whether firms export or import directly or indirectly through independent intermediaries. We can match each firm with at least 10% foreign ownership with a control group of firms from

the same industry and country that, in terms of their labor productivity, employment and other characteristics, are equally likely to exhibit foreign ownership. By matching firms within an industry and country we control for the foreign ownership determinants suggested by the traditional theories of foreign direct investment (FDI), including the knowledge capital model (see, for instance, Markusen 2002). Firm-level controls, such as productivity, are suggested by the more recent heterogeneous firm models of FDI (Helpman et al. 2004).

By comparing the average export and import propensities of “treated” firms with those of firms in the control group we are able to isolate the effect of foreign ownership over and beyond the effect stemming from firm productivity and other characteristics that are already well known to be highly correlated with export and import activities of firms.³ Our matching procedure helps us to alleviate two concerns that arise when comparing the trade performance of foreign-owned and domestically owned firms: First, in theories of vertical FDI foreign affiliates are set up for the purpose of supplying intermediate goods to the parent company (Markusen, 2002). Finding (in an unmatched sample) that foreign-owned firms are more likely to trade would then be a trivial result and not tell us much about the barriers to trade faced by developing country firms. Second, the foreign ownership of firms is not random. There is considerable evidence that foreign investors tend to acquire the more productive local firms (Blonigen et al. 2014). Finding that foreign-owned firms have a greater likelihood to engage in trade would then be confounded with the effect that more productive firms tend to trade more.⁴

³See, for instance, Bernard and Jensen (2004) on the firm-specific determinants of trade. The large literature on firm heterogeneity and selection into exporting and importing is surveyed by Greenaway and Kneller (2007) and Wagner (2012).

⁴Using French micro data, Blonigen et al. (2014) find that foreign investors also tend to target firms with a large existing export network. This is obviously something that we cannot control for in our sample. However, we would expect this to be less of a concern in our sample, since firms in developing countries are less likely to have such networks.

The matching procedure significantly reduces the effects of foreign ownership in our sample. Still we find a statistically significant and economically large effect of foreign ownership on the propensity of firms to engage in international trade. In our baseline model, foreign ownership increases the propensity to export by 17.6 percentage points and the propensity to import by 13.4 percentage points. Consistent with our theoretical model, we find significant differences between the effects of foreign ownership on direct versus indirect trade. While foreign ownership is associated with considerably higher export and import propensities, the effect on the propensity to export or import indirectly is zero, respectively negative. This supports our interpretation of foreign ownership as helping with the intermediation of foreign trade. The effects of foreign ownership turn out to be especially big for firms in countries with low per-capita incomes and low institutional development, suggesting that weak institutions are indeed big obstacles to trade.

The effect of foreign ownership on firm performance has received considerable attention in the literature. But most studies have been concerned with direct effects on firm productivity or indirect effects, i.e., spillovers, on locally owned firms (see Görg and Greenaway 2004 for a survey, and especially Girma et al. 2015 for a recent, state-of-the-art contribution and a discussion of this strand of the literature). Only few papers have looked at the effect of foreign ownership on the trade performance of firms and these have tended to focus on developed countries (see, for instance, Raff and Wagner 2015 on the effect of foreign ownership on the extensive margins of exports of German manufacturing firms). An important exception is Wang and Wang (2015) who study the effect of foreign ownership on the export share and other performance measures of Chinese firms. This paper is especially noteworthy for the way it identifies causal effects of foreign ownership, namely by comparing changes in the pre- and post-acquisition performance of foreign-acquired firms using domestically acquired firms as the control group. Our cross-section data obviously do not allow us to do this, but we can generate

insights along other dimensions.⁵ In particular, we are able to examine not just exporting but also importing as well as the mode of trade (direct versus indirect, i.e., intermediated trade). Moreover, given that our data set covers a wide range of countries, we can compare the trade performance of firms across countries with different levels of per-capita income or institutional development. Another interesting exception is a paper by Manova and Zhang (2009) on exports and imports by Chinese firms. That paper shows that foreign-owned firms trade more on average than local privately owned firms and that their trading relationships tend to be more stable. However, like Wang and Wang (2015), it focuses on firms in only one country and does not attempt to measure the effect of foreign ownership on the propensity to engage in trade.

The rest of the paper is organized as follows. The next section contains the theoretical framework. In Section 3 we describe the data and present summary statistics. In Section 4 we discuss the empirical methodology, present results for our baseline model, and explore several alternative empirical specifications to check the robustness of our results. In Section 5 we compare the effects of foreign ownership across countries exhibiting different levels of income or institutional quality. Conclusions follow in Section 6.

2 Theoretical Framework

To set the stage for our empirical analysis consider a simple theoretical framework with heterogeneous firms, based on Chaney (2013) and Raff and Wagner (2015). The model allows us to identify how foreign ownership interacts with the more standard firm-level determinants of foreign-market participation, in this case the firm's productivity. We focus on foreign market access for exports, noting that models of firm heterogeneity can be easily adapted

⁵To be precise, when we speak of foreign ownership having "effects" on trade propensities, what we mean is that the observed correlations are consistent with the causal effects predicted by our theoretical model.

to study firms that import intermediates or engage in both exporting and importing (as in Kasahara and Lapham 2013).

Consider two symmetric countries, home and foreign. Each country has two industries that use labor as the only input. One industry produces a homogeneous, freely tradable good with a constant unit labor requirement of 1. This is the numeraire good and, since its price is set to 1, we also obtain a wage rate of 1. The other industry produces a continuum of differentiated goods under increasing returns to scale and monopolistic competition.

2.1 Households

Home and foreign each have L consumers/workers, each endowed with one unit of labor. Individual preferences are given by the utility function

$$U = q_0 + \rho \ln Q_c, \quad \rho < 1, \quad (1)$$

where q_0 denotes the consumption of the numeraire, and Q_c is the aggregate individual consumption of differentiated goods. Letting $q_c(i)$ denote the quantity consumed of variety i , we assume that Q_c takes the following CES form:

$$Q_c = \left(\int_{i \in \Delta} q_c(i)^{\frac{\sigma-1}{\sigma}} di \right)^{\frac{\sigma}{\sigma-1}}, \quad (2)$$

where $\sigma > 1$ is the constant elasticity of substitution between varieties and Δ is the set of varieties.

Maximizing utility subject to the consumer's budget constraint and aggregating individual demands over the L consumers yields the following total demand for variety i :

$$q(i) = \frac{\rho L}{P^{1-\sigma}} p(i)^{-\sigma}, \quad (3)$$

where $p(i)$ is the consumer price of variety i , and

$$P = \left(\int_{i \in \Delta} p(i)^{1-\sigma} di \right)^{\frac{1}{1-\sigma}} \quad (4)$$

is the CES price index.

2.2 Firms

Firms in each country have access to the same technology. In the differentiated good industry each firm draws a random unit labor productivity $z \geq 0$. When entering the domestic market a firm incurs a fixed cost F_d . To enter the export market a firm has to choose between two strategies: strategy x is to export directly, strategy w is to export indirectly with the help of an intermediary, such as a wholesaler. Strategy x involves a fixed cost of exporting F_x . Going through an intermediary requires a smaller fixed cost, $F_w < F_x$, because the intermediary is able to spread market access costs across a number of exporters whose goods it distributes. The trade-off is that the intermediary has to be paid in kind for each unit that it ships abroad. This cost of intermediation is denoted by $\omega > 1$. Both exporting strategies also involve an iceberg transport cost $\tau \geq 1$. We may hence summarize the cost of producing quantities q_d for the domestic market and q_w or q_x for sale in the foreign market via indirect, respectively direct trade as follows:

$$C_d(q_d) = \frac{q_d}{z} + F_d, \quad (5)$$

$$C_w(q_w) = \frac{\omega\tau q_w}{z} + F_w, \quad (6)$$

$$C_x(q_x) = \frac{\tau q_x}{z} + F_x. \quad (7)$$

Profit maximization in the case of CES demand functions requires a firm with labor productivity z to set a price at a constant mark-up over its marginal cost, c , so that $p(c) = \sigma c / (\sigma - 1)$. The marginal cost c of supplying output is equal to $1/z$ in the domestic market, $\omega\tau/z$ and τ/z , respectively, in the foreign market. The corresponding profits that such a firm can earn in the respective markets and using the respective modes of delivery are then given

by:

$$\pi_d(z) = \frac{\rho L}{\sigma} \left(\frac{\sigma}{(\sigma - 1)zP} \right)^{1-\sigma} - F_d, \quad (8)$$

$$\pi_w(z) = \frac{\rho L}{\sigma} \left(\frac{\sigma \omega \tau}{(\sigma - 1)zP} \right)^{1-\sigma} - F_w, \quad (9)$$

$$\pi_x(z) = \frac{\rho L}{\sigma} \left(\frac{\sigma \tau}{(\sigma - 1)zP} \right)^{1-\sigma} - F_x. \quad (10)$$

2.3 Foreign Ownership

We are interested in determining how foreign ownership affects the export market participation of firms and the choice of export mode, w or x ; and we want to separate the impact of foreign ownership from that of labor productivity. A simple and very useful way to model the effect of foreign ownership is to assume that it allows a firm to draw a random endowment of an ability, A , that may help it to overcome the fixed cost of foreign-market entry. In particular, let A and z be drawn from the joint cumulative distribution $G(A, z)$, and let the marginal distribution of z be given by $G_z(z) \equiv \lim_{A \rightarrow \infty} G(A, z)$.⁶ Modelling foreign ownership as a random draw of ability is useful, precisely because in our data we do not directly observe how much, if at all, an individual firm benefits from it.

We formally treat A as an ability that a firm can combine with the profit it earns in the domestic market to bear the fixed cost of exporting directly or through intermediaries:

$$\pi_d(z) + A \geq F_i \quad \text{for } i = w, x. \quad (11)$$

We thus implicitly assume that the firm cannot leverage potential export proceeds to finance this fixed cost. This market failure can be overcome if the firm draws a big enough A . More precisely, since $\pi_d(z)$ is strictly

⁶In his model Chaney (2013) interprets A as a liquidity shock and examines how draws of z and A affect the propensity of a firm to export. Our model extends Chaney's by allowing for both direct trade and indirect trade through an intermediary.

increasing in z , only a very productive firm may be able to pay F_i without a large endowment of A , whereas a firm with a very low labor productivity may not be able to export indirectly even if A is big.

2.4 Equilibrium

To simplify the characterization of equilibrium we assume that import prices have a negligible effect on the domestic price index. That is, we approximate the price index in (4) by:

$$P \approx \left(\int_{z \in \Delta} p_d(z)^{1-\sigma} dG_z(z) \right)^{\frac{1}{1-\sigma}}. \quad (12)$$

We can then derive the equilibrium in three steps. The first step is to consider firms that do not face any “ability” constraint. For such firms we can use equations (8) and (9) to implicitly define two cut-off levels of labor productivity, \bar{z}_d and \bar{z}_w , at which they would earn exactly zero profit in the domestic market and in the export market using an intermediary, respectively:

$$\pi_i(\bar{z}_i) = 0 \quad \text{for } i = d, w. \quad (13)$$

Next we can compare (9) and (10) to derive a cut-level of labor productivity, \bar{z}_x , at which a firm is indifferent between exporting indirectly and directly:

$$\pi_w(\bar{z}_x) = \pi_x(\bar{z}_x). \quad (14)$$

Assuming, reasonably, that the trade and intermediation costs are such that $\bar{z}_d < \bar{z}_w < \bar{z}_x$, we obtain four types of firms.⁷ The most efficient firms, i.e., those with $z > \bar{z}_x$, sell both on the domestic market and export directly to the foreign market. Firms with labor productivity in the range $\bar{z}_w < z \leq \bar{z}_x$ sell at home and export through wholesalers. Firms in the productivity range $\bar{z}_d < z \leq \bar{z}_w$ sell only on the domestic market; and firms with labor productivity $z < \bar{z}_d$ do not sell on either market.

⁷Note that a sufficient condition for $\bar{z}_d < \bar{z}_w$ is simply $F_d \leq F_w$. For $\bar{z}_w < \bar{z}_x$ we require F_x to be sufficiently greater than F_w , specifically $F_x > F_w(1 + w^{\sigma-1}(1 - w^{1-\sigma}))$.

Using (12) in (13) we can derive implicit expressions for these cutoffs. From $\pi_d(\bar{z}_d) = 0$ we obtain

$$\bar{z}_d = \left(\frac{\sigma F_d}{\rho L} \int_{z \geq \bar{z}_d} z^{\sigma-1} dG_z(z) \right)^{\frac{1}{\sigma-1}}. \quad (15)$$

For what follows it turns out to be convenient to define a function $h(\cdot)$ with $h' > 0$ such that

$$\bar{z}_d = h(F_d). \quad (16)$$

Likewise for the other two cutoffs we have

$$\bar{z}_w = \omega \tau \left(\frac{F_w}{F_d} \right)^{\frac{1}{\sigma-1}} h(F_d), \quad (17)$$

$$\bar{z}_x = \tau \left(\frac{F_x - F_w}{(1 - w^{1-\sigma}) F_d} \right)^{\frac{1}{\sigma-1}} h(F_d). \quad (18)$$

Figure 1 shows cutoffs \bar{z}_w and \bar{z}_x as horizontal lines.

The second step is to consider the cut-off levels of labor productivity in the presence of an “ability” constraint, specifically to use (11) to implicitly define $\bar{z}_w(A)$ and $\bar{z}_x(A)$ such that a firm below the respective cut-off cannot export indirectly, respectively directly:

$$\pi_d(\bar{z}_i(A)) + A = F_i \quad \text{for } i = w, x. \quad (19)$$

Using (19) we obtain

$$\bar{z}_w(A) = \left(\frac{F_d + F_w - A}{F_d} \right)^{\frac{1}{\sigma-1}} h(F_d), \quad (20)$$

$$\bar{z}_x(A) = \left(\frac{F_d + F_x - A}{F_d} \right)^{\frac{1}{\sigma-1}} h(F_d). \quad (21)$$

Notice that $\bar{z}_w(A)$ and $\bar{z}_x(A)$ are both decreasing in A with $\bar{z}_w(A) < \bar{z}_x(A)$. These two curves are also shown in Figure 1.

The third step is to combine the “unconstrained” cut-off lines from step 1 that are relevant when firms have sufficient ability with the “constrained” cut-off lines from step 2 that are appropriate when firms have little ability. This is also illustrated in Figure 1. First consider the two curves $\bar{z}_x(A)$ and \bar{z}_x , where we have assumed that $(F_d + F_x) > (F_x - F_w)\tau^{\sigma-1}(1 - w^{1-\sigma})^{-1}$ so that $\bar{z}_x(0) > \bar{z}_x$ and the two curves intersect at a positive level of A . Firms in the set Ω in Figure 1 thus do not have enough ability to export directly despite the fact that their productivity exceeds \bar{z}_x . However, these firms would be able to export directly, if they had a large enough endowment of A (to the right of $\bar{z}_x(A)$). Put differently, for these firms having more A raises the probability of exporting directly. Hence the more A they have, the less likely they are to export indirectly.

Next, consider the two curves $\bar{z}_w(A)$ and \bar{z}_w . In Figure 1 they are drawn assuming that $(F_d + F_w) > F_w(\omega\tau)^{\sigma-1}$ so that $\bar{z}_w(0) > \bar{z}_w$ and the intersection is again at a positive level of A . Firms with a productivity between \bar{z}_w and \bar{z}_x are productive enough to export indirectly provided they have a sufficient endowment of A ; those in the set Ψ have insufficient A to export. Hence for firms in this productivity range having more A increases the probability of exporting indirectly.

2.5 Implications

Finally consider what the model’s results imply about the effect of foreign ownership on the export propensity of firms drawn from a given productivity distribution. First, consider the effect on the propensity to export directly. For firms with productivities below \bar{z}_x or above $\bar{z}_x(0)$ foreign ownership does not affect the direct exporting propensity. In the former case, firms cannot export directly no matter what their ownership structure is; in the latter case firms export directly even without foreign ownership. For firms with productivities between \bar{z}_x and $\bar{z}_x(0)$ foreign ownership raises the propensity to export directly. Hence we conclude that foreign ownership on average

raises the propensity that a firm exports directly.

Second, consider the propensity to export indirectly. Here we observe that for firms with productivities in the interval \bar{z}_w to $\bar{z}_w(0)$ foreign ownership unambiguously raises their likelihood of exporting indirectly. However, for firms with productivities between \bar{z}_x and $\bar{z}_x(0)$ being foreign owned reduces the likelihood of exporting indirectly. Which effect dominates and hence whether the average effect of foreign ownership is positive or negative depends on the distribution of productivities in the sample. If, as we explain below, the more productive (and therefore larger) firms are overrepresented in our sample, we would expect to find a zero or even negative effect of foreign ownership on the propensity to export indirectly.

Third, regarding the overall propensity to export (either directly or indirectly) we observe that foreign ownership on average increases this propensity. This is because the firms with productivities in the interval \bar{z}_x and $\bar{z}_x(0)$ that may stop exporting indirectly when they are foreign owned do so only because they switch to direct exporting.

3 Data and Summary Statistics

Our empirical analysis is based on firm-level data collected by the World Bank as part of the Enterprise Surveys project (for more information about the surveys visit <http://www.enterprisesurveys.org>). The data cover the period of 2002 to 2006, and provide a representative sample of a country's private sector firms. The firms are not followed up in later years, so the data do not constitute a panel. We restrict the sample to those countries for which there are enough observations with sufficient information across all variables of interest after cleaning the data for missing values and obvious errors. Our final sample contains 14,585 firms from 30 countries and 14 industries.⁸ Ranking the countries according to income, we distinguish between low-,

⁸To be precise the data are provided at the establishment (plant) level. We use “firm”, “plant” and “establishment” interchangeably.

lower-middle and upper-middle-income countries: Bangladesh, Benin, India, Kyrgyzstan, Moldova, Uzbekistan and Vietnam (low income countries); Armenia, Ecuador, Egypt, El Salvador, Guatemala, Guyana, Honduras, Kazakhstan, Morocco, Nicaragua, Philippines, Romania, Serbia, Sri Lanka and Syria (lower-middle income countries); Brazil, Chile, Costa Rica, Hungary, Poland, Russia, South Africa and Turkey (upper-middle income countries).⁹ The data cover light industries (beverages, food, garments, leather and textiles) and heavy industries (auto and auto components, chemicals and pharmaceuticals, electronics, metals and machinery, non-metallic and plastic materials, other manufacturing, other transport equipment, paper, wood and furniture).¹⁰ The survey records information on a number of firm characteristics, such as the firm’s location, industry, ownership structure, employment, etc. The survey also records detailed information on the distribution of sales between domestic and foreign markets, where foreign sales are broken down into direct and indirect exports (exports through a distributor), and on the domestic and foreign sourcing of inputs, where foreign sourcing is divided into direct and indirect imports.

Table 1 shows the export structure of the data. We group the firms in each industry and country by productivity terciles (“low”, “medium” and “high”). On average 40.6% of the firms in the sample are exporters, ranging from 48.9% among the group of high-productivity firms to 32.1% among the low-productivity firms. Of those firms that export about 73.5% only export directly, 15.5% export only through distributors (indirect exporters), and 11% are classified as mixed exporters that export both directly and

⁹We follow the World Bank Atlas Method to determine the income group of a country. We take each country’s per capita GNI over the five-year sample period and classify the countries according to the average World Bank Atlas intervals to account for country classification changes that occur within that period.

¹⁰We set the minimum requirement for the number of firms in an industry in a country to 60 to guarantee a sufficiently large number of observations. Results are essentially unaffected if we increase the minimum amount. Applying the restriction, industries contain 182 firms on average.

indirectly. The share of direct exporters ranges from 77.6% among the most productive firms to 67% for the least productive firms. The share of indirect exporters is highest for firms in the low-productivity range (21.2%).¹¹

We also observe variation in the selection into export modes across low-, lower-middle- and upper-middle-income countries (not reported in the table). The share of exporters is higher for upper-middle income countries (45.9%) than for low-income countries (34.2%), with lower-middle-income countries in between (41.1%). The share of direct exporters is highest among low-income-country exporters (77%). The share of indirect exporters is higher for lower-middle-income countries (20.5%) than for low-income countries (15.9%) and upper-middle-income countries (10.7%). 27.7% of the firms engage in exporting and importing simultaneously, ranging from 20% in lower-middle-income countries to 31.4% in upper-middle-income countries. On average, direct exporters export a slightly higher share of their production (56.7%) than indirect exporters (53.3%).

Table 2 shows the import structure by productivity tercile. More firms in the sample (47.3%) engage in importing than in exporting. The share of direct importers (54.9%) is lower than the share of direct exporters (73.5%). Instead the use of intermediaries is of greater importance for importers than for exporters. 32% of importers import only indirectly, and 13.1% are mixed importers. The share of importers is highest among the most productive firms (56.7%) and lowest for the least productive firms (38%). Likewise the share of direct importers and mixed importers is highest among high-productivity firms, whereas the share of indirect importers is largest among low-productivity firms. Additional evidence (not reported in the table) reveals that the share of importers is lowest in the low-income countries (36.5%)

¹¹The relatively high share of exporting firms in the sample is probably due to the fact that the Enterprise Surveys oversample large firms (100 and more employees). Large firms are generally more likely to trade internationally, even if they are not foreign owned. This suggests that our estimates of the effect of foreign ownership on the propensity to trade should be regarded as lower bounds of the true impact.

and higher for lower-middle-income countries (53.2%) than for upper middle-income countries (41.1%). The data show a much larger share of direct importers for low-income and lower-middle-income countries than for upper-middle-income countries. Direct importers on average import 17.2% and indirect importers on average 8.3% of their inputs.

For our study we follow the IMF convention and define a firm as foreign owned if it reports a share of ownership by foreigners of at least 10%.¹² Based on this definition, about 9% of plants in the sample are foreign owned. The share of foreign owned firms increases with productivity; about 5.6% of the lowest productivity firms and about 13.1% of the highest productivity firms are foreign owned. In our data the share of foreign owned firms is highest in lower-middle-income countries (12.1%) and lowest in low-income countries (5.9%).

4 Empirical Methodology and Results

In this section we present our empirical analysis of the role of foreign ownership. As suggested by our theoretical model, in order to isolate the effect of foreign ownership as much as possible it is essential to control for firm characteristics that are likely to affect a firm's propensity to trade whether or not it is foreign owned. In addition, we want to control for firm characteristics that are likely to affect whether or not a firm is foreign owned. To reduce the dimensionality problem when considering a large number of observable firm characteristics, these characteristics are distilled into a single scalar (propensity score) reflecting the probability of a firm to be foreign owned. In our baseline model we apply standard nearest-neighbor propensity score matching. The results of the baseline model are presented in the next subsection. We then explain in more detail why we consider this choice of matching procedure to be reasonable and report the results of alternative sta-

¹²In our estimation we also tried thresholds of 20%, 30%, 40% and 50%. Results are largely unaffected by the choice of threshold.

tistical procedures (propensity score reweighting as well as propensity score matching with kernel and caliper specifications).

4.1 Baseline Model

In our basic setup we pair each foreign-owned firm with three otherwise very similar domestic firms, where similarity is based on a number of background characteristics. In addition to labor productivity (sales per worker) we include as covariates the number of employees, R&D-intensity (R&D expenditure relative to sales), the employment structure (share of skilled production workers, share of professionals), whether the firm offers formal training for its employees, the manager’s education, and whether the firm has problems to access external sources of finance.¹³ Specifically, we use propensity scores to match each foreign owned firm to 3 domestic firms within the same industry and country that have a similar predicted probability of being foreign owned based on the covariates. We opt for this 3-to-1 matching due to this estimator’s lower variability at the cost of higher bias in comparison to 1-to-1 matching, since our balancing tests (details are reported below) indicate that bias is not a concern in our sample.

As Table 3 indicates, foreign owned and domestic firms differ widely in their propensity to engage in international trade, especially in direct trade. The first three columns show the propensities of foreign owned firms and domestic firms to engage in various modes of trade for an unmatched sample and the difference between them. The last three columns show the same information after matching every foreign owned firm with the three most similar domestic firms. In the unmatched sample, the difference can be as large as 40.9 percentage points for firms engaging in both im- and exporting.

¹³We also tried a large number of other covariates as robustness check. These included lagged firm performance (sales per worker and employment 2 and 3 years ago), productivity relative to the industry average, whether the firm received an ISO certification, introduced a new technology within the past three years, launched a new product within the last three years and uses the web and email. Results remained largely unaffected and thus proved to be robust to the choice and combination of covariates.

This is because in the entire pool of domestic firms the average propensity to engage in trade is generally much lower than for foreign owned firms. It is only after we focus on the subgroup of domestically owned firms that are very similar to the foreign owned ones that we see a higher propensity to trade. As a consequence a lot of the difference in trade propensities disappears when we match firms. But the outcome of the matching procedure reported in the last column of the table shows that an economically sizeable and statistically significant difference in trade propensities still exists. Foreign owned firms are 17.6 percentage points more likely to export, 13.4 percentage points more likely to import, and 18.8 percentage points more likely to both import and export than their domestic counterparts. Consistent with the theoretical model we observe different effects of foreign ownership on direct and indirect trade. The effect is especially big and positive for direct trade: foreign owned firms are about 18.3 percentage points more likely to export directly and 17.3 percentage points more likely to import directly than domestic firms. Also in line with the theoretical model we find that foreign ownership leaves the propensity to export indirectly unaffected, but reduces the propensity to import indirectly.¹⁴ Recall that zero or negative effects were predicted by the theoretical model for samples in which, like in the current one, very productive firms are oversampled.¹⁵ We do not observe significant differences

¹⁴Our data do not permit us to distinguish between intra-firm and arm's-length trade. We do not observe whether foreign ownership would also raise the propensity of firms to trade with independent parties. Our results are consistent with both the internalization of trade within foreign-owned firms, as this would correspond to the complete internalization of intermediation functions within the firm and also the increase in arm's-length trade for instance due to better market knowledge abroad or greater financial capacity.

¹⁵Another potential explanation for smaller effects for indirect as compared to direct modes of trade could be the quality of reporting. Indirect exports and imports could be poorly reported (especially in survey data) as the firm may not be aware that some of the goods it sells domestically may end up being exported by the buyer, or may not know the primary origin of domestically purchased products.

It could also be that foreign-owned firms are better at observing and hence reporting indirect trade than locally owned firms. In this case we might wrongly attribute indirect trade activity to foreign ownership. This potential bias, however, cannot account for either zero or negative and statistically significant effects of foreign ownership on indirect modes

in the propensity to engage in mixed exporting or mixed importing.

Finally we find considerable heterogeneity in treatment effects when we divide our sample of firms into productivity terciles. As reported in Table 4, the effects of foreign ownership differ in magnitude across the productivity terciles. The effects tend to be smaller the higher is productivity. We find the largest difference in trade propensities across productivity levels for direct importing. Foreign ownership raises the direct-importing propensity of low productivity firms by 27.2 percentage points, whereas foreign-owned high-productivity firms are only 13.7 percentage points more likely to import directly. For exporting and direct exporting as well as for importing and indirect importing the effect size differs by about 2 to 6 percentage points between low and high productivity firms.

4.2 Balancing Test and Alternative Specifications

The validity of our findings obviously depends on the quality of the matching. Table 5 summarizes the balancing test for our baseline model. The test reveals that the matching is successful and the covariates are well balanced. In particular, for all covariates the bias after matching is either below or very close to the 5% criterion. The t-tests indicate that after matching the difference between the treated and untreated groups does not differ from zero, while before matching the two groups differed significantly in all but two covariates. After matching the Pseudo- R^2 is close to zero and the LR- X^2 -Test is insignificant indicating a high matching quality.¹⁶

One of the disadvantages of our baseline propensity score method is the fact that it discards a lot of potentially useful information. Specifically we match 1103 foreign owned firms with at most 3309 ($3 * 1103$) domestic firms, thereby ignoring at least 4996 other domestic firms in the sample that could

of trade.

¹⁶We additionally conduct a Rosenbaum sensitivity analysis. The results indicate that our estimated treatment effects are very robust with respect to a potential hidden bias. We still find significant effects (at a 10%-level) up to $\Gamma = 2.6$.

potentially be included in the analysis. Alternative methods, such as propensity score matching with kernel and caliper specification as well as propensity-score reweighting, make use of the full (or at least a larger proportion of the) untreated sample. Kernel matching uses weighted averages of all (or almost all) untreated observations and caliper-matching uses the untreated observations that, in our specification, lie within a range of a quarter standard deviation of the propensity score. The propensity-score-reweighting estimator has been shown to generate an efficient estimate of the average treatment effects on the basis of reweighting by the inverse of the propensity score.¹⁷ Intuitively, this method adjusts for differences between foreign owned and domestic firms by assigning higher weights to domestic firms that are more similar to the foreign owned firms. Rather than completely dismissing domestic firms that are not very similar, this method simply assigns a lower weight to such firms. Columns 2 to 4 of Table 6 contains the estimation results for caliper, kernel matching and propensity score reweighting; column 1 reproduces the results from the baseline nearest-neighbor matching in Table 3 to allow for easier comparison. The main point to note about the new results is that they are remarkably similar to the effects found in our baseline nearest neighbor propensity score analysis.¹⁸ The results are thus highly robust with respect to the choice of the statistical procedure. The fact that nearest-neighbor matching produces relatively conservative estimates of the effects of foreign ownership is another reason for selecting this specification as our baseline model.

¹⁷See, for instance, Hirano et al. (2003) and Cerulli (2014) for further information.

¹⁸The balancing tests for the alternative specification mostly show well balanced covariates. For two covariates, however, t-tests indicate that after matching the difference between treated and untreated does still differ from zero.

5 Comparisons across Country and Industry Groups

In this section we compare the effects of foreign ownership across groups of countries and industries. In Table 7 we break down the analysis according to the income level of the country. Specifically, we investigate the differences between low-income, lower-middle-income and upper-middle-income countries. Foreign owned firms are more likely to engage in international trade in all country groups, but the difference in trade propensities is biggest for low-income countries and smallest for lower-middle-income countries. This holds for exporting and importing and for direct exporting and importing, where the magnitude of the effect differs by up to 14.3 percentage points between low- and lower-middle-income countries. Specifically foreign owned firms in low-income countries are 28.1 percentage points more likely to export directly and 25.5 percentage points more likely to import directly than domestic firms; for lower-middle income countries we estimate a treatment effect of only 13.8 percentage points for direct exporting and 11.9 percentage points for direct importing. In the case of indirect importing we find a highly significant negative effect of foreign ownership in low-income countries, but no or only weak evidence for an effect for lower-middle-income countries and high-middle-income countries, respectively.

Even though correlated with the country's income level, institutional quality may also influence how strongly foreign ownership increases the likelihood to engage in international trade. It seems plausible that foreign ownership is particularly important in countries with poor institutional quality as it may help overcome institutional barriers to trade. To test this hypothesis we use an institutional quality dataset compiled by Kuncic (2014), who combines more than 30 legal, political and economic indicators to group countries in 5 different clusters depending on the institutional quality.¹⁹ Table 8 shows

¹⁹We additionally use a country-specific creditor rights index provided by Djankov et al. (2007); results are largely unaffected by the choice of the institutional quality index.

the effects of foreign ownership by institutional quality cluster with the lowest institutional quality countries being in Cluster 1 (Column 1) and the (in our dataset) highest institutional quality countries being in Cluster 4 (Column 4).²⁰ We see that effects of foreign ownership for all modes of trade except simultaneous im- and exporting are largest for the countries with the lowest institutional quality (Cluster 1). For these countries we observe an especially strong positive impact of foreign ownership on direct imports, and a significant negative impact on indirect imports, suggesting that foreign-owned firms tend to internalize the intermediation of imports. For countries with higher institutional quality the effect of foreign ownership is non-monotonic across different institutional quality clusters, as we obtain the second largest effects for countries with the highest institutional quality. A likely explanation for why foreign ownership tends to have the biggest effects on the propensity to trade in countries with the lowest income and lowest institutional quality is that these countries suffer the most from institutional barriers to trade and foreign owners helps firms to overcome these barriers.

We also compare the effects across different industry groups.²¹ In Table 9 we distinguish between light industries (beverages, food, garments, leather and textiles) and heavy industries (auto and auto components, chemicals and pharmaceuticals, electronics, metals and machinery, non-metallic and plastic materials, other manufacturing, other transport equipment, paper, wood and furniture). Foreign ownership increases the likelihood to trade internationally for both groups. However, the effects are bigger for heavy than for light industries for all modes of trade. For instance, foreign owned firms in heavy industries are 20.4 (21.7) percentage points more likely to export (import) than domestic firms, whereas foreign owned firms in light industries are 15.0 (14.2) percentage points more likely to export (import)

²⁰Our sample does not contain countries with the highest institutional quality as defined by Kuncic (2014) (Cluster 5).

²¹Unfortunately we cannot break down our sample further into particular industries as the sample size would become too small for a profound matching.

than their domestic counterparts. This may be an indication that fixed trade costs are substantially higher in heavy than in light industries.

6 Conclusions

The paper uses micro-data from the World Bank Enterprise Surveys to study to what extent foreign ownership helps manufacturing firms in developing countries to connect with overseas customers and suppliers. Defining foreign owned firms as firms with a foreign equity participation of at least 10%, we find that foreign ownership has a statistically significant and in many cases economically large effect on the export and import propensities of developing-country firms. In our baseline specification foreign owned firms are 17.6 percentage points more likely to engage in exporting and 13.4 percentage points more likely to engage in importing than domestic firms. This advantage of foreign owned firms over domestic firms in the propensity to trade is especially large when it comes to direct trade, namely 18.3 percentage points in case of direct exporting and 17.3 percentage points in case of direct importing. While foreign owned firms are significantly more likely to trade than matched domestic firms, they are around 4.9 percentage points less likely to import through intermediaries, and no more likely to export through intermediaries. This suggests that foreign ownership helps firms intermediate foreign trade, and at least for firms that are not highly productive acts as a substitute for intermediation through independent agents. The role of foreign owners as intermediaries is consistent with our model. As predicted, we find that foreign owned firms are less likely to engage in indirect modes of trade, that is trade through independent intermediaries, but are more likely to engage in direct modes of trade.

Relevant from a public policy perspective, we find that the intermediation function of foreign ownership differs in importance across countries and industry groups. In particular, we find that the effect of foreign ownership

differs in magnitude across countries in different income groups. The impact tends to be highest for low-income countries, where foreign ownership boosts the propensity to export by 25 percentage points and the propensity to export directly by 28.1 percentage points. Foreign ownership also has a bigger effect on the propensity to import in these countries than for the sample of countries as a whole, with direct importing being 25.5 percentage points more likely for foreign owned than for domestic firms. Similar results are obtained when classifying countries according to the quality of their institutions, with foreign ownership having the biggest effect in countries with the lowest degree of institutional development. We also find cross-industry differences in the effect of foreign ownership, with heavy industries recording a bigger effect than light industries.

Our findings have to be interpreted with caution. The results are consistent with both the internalization of trade within foreign-owned firms, as this would correspond to the complete internalization of intermediation functions within the firm and also the increase in arm's-length trade for instance due to better market knowledge abroad or greater financial capacity. The data, however does not allow to distinguish between the two. Additionally our analysis does not allow us to make statements about the volume of trade. Our findings could potentially only reflect a change composition of trade. In our model we have shown that foreign ownership is not only linked with an increase in direct trading but also with a decrease in indirect modes of trade. If a firm sets up production in a foreign location for which indirect importing is required, previous direct import could be displaced and the composition of trade would change. However, this seems unlikely because our results show that the magnitude of the foreign ownership effect is much bigger for the increase in direct modes of trade than for the decrease in indirect modes.

The results indicate that if FDI comes under strain, as has happened during the financial crisis, this may not bode well for the world market access of firms especially in the lowest-income countries. According to UNCTAD

(2011, Table I.1), world outflows of FDI were 46% lower in 2009 compared to 2007, with the drop in outflows from developed countries exceeding 50%. The direct acquisition of ownership in foreign companies through cross-border mergers and acquisitions fell even more during this period, namely by over 75% measured in net purchases (UNCTAD, 2011, Table I.3). Given the importance of foreign owners in supporting engagement in international trade, the financial crisis may have long-term negative effects on developing country trade.

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