Document de travail
Discussion paper
N°2023-03
https://lem.univ-lille.fr

Unleashing Potential:

Foreign Workers and Direct Exports

Léa Marchal
University of Paris 1 Pantheon-Sorbonne - CES (8174) | lea.marchal@univ-paris1.fr

Claire Naiditch
Univ. Lille, CNRS, IESEG School of Management, UMR 9221-LEM-Lille Economie Management, F-59000 Lille, France | claire.naiditch@univ-lille.fr

Martín A. Valdez
Univ. Lille, CNRS, IESEG School of Management, UMR 9221-LEM-Lille Economie Management, F-59000 Lille, France | martin.valdezquintero.etu@univ-lille.fr

Adnan Seric
United Nations Industrial Development Organization, Austria

Unleashing Potential: Foreign Workers and Direct Exports*

Léa MARCHAL[†], Claire NAIDITCH[‡], Martín A. VALDEZ[‡◇], and Adnan SERIC[⋆]

[†]University of Paris 1 Pantheon-Sorbonne - CES (8174), lea.marchal@univ-paris1.fr
[‡]Univ. Lille, CNRS, IESEG School of Management, UMR 9221 - LEM - Lille Économie Management, F-59000 Lille, France, claire.naiditch@univ-lille.fr ; martin.valdezquintero@univ-lille.fr
[◇]Ghent University, Sint-Pietersplein 6, 9000 Ghent, Belgium
[⋆]United Nations Industrial Development Organization, Austria

July 17, 2023

Abstract

This paper studies how skilled foreign workers affect firms' export mode. We build a model with heterogeneous firms, incorporating trade intermediaries and foreign workers, and analyse how these workers affect firms' choice to export directly, indirectly or not at all. We show that foreign workers help firms relax productivity constraints to export, both directly and indirectly. This pro-trade effect is larger for highly productive firms that export directly. Using the 2010 UNIDO Viet Nam Investor Survey, we find evidence of the pro-trade effect of skilled foreign workers and their asymmetric impact across firms of different sizes.

Key words: Export; Foreign worker, Heterogeneous firm
JEL classification: F14, F22, F16

*We thank Michel Beine, Lisa Chauvet, Nicola Coniglio, Étienne Farvaque, Bruno Merlevede and Glenn Rayp for their constructive remarks. We also thank participants of the ETSG 2022 Conference and the seminar of the Department of Economics at Ghent University. The usual disclaimer applies. Conflicts of interest: none.

1 Introduction

This article investigates whether foreign workers determine firms' probability to export directly or indirectly. While the majority of exporting firms are able to internalise fixed export costs and export directly, others rely on trade intermediaries to access foreign markets. Indirect trade accounts for a small share of trading activities. It represents between 10 and 20 per cent of total exports in developed economies (Akerman, 2018; Bernard, Grazzi and Tomasi, 2015; Crozet, Lalanne and Poncet, 2013), and is even more important for emerging economies such as China (22%) and Turkey (17%) (Ahn, Khandelwal and Wei, 2011; Abel-Koch, 2013).

Trade intermediaries allow manufacturers to decrease informational frictions that prevent them from exporting directly. They mitigate risks and facilitate matching between buyers and sellers (Spulber, 1996). Indirect exporters are mostly small firms that cannot cover the fixed costs of setting up their own distribution network abroad, as well as firms developing new products and producing low-quality goods (Abel-Koch, 2013). Empirical studies on trade intermediation also show that this export mode is used to serve markets that are small and difficult to access (Ahn, Khandelwal and Wei, 2011; Akerman, 2018; Bernard, Grazzi and Tomasi, 2015; Crozet, Lalanne and Poncet, 2013).

Similarly to trade intermediaries, foreign workers – in particular skilled individuals – help firms overcome informational barriers and reduce risks associated to exporting. They possess knowledge about their country of origin and have access to international business networks that foster export activity (Hanson, 2010; Hatzigeorgiou and Lodefalk, 2021; Parsons and Winters, 2014). This study explores whether foreign workers help firms export indirectly and/or directly. Do they allow firms that are not productive enough to reach foreign markets, through trade intermediaries? Do they help firms internalise the export process and export directly?

To investigate these questions, we build a heterogeneous firm model incorporating an intermediary sector similarly to Crozet, Lalanne and Poncet (2013), and foreign workers. Firms are heterogeneous in their productivity level and in the share of foreign workers they hire. They can export directly, indirectly, or not at all. If they export directly, they face destination-specific per unit and fixed entry costs. If they export indirectly, part of their output is sold to an intermediary, which then exports it. In that case, firms face a lower destination-specific fixed entry cost. One original feature of the model is its ability to capture the role foreign workers play in firms' choice of export mode. Based on the well-documented effect foreign workers have on firm export performance (Hatzigeorgiou

and Lodefalk, 2021), we posit that they help reduce both the direct and indirect fixed export costs faced by their employing firm.

We find that, for any share of foreign workers, the most productive firms export directly, the medium productive firms export indirectly, the less productive firms do not export at all. We then analyse how the export decisions of firms react to changes in their employment of foreign workers. Our results indicate that when foreign workers decrease the fixed export cost for both direct and indirect exports, the shares of direct and indirect exporters among all firms increase in the share of foreign workers. Additionally, assuming that firm productivity is distributed according to a Pareto distribution, as is standard in the trade literature, our model predicts that the share of direct exporters among exporters increases in the share of foreign workers.

We test the predictions of our model using the 2010 UNIDO Viet Nam Industry Investor Survey. The economic development experienced by Viet Nam until 2010 was driven by trade expansion and inward foreign direct investment following 1986's Doi Moi (Renovation) economic reforms, and by its accession to the World Trade Organization in 2007 (UNIDO, 2012). Our sample contains 1,152 large firms located in the nine main provinces of Viet Nam and operating in the three main economic sectors (manufacturing, construction and utilities sectors). Among these firms, 29.8 per cent do not export, 4.0 per cent export indirectly, 59.4 per cent export directly, and 6.8 per cent use both export modes. We find supporting evidence that skilled foreign workers affect firms' export mode. Additionally, this pro-trade effect is concentrated on larger firms that export directly.

Our study contributes to the literature on the pro-trade effect of foreign workers. First, this literature shows that skilled and educated foreign workers reduce trade costs for their employing firms. These workers lower transaction costs linked to linguistic, cultural and institutional distances. Using data on service firms in the U.K., Ottaviano, Peri and Wright (2018) find that an increase in the supply of foreign workers fosters direct bilateral exports for language-intensive and culture-specific services. Andrews, Schank and Upward (2017) for Germany and Hiller (2013) for Denmark show that foreign workers help firms reduce their trade costs and foster direct export sales thanks to their destination-specific knowledge. Second, foreign workers foster trade by improving firms' integration in the global value chain through their business networks and through their knowledge of input quality (Bastos and Silva, 2012; Hatzigeorgiou and Lodefalk, 2016; Egger, Erhardt and Lassmann, 2019; Ariu, 2020). Third, foreign workers affect firm-level performance through higher productivity. Productivity gains stem from the imperfect

substitution between foreign and native workers that leads to a more efficient allocation of tasks within and across firms (Foged and Peri, 2016; Ottaviano, Peri and Wright, 2013; Peri and Sparber, 2009), to the adoption of different and possibly more efficient technologies and to innovation thanks to a broadened knowledge base (Bitzer, Gören and Kruse-Becher, 2021; Kerr and Lincoln, 2010; Lewis, 2011), and to knowledge externalities (Mitaritonna, Orefice and Peri, 2017; Ottaviano, Peri and Wright, 2018).

Our study is of particular interest to this strand of literature, as it analyses the effect of skilled foreign workers on indirect and direct exports separately. We propose a theoretically founded analysis where the focus is set on the impact of foreign workers on the export mode of firms, through their impact on the fixed costs of exporting.

Finally, our article contributes to the literature on the link between economic development and trade liberalisation in emerging countries, in particular for south-east Asian and Latin American economies (Wacziarg and Welch, 2008; Winters, McCulloch and McKay, 2004; Bas and Ledezma, 2020). Given the importance of the export sector in the Vietnamese economy, our study explores one specific determinant of firm-level export behaviour with potential aggregate-level implications for growth and poverty alleviation.

2 The Data

2.1 Data and Descriptive Statistics

The survey. We use the 2010 Viet Nam Industry Investor Survey, carried out by UNIDO in 2009 and 2010 in collaboration with Vietnamese institutions (UNIDO, 2012).[1] It covers 1,493 formal firms across nine major provinces – Ba Ria-Vung Tau, Bac Ninh, Binh Duong, Dong Nai, Vinh Phuc, Da Nang, Ha Noi, Hai Phong and Ho Chi Minh City – and across three sectors of the economy – manufacturing, construction and utilities. This last sector includes the public and energy sectors. The sample consists of 57.2 per cent foreign firms, 32.9 per cent private Vietnamese firms and 9.9 per cent state-owned firms. Only firms with a capital stock higher than 225,000 USD and more than 50 employees were included in the survey. This implies that our sample focuses on the middle and upper tail of the firm size distribution.

The survey collected information on firms' and employees' characteristics, and on firms' export behaviour in 2008, 2009 and 2010. Respondent firms had to answer the

[1] In this sample, 11.9 per cent of manufacturing exporters were surveyed in 2010, the rest of the sample was surveyed in 2009.

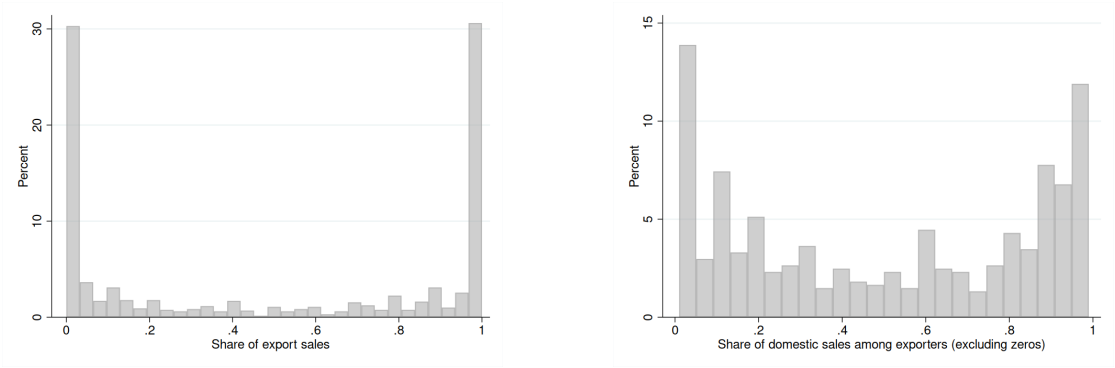
following question on their export mode: "What percentage of this enterprise's total sales by value was: sold in Viet Nam, exported directly, exported indirectly?" We combine this question of the survey with information on total sales to build our dependent variables (the probability of the firm to export directly and indirectly, and the export performance of the firm). After harmonising the data, we obtain a sample of 1,152 firms for which the export mode is known (77.3 per cent of the initial sample)[2]. Summary statistics for this sample of firms are provided in Appendix, Tables A.1 to A.3.

Exporting firms. About 70 per cent of firms report some export activity. Exporting firms are larger than non-exporting firms: they declare larger sales and are more likely to be multinational firms or to hold foreign capital; in addition, they employ a higher share of (skilled) foreign workers, which is in line with findings of the literature on the trade-migration nexus (Hatzigeorgiou and Lodefalk, 2021).

Exporting firms are heterogeneous in various dimensions. The distributions of export and domestic sales are shown in Figure 1. The graph on the left shows that about 30 per cent of firms do not export and about 30 per cent of them sell all their production abroad. This implies that the remaining firms export *and* serve their domestic market. Among these firms, the shares of domestic sales vary greatly, as shown by the graph on the right. Exporting firms are also heterogeneous in their export modes. 5.70 per cent of them export indirectly, 84.65 per cent export directly, and 9.65 per cent export using both export modes. On average, the value of direct and indirect exports respectively represent 45.1 and 1.5 per cent of total sales; and indirect exports account for 3.16 per cent of total exports. Figure 2 depicts the statistical relationship between the size of the exporters (measured as the (log) number of permanent full-time workers) and the share of indirect exports. This graph shows a large heterogeneity in export modes across firm size. In addition, Table A.3 in Appendix A.3 shows that indirect exporters report significantly smaller sales, assets, and costs, and serve a smaller number of destinations than direct exporters. The UNIDO data are thus in line with existing literature on the characteristics of indirect exporters (Ahn, Khandelwal and Wei, 2011; Crozet, Lalanne and Poncet, 2013).

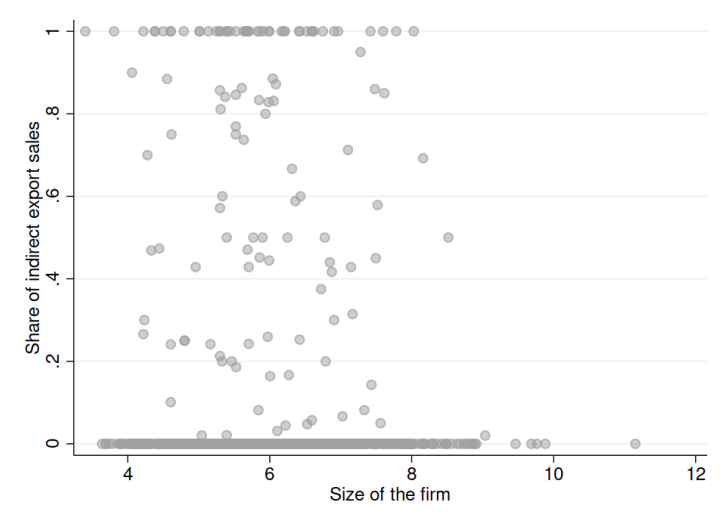
[2]Among these firms, some firms answered that they export, but did not specify their export mode

Figure 1: Share of Export and Domestic Sales



Note: The graph on the left shows the distribution of export sales as a percentage of total sales across all firms, including non-exporters (in the first bin). The graph on the right shows the distribution of domestic sales as a percentage of total sales across exporters that serve their domestic market (i.e. exporters not serving their domestic market are excluded).

Figure 2: Share of Indirect Exports Across Exporting Firms' Size



Note: Statistical relationship between the size of the firm and the share of indirect export sales among exporting firms. The size of the firm is measured as the (log) number of permanent full-time workers employed by the firm in the previous year.

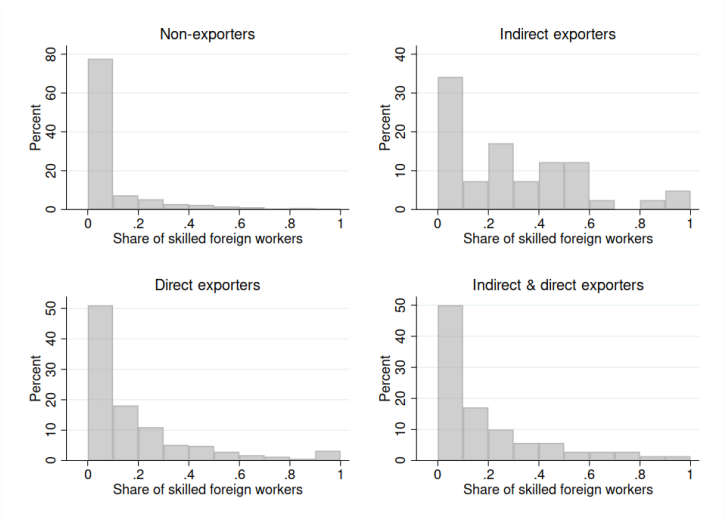
Workforce composition. The workforce composition of firms is disaggregated in four occupation groups: (i) technical and supervisory employees, (ii) managers, (iii) clerical

and administrative employees, and (iv) production workers. Henceforth, we refer to the first two groups as *skilled* workers and to the last two groups as *unskilled* workers. For each occupation group, we know the numbers of native and foreign workers. Foreign workers account for 1.7 per cent of total employment. They account for about 15.7 and 0.4 per cent of skilled and unskilled workers respectively.

The Vietnamese labour market is characterised by a shortage of skilled workers, especially in the foreign invested sectors (Dang and Nguyen, 2021). Only 20 per cent of the demand for skilled labour could be addressed by the Vietnamese workforce in the last decade (Bodewig et al., 2014). Meanwhile, the World Development Indicators published by the World Bank indicate that immigrants accounted for less than 1 per cent of the population in 2010. Therefore, skilled foreign employees reported in the UNIDO survey are likely to be posted workers or expatriates. These workers are usually temporary migrant workers, sent to ensure tacit knowledge transfers and, in the case of multinational enterprises, to coordinate operations between the headquarter and the subsidiary (Kogut and Zander, 2003; Williams, 2007; Cho, 2018).

Figure 3 shows the shares of skilled foreign workers employed by non-exporters, indirect-only exporters, direct-only exporters, and firms using both export modes. For each export status, we find that firms are widely heterogeneous in their employment of skilled foreign workers, and that a large part of them do not employ any skilled foreign workers. Figure A.1 presents a similar graph for unskilled foreign workers, showing little heterogeneity across firms as most of them do not hire any unskilled foreign workers. In addition, we find that indirect exporters employ significantly more skilled foreign workers than direct exporters (see Table A.3). These descriptive statistics and the literature pointing to a stronger impact of skilled foreign workers relative to unskilled foreign workers on firms' performance lead us to focus the remainder of our analysis on skilled foreign workers.

Figure 3: Share of Skilled Foreign Workers by Export Modes



Note: The four figures depict the distributions of the shares of skilled foreign worker observed across non-exporters, indirect-only exporters, direct-only exporters, and firms using both export modes.

2.2 Sample Representativeness

The 2010 Viet Nam Industry Investor Survey targets large and foreign firms (UNIDO, 2012). While the UNIDO data consists of 57.2 per cent foreign firms, the Viet Nam General Statistics Office estimates that the Vietnamese economy only consisted of 2.6 per cent foreign firms in 2010 (and 96.2 per cent domestic firms and 1.2 per cent state-owned firms). Nevertheless, the UNIDO data captures 31.6 per cent of Vietnamese exports realised by manufacturing firms in 2010 and reported by the Viet Nam General Statistics Office to the United Nations (Comtrade database).

The World Bank also conducted a Viet Nam Enterprise Survey in 2009. This survey contains 1,053 firms, among which 62.6 per cent do not export, 8.8 per cent export indirectly, 23.1 per cent export directly, and 5.5 per cent export both indirectly and directly. We find that firms larger than 50 employees with at least 10% of foreign ownership exhibit similar characteristics in both the 2010 UNIDO Viet Nam Industry Investor Survey and the 2009 World Bank Viet Nam Enterprise Survey (Table A.4).

3 Theoretical Framework

Our model builds upon Crozet, Lalanne and Poncet (2013), which consists of a heterogeneous firm model *à la* Melitz (2003) that incorporates trade intermediaries. We modify it in order to capture the effect foreign workers have on firms' choice of export mode. We start by describing the demand and the production sides, before analysing the firm's choice of export mode.

3.1 Demand

The world is made of J countries, trading with each other. The preferences of a representative consumer in country $j \in J$ can be represented by a CES utility function over a bundle of goods indexed by k:

$$U_j = \left[\int_0^N (q_{kj})^{\frac{\sigma-1}{\sigma}} \mathrm{d}k \right]^{\frac{\sigma}{\sigma-1}} \tag{1}$$

where q_{kj} is the demand for variety k in country j, N is the mass of available varieties and $\sigma > 1$ is the elasticity of substitution.

Total expenditure in country j, E_j, reads as follows:

$$E_j = \int_0^N p_{kj}^{\mathrm{CIF}} q_{kj} \mathrm{d}k \tag{2}$$

where p_{kj}^{CIF} is the trade-cost inclusive price (cost-insurance-freight or CIF price) of variety k in country j.

Maximising utility subject to the budget constraint yields the demand curve for each variety k available in country j:

$$q_{kj} = \left(p_{kj}^{\mathrm{CIF}}\right)^{-\sigma} \frac{E_j}{P_j^{1-\sigma}} \tag{3}$$

where $P_j = \left[\int_0^N \left(p_{kj}^{\mathrm{CIF}}\right)^{1-\sigma} \mathrm{d}k \right]^{\frac{1}{1-\sigma}}$ denotes country j's CES price index.

3.2 Production Possibilities

A continuum of monopolistically competitive firms manufacture a distinct variety each (index k thus represents a variety as well as a firm). Production requires a single factor, labour, supplied inelastically at aggregate level L. Firms in country j face a fixed production cost F_j. They are heterogeneous in their productivity level measured by $1/c_k$,

where c_k is firm k's marginal cost, and in the share of foreign workers they hire, denoted θ_k.

Firm k can produce for its domestic market, export directly or export indirectly through a trade intermediary. In each case, it chooses its optimal free on-board (FOB) price to maximise profits.

When the firm serves its home market, denoted h, the FOB and CIF prices are equal. When exporting *directly* to a foreign country j, firm k in country h faces three distinct costs. First, it faces a fixed direct-export cost $F_j(\theta_k) > F_h$. In light of the documented effect of immigrants on export propensity (Hatzigeorgiou and Lodefalk, 2021), we assume that the fixed direct-export cost is decreasing in the share of foreign workers employed by the firm ($\mathrm{d}F_j(\theta_k)/\mathrm{d}\theta_k < 0$)[3]. This fixed direct-export cost is paid by the firm when entering a foreign market. It includes the search for potential clients, logistics and inventory, non-tariff trade barriers related to the regulatory and cultural context.

In addition, direct exporters face two variable exporting costs: a per-unit shipment cost, T_j, and an *ad-valorem* trade cost, $\tau_j > 1$, reflecting the increased marginal cost due to international freight, dealing with customs and adapting the product to a new regulatory and cultural environment. The CIF direct-export price can then be written as a function of the FOB price (p_{kj}), such that $p_{kj}^{CIF} = p_{kj}\tau_j + T_j$.

When exporting *indirectly* to country j, firm k in country h sells part of its production to an intermediary, which then resales it abroad. The intermediary reduces the fixed cost of exporting since it must be easier for the firm to find foreign customers through the intermediary; additionally, as explained by Crozet, Lalanne and Poncet (2013), some aspects of the fixed cost of exporting are taken care of by the intermediary. Then, the fixed indirect-export cost, denoted $F_j^w(\theta_k)$, is lower than the fixed direct-export cost. We assume that it is also decreasing in the share of foreign workers hired by firm k, and can be written as a fraction α of the fixed direct-export cost: $F_j^w(\theta_k) = \alpha F_j(\theta_k) \leqslant F_j(\theta_k) \ \forall \theta_k$, with $\alpha \in (0, 1)$.

[3]We assume an exogenous distribution of foreign workers across firms. In doing so, we can focus on the effect of foreign workers on firms' export behaviour through their effect on fixed export costs. We set aside other mechanisms through which foreign workers affect firms' export performance. In particular, we set aside the fact that foreign workers generate total factor productivity gains (Mitaritonna, Orefice and Peri, 2017) thanks to their complementarity in tasks with native workers (Peri and Sparber, 2009).

3.2.1 Domestic Production and Direct Exports

Firms price their varieties for domestic sales and direct exports by solving two similar optimisation problems, detailed in Appendix A.1. For domestic sales, profit maximisation yields the constant markup pricing rule, along with firm domestic output and profits:

$$p_{kh} = \frac{\sigma}{\sigma - 1} c_k \tag{4}$$

$$q_{kh}\left(p_{kh}\right) = \frac{E_h}{{P_h}^{1-\sigma}} \left(\frac{\sigma}{\sigma - 1}\right)^{-\sigma} {c_k}^{-\sigma} \tag{5}$$

$$\pi_{kh} = \frac{1}{\sigma - 1} \left(\frac{\sigma}{\sigma - 1}\right)^{-\sigma} \frac{E_h}{{P_h}^{1-\sigma}} {c_k}^{1-\sigma} - F_h. \tag{6}$$

For a firm serving its domestic market h, profit maximisation for direct exports to country $j \neq h$ yields optimal FOB and CIF prices, optimal direct-export output and profits:

$$p_{kj} = \frac{\sigma}{\sigma - 1} \left(c_k + \frac{T_j}{\sigma \tau_j}\right) \tag{7}$$

$$p_{kj}^{CIF} = \frac{\sigma}{\sigma - 1} \left(c_k \tau_j + T_j\right) \tag{8}$$

$$q_{kj}\left(p_{kj}^{CIF}\right) = \frac{E_j}{{P_j}^{1-\sigma}} \left(\frac{\sigma}{\sigma - 1}\right)^{-\sigma} \left(c_k \tau_j + T_j\right)^{-\sigma} \tag{9}$$

$$\pi_{kj}^{d} = \frac{1}{\sigma - 1} \left(\frac{\sigma}{\sigma - 1}\right)^{-\sigma} \frac{E_j {\tau_j}^{-\sigma}}{{P_j}^{1-\sigma}} \left(c_k + \frac{T_j}{\tau_j}\right)^{1-\sigma} - F_j\left(\theta_k\right). \tag{10}$$

Direct-export profits are decreasing in firms' marginal cost and increasing in the share of foreign workers.

3.2.2 Indirect Exports

In the case of indirect exports, firm k must take into account the behaviour of intermediaries. We assume these intermediaries act as wholesalers in a competitive market where free entry drives profits to zero. Following Crozet, Lalanne and Poncet (2013), we assume that they face a constant entry cost $f \geqslant 0$. We use a two-stage backward procedure to solve the pricing problem of firm k. We first solve the trade intermediary's problem taking the manufacturer's price as given; then, we solve the manufacturer's problem.

A trade intermediary i buys a variety k at price p_{kj}^{i} from manufacturer k and resells it in country j for FOB price p_{kj}^{w}. It faces the same demand curve as a direct exporter and incurs the same transport costs so that consumers in country j face the CIF price ${p_{kj}^{w}}^{\text{CIF}} = p_{kj}^{w} \tau_j + T_j$. This implies that the intermediary behaves like a direct exporter

with a marginal cost equal to p^i_{kj}. The maximisation programme of the intermediary as well as its optimal choices are detailed in Appendix A.1.

The optimisation problem for indirect exports to country j of manufacturer k serving its domestic market h reads as follows:

$$\max_{p^i_{kj}} \pi^i_{kj} = \left(p^i_{kj} - c_k\right) q_{kj}\left(p^{w\,\text{CIF}}_{kj}\right) - \alpha F_j\left(\theta_k\right) \tag{11}$$

with $q_{kj}\left(p^{w\,\text{CIF}}_{kj}\right) = {E_j}/{P_j}^{1-\sigma}\left({\sigma}/{\sigma-1}\right)^{-\sigma}\left(p^i_{kj}\tau_j + T_j\right)^{-\sigma}$.

Profit maximisation yields the optimal pricing rule of indirect exporters:

$$p^i_{kj} = \frac{\sigma}{\sigma-1}\left(c_k + \frac{T_j}{\sigma\tau_j}\right). \tag{12}$$

Final intermediary FOB and CIF prices, indirectly exported quantities to country j and associated profits are:

$$p^w_{kj} = \left(\frac{\sigma}{\sigma-1}\right)^2\left(c_k + \frac{2\sigma-1}{\sigma}\frac{T_j}{\sigma\tau_j}\right) \tag{13}$$

$$p^{w\,\text{CIF}}_{kj} = \left(\frac{\sigma}{\sigma-1}\right)^2\left(c_k\tau_j + T_j\right) \tag{14}$$

$$q_{kj}\left(p^{w\,\text{CIF}}_{kj}\right) = \frac{E_j}{{P_j}^{1-\sigma}}\left(\frac{\sigma}{\sigma-1}\right)^{-2\sigma}\left(c_k\tau_j + T_j\right)^{-\sigma} \tag{15}$$

$$\pi^i_{kj} = \frac{1}{\sigma-1}\left(\frac{\sigma}{\sigma-1}\right)^{-2\sigma}\frac{E_j{\tau_j}^{-\sigma}}{{P_j}^{1-\sigma}}\left(c_k + \frac{T_j}{\tau_j}\right)^{1-\sigma} - \alpha F_j\left(\theta_k\right). \tag{16}$$

Similarly to the direct-export case, optimal profits derived from indirect exports are decreasing in the manufacturer's marginal cost and increasing in its share of foreign workers. However, compared to direct-export profits, profits from indirect exports are less sensitive to both marginal production costs and the share of foreign workers:

$$\frac{\partial\pi^d_{kj}/\partial c_k}{\partial\pi^i_{kj}/\partial c_k} = \left(\frac{\sigma}{\sigma-1}\right)^{\sigma} > 1; \qquad \frac{\partial\pi^d_{kj}/\partial\theta_k}{\partial\pi^i_{kj}/\partial\theta_k} = \frac{1}{\alpha} > 1. \tag{17}$$

3.3 Production Decisions

3.3.1 Operating Cutoffs

We now study firm k's decision to serve a market or not. The firm produces and exports only if it earns non-negative profits. We define three operating cutoffs. The *domestic operating cutoff* $\bar{c}^h$, the *indirect-export operating cutoff* $\bar{c}^i_{j\theta_k}$ and the *direct-export operating*

cutoff $\bar{c}^{d0}_{j\theta_k}$ are such that $\pi_{kh}\left(\bar{c}^{h}\right) = 0$, $\pi^{i}_{kj}\left(\bar{c}^{i}_{j\theta_k}\right) = 0$ and $\pi^{d}_{kj}\left(\bar{c}^{d0}_{j\theta_k}\right) = 0$ respectively. These cutoffs consist in threshold marginal costs above which firms face negative profits, and below which firms earn positive profits.

Solving for the zero-profit conditions, we can express the three operating cutoffs as follows:

$$\bar{c}^{h} = \left(\frac{E_h}{\sigma F_h}\right)^{\frac{1}{\sigma-1}} \frac{\sigma-1}{\sigma} P_h \tag{18}$$

$$\bar{c}^{i}_{j\theta_k} = \left[\frac{1}{\sigma-1}\left(\frac{\sigma}{\sigma-1}\right)^{-2\sigma} \frac{E_j {\tau_j}^{-\sigma}}{{P_j}^{1-\sigma}} \frac{1}{\alpha F_j\left(\theta_k\right)}\right]^{\frac{1}{\sigma-1}} - \frac{T_j}{\tau_j} \tag{19}$$

$$\bar{c}^{d0}_{j\theta_k} = \left[\frac{1}{\sigma-1}\left(\frac{\sigma}{\sigma-1}\right)^{-\sigma} \frac{E_j {\tau_j}^{-\sigma}}{{P_j}^{1-\sigma}} \frac{1}{F_j\left(\theta_k\right)}\right]^{\frac{1}{\sigma-1}} - \frac{T_j}{\tau_j}. \tag{20}$$

Firms with a marginal cost higher than $\bar{c}^{h}$ do not serve their domestic market. Firms with a lower (or equal) marginal cost produce and serve their domestic market. Among them, for firms with a share of foreign workers θ_k, only firms with a marginal cost lower than (or equal to) $\bar{c}^{i}_{j\theta_k}$ find it profitable to export indirectly to country j, and only those with a marginal cost lower than (or equal to) $\bar{c}^{d0}_{j\theta_k}$ find it profitable to export directly to country j. Firms that find both types of export modes profitable will choose the one that maximises their profits.

3.3.2 Choice of Export Mode

Existence of Indirect Exporters. As noted before, profits from direct exports are more sensitive to marginal costs compared to profits from indirect exports. Yet, in the case of Viet Nam, as shown in Section 2, there exists indirect exporters for a wide range of foreign worker shares. Thus, for a given share of foreign workers, there may be indirect as well as direct workers. This implies that, for any share of foreign workers θ_k, the indirect-export operating cutoff is larger than the direct-export operating cutoff; otherwise no firm would choose to export indirectly (since direct-export profits would always be higher than indirect-export profits). Thus, we assume that $\bar{c}^{d0}_{j\theta_k} < \bar{c}^{i}_{j\theta_k} \forall \theta_k$, which implies that the following condition holds.

Condition 1

$$\alpha < \left(\frac{\sigma}{\sigma-1}\right)^{-\sigma}. \tag{21}$$

This condition is independent from the source and destination countries as well as from firm characteristics, and places an upper bound on α that guarantees the existence of indirect exporters.

The Direct-Export Cutoff. We define the *direct-export cutoff* $\bar{c}^d_{j\theta_k}$ as the marginal cost equalising profits from indirect and direct exports. It is such that $\pi^d_j\left(\bar{c}^d_{j\theta_k}\right) = \pi^i_j\left(\bar{c}^d_{j\theta_k}\right)$. Under Condition 1, $\bar{c}^d_{j\theta_k}$ exists and leads to positive direct-export profit.

Solving this equality, we can express the direct-export cutoff as a linear function of the indirect-export operating cutoff:

$$\bar{c}^d_{j\theta_k} = a\bar{c}^i_{j\theta_k} - (1-a)\frac{T_j}{\tau_j} \tag{22}$$

where $a = \left\{{}^{\alpha}\!/_{1-\alpha}\left[({}^{\sigma}\!/_{\sigma-1})^{\sigma} - 1\right]\right\}^{\frac{1}{\sigma-1}} \in (0,1)$.

For any share of foreign workers θ_k, since indirect-export profits decrease less rapidly than direct-export profits with the marginal cost, we know that $\bar{c}^d_{j\theta_k} < \bar{c}^i_{j\theta_k}$. Under Condition 1, this implies that firms with a marginal cost below (or equal to) $\bar{c}^d_{j\theta_k}$ will export directly while those with a marginal cost between $\bar{c}^d_{j\theta_k}$ and $\bar{c}^i_{j\theta_k}$ will export indirectly, as long as these cutoffs are positive. As documented in the literature and reflected in our data (see Section 2), indirect exporters tend to be smaller in terms of total employment than direct exporters, which is in line with our model prediction.

The direct-export cutoff and the indirect-export operating cutoff are both increasing in the share of foreign workers, implying that a higher share of foreign workers allows firms that are marginally less productive to access foreign markets that would otherwise be out of reach.

Existence of Direct Exporters. For any share of foreign workers, $\bar{c}^d_{j\theta_k}$ should be positive, otherwise there would not be any direct exporters among firms endowed with that share of foreign workers. In the case of Viet Nam, there are direct exporters for a wide range of foreign worker shares, including firms that do not employ any foreign worker (see Section 2). Thus, we assume that $\bar{c}^d_{j\theta_k} > 0\ \forall\theta_k$. Since $\bar{c}^d_{j\theta_k}$ is increasing in θ_k, this inequality will be true for all shares of foreign workers if it is true for $\theta_k = 0$. Solving for $\bar{c}^d_{j(\theta_k=0)} > 0$, we get the following condition on $F_j(0)$:

Condition 2

$$F_j(0) < \frac{1}{1-\alpha}\frac{1}{\sigma-1}\left(\frac{\sigma}{\sigma-1}\right)^{-\sigma}\left[1-\left(\frac{\sigma}{\sigma-1}\right)^{-\sigma}\right]\frac{E_j{\tau_j}^{-\sigma}}{{P_j}^{1-\sigma}}\left(\frac{T_j}{\tau_j}\right)^{1-\sigma}. \tag{23}$$

Under Conditions 1 and 2, we know that $0 < \bar{c}^d_{j\theta_k} < \bar{c}^i_{j\theta_k}\ \forall\theta_k$. Then, for any share of foreign workers, among exporting firms, there may be both direct and indirect exporters, and direct exporters will necessarily be more productive than indirect exporters.

Exporting Firms also Serve their Domestic Market. In our modelling strategy, we assume that exporting firms also serve their domestic market, as shown in the literature (Bernard et al., 2003). This is the case of 64.16 per cent of exporting firms in our sample. Under Conditions 1 and 2, this implies that for any share of foreign workers, the indirect-export operating cutoff is lower than the domestic operating cutoff: $\bar{c}^i_{j\theta_k} < \bar{c}^h\ \forall\theta_k$. Since $\bar{c}^i_{j\theta_k}$ is increasing in θ_k, this inequality will be true for all shares of foreign workers if it is true for $\theta_k = 1$. Solving $\bar{c}^i_{j(\theta_k=1)} < \bar{c}^h$, we get the following condition on $F_j(1)$:

Condition 3

$$F_j(1) > \frac{1}{\alpha}\frac{1}{\sigma-1}\left(\frac{\sigma}{\sigma-1}\right)^{-2\sigma}\frac{E_j{\tau_j}^{-\sigma}}{{P_j}^{1-\sigma}}\left[\left(\frac{E_h}{\sigma F_h}\right)^{\frac{1}{\sigma-1}}\frac{\sigma-1}{\sigma}P_h + \frac{T_j}{\tau_j}\right]^{1-\sigma}. \quad (24)$$

To sum up, for any share of foreign workers, Conditions 1, 2 and 3 respectively rule out the possibility of having direct exporters only, indirect exporters only, and exporters only.

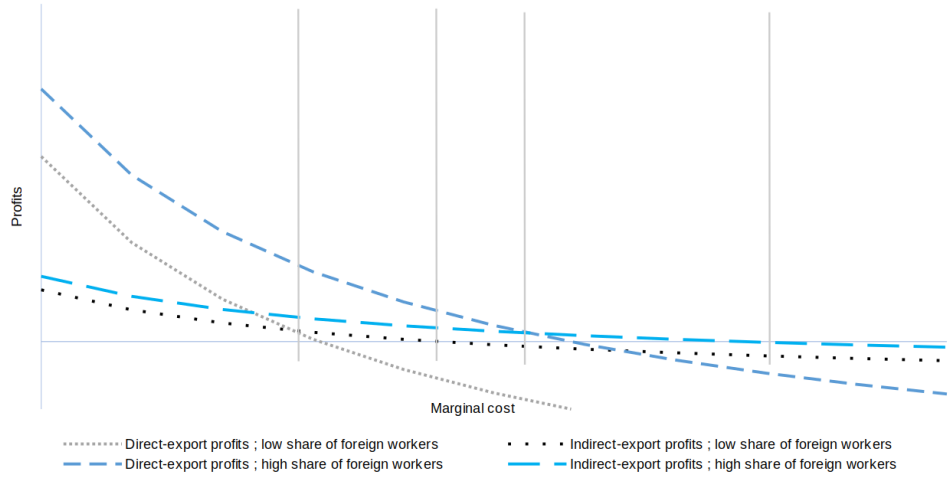
3.4 Analysis of the Equilibrium

3.4.1 The Gap Between the Cutoffs

Under Conditions 1 to 3, the cutoffs satisfy $0 < \bar{c}^d_{j\theta_k} < \bar{c}^i_{j\theta_k} < \bar{c}^h$. It implies that, among firms with a share of foreign workers θ_k, the most productive firms (with a marginal cost $c_k \leqslant \bar{c}^d_{j\theta_k}$) export directly, those with medium productivity ($\bar{c}^d_{j\theta_k} < c_k \leqslant \bar{c}^i_{j\theta_k}$) export indirectly, those with low productivity ($\bar{c}^i_{j\theta_k} < c_k \leqslant \bar{c}^h$) do not export (but produce for the domestic market), and those with very low productivity ($c_k > \bar{c}^h$) do not serve any market.

Both $\bar{c}^i_{j\theta_k}$ and $\bar{c}^d_{j\theta_k}$ are increasing functions of θ_k. This is shown in Figure 4 which reports indirect- and direct-export profits and the associated cutoffs for different shares of foreign workers. This figure illustrates that the direct-export cutoff is always lower than the indirect-export operating cutoff (under Conditions 1 to 3), and that foreign workers increase both export cutoffs.

Figure 4: Indirect- and Direct-Export Profits



Note: Profits from direct and indirect exports as a function of marginal costs, for low and high shares of foreign workers. For a given share of foreign workers (low or high), the indirect-export operating cutoff is located where indirect-export profits equal zero, and the direct-export cutoff is located where the indirect- and direct-export profits intersect.

Let $\Delta(\theta_k)$ denote the gap between the indirect-export operating cutoff and the direct-export cutoff. Using equation (22), we can write this gap as follows:

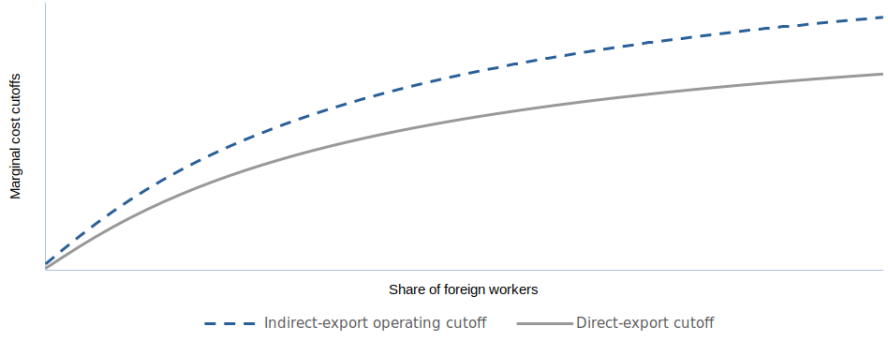
$$\Delta(\theta_k) = \bar{c}^i_{j\theta_k} - \bar{c}^d_{j\theta_k} = (1-a)\left(\bar{c}^i_{j\theta_k} + \frac{T_j}{\tau_j}\right) \geqslant 0. \tag{25}$$

Similarly to $\bar{c}^i_{j\theta_k}$ and $\bar{c}^d_{j\theta_k}$, $\Delta(\theta_k)$ is an increasing function of θ_k. Therefore, when θ_k increases, $\bar{c}^d_{j\theta_k}$ increases less than $\bar{c}^i_{j\theta_k}$. The asymmetry of foreign workers' pro-trade effect on each cutoff comes from the definition of each export cutoff. For the case of indirect exports, it is optimal for a firm to pursue this export strategy the moment it yields non-negative profits. For the case of direct exports, non-negative profits are not sufficient since the firm could also decide to export indirectly. Hence, firms opt for the direct export strategy if it is at least as profitable as the indirect export strategy. This results in a direct-export cutoff that is a linear function of the indirect export cutoff with a slope smaller than one (see equation 22). Hence, the pro-trade effect of foreign workers gets dampened for direct-exporters compared to indirect-exporters. This is summarised in the following proposition and in Figure 5 which shows the cutoffs as a function of the share of foreign workers. Note, however, that while the gap between the cutoffs increases, the relative share of each export mode among exporting firms may not follow

the same pattern. It cannot be assumed that the share of indirect exporters is increasing as the share of foreign workers increases. In fact, Proposition 3 reveals that under certain conditions, the opposite may be true.

Proposition 1 *Under Conditions 1 to 3, the indirect-export operating cutoff and the direct-export cutoff as well as the difference between these cutoffs are positive and increasing in the share of foreign workers.*

Figure 5: Indirect-Export Operating Cutoff and Direct-Export Cutoff



Note: Indirect-export operating cutoff and direct-export cutoff as a function of the share of foreign workers.

3.4.2 Direct and Indirect Exporter Shares

We denote by ϕ the cumulative distribution function of marginal costs. Since direct exporters have a marginal cost lower than $\bar{c}^d_{j\theta_k}$, indirect exporters a marginal cost between $\bar{c}^d_{j\theta_k}$ and $\bar{c}^i_{j\theta_k}$, and non-exporters a marginal cost higher than $\bar{c}^i_{j\theta_k}$, then $\phi\left(\bar{c}^d_{j\theta_k}\right)$, $\phi\left(\bar{c}^i_{j\theta_k}\right) - \phi\left(\bar{c}^d_{j\theta_k}\right)$ and $\phi\left(\bar{c}^i_{j\theta_k}\right)$ respectively represent the shares of direct exporters, indirect exporters, and exporters (both direct and indirect exporters) among total firms. We assume that ϕ and its derivative ϕ' are increasing functions of the marginal cost. Following from Proposition 1, these three shares are increasing in the share of foreign workers. This is summarised in the following proposition.

Proposition 2 *Under Conditions 1 to 3, the shares of direct exporters, indirect exporters, and exporters among total firms are increasing in the share of foreign workers.*

Then, the share of direct exporters among exporters is given by $\phi\left(\bar{c}^d_{j\theta_k}\right)/\phi\left(\bar{c}^i_{j\theta_k}\right)$. This share is increasing in the share of foreign workers if and only if:

$$a\phi'\left(\bar{c}^d_{j\theta_k}\right)/\phi\left(\bar{c}^d_{j\theta_k}\right) \geqslant \phi'\left(\bar{c}^i_{j\theta_k}\right)/\phi\left(\bar{c}^i_{j\theta_k}\right). \tag{26}$$

Thus, the impact of foreign workers on the share of direct exporters among exporters depends on the distribution of productivity among firms. In Appendix A.2, we show that the share of direct exporters among exporters increases in the share of foreign workers when firms' productivity follows a Pareto distribution, a common assumption in the literature (see, for example, Helpman, Melitz and Yeaple, 2004; Melitz and Redding, 2015).

Proposition 3 *Under Conditions 1 to 3, the impact of foreign workers on the share of direct exporters among exporters depends on the distribution of productivity among firms. This impact is positive when firms' productivity follows a Pareto distribution.*

Under Conditions 1 to 3, Propositions 1 to 3 imply that for any share of foreign workers, high productivity firms export directly and medium productivity firms export indirectly. In addition, when the share of foreign workers increases, the shares of direct and indirect exporters among total firms increase. However, the theoretical model does not allow us to conclude on how the share of foreign workers impact the share of direct exporters among exporters, except in the case of a Pareto distribution of firms' productivity.

4 Empirical Analysis

We use the 2010 UNIDO Viet Nam Industry Investor Survey to test the predictions of our model. We test the validity of Propositions 1 to 3, before running a series of robustness tests in which we use alternative specifications and sub-samples.

4.1 Baseline Specification

To test the three predictions of the model, we estimate the following specification:

$$X_i = \beta_0 + \beta_1 \text{For}_i + \beta_2 \ln \text{Size}_i + \Gamma' \text{Ctrls}_i + \gamma_s + \gamma_p + \epsilon_i \tag{27}$$

where X_i captures either the (indirect/direct) export probability or the export performance of firm i. The export performance is measured as the share of exports over total

sales. The independent variables of interest include the share of skilled foreign workers employed by the firm (For_i) and the logarithm of the size of the firm ($Size_i$). The firm size is captured by the number of permanent full-time workers employed in the previous year. The vector of control variables, denoted $Ctrls_i$, includes the (log) age of the firm, and a binary variable equal to one for mono-product firms and zero otherwise. The model includes 2-digit sector fixed effects (γ_s) as well as province fixed effects (γ_p) to reduce the bias for omitted variables. Finally, we follow the literature by clustering standard errors at the province-sector level, because observations could be highly correlated within province-sector pairs due to agglomeration effects.

4.2 Endogeneity Concerns

Research on the role of skilled foreign workers in firms' export decisions faces a fundamental problem of causal inference due to reverse causality and omitted confounding factors (see Hiller, 2013; Marchal and Nedoncelle, 2019, for similar endogeneity issues).

First, firms may decide to hire skilled foreign workers according to their export strategy, especially if they are aware of the potential beneficial effects of these workers on their export performance. Some articles show that firms actively prepare to export by increasing their workforce expertise, for instance by hiring workers from other exporters (Masso, Rõigas and Vahter, 2015; Sala and Yalcin, 2015). Second, firms' export mode may affect their ability to attract certain types of workers and thus bias the estimation (Bombardini, Orefice and Tito, 2019). For instance, skilled foreign workers may self-select into direct exporters that are also more productive because they offer higher wages. Therefore, both workers' and firms' decisions are likely to generate a potential upward bias in the estimation of the pro-trade effect of skilled foreign workers.

To ensure identification in spite of potential endogeneity issues, we use an instrumental variable (IV) strategy. The chosen instrument needs to have a significant impact on firms' employment of skilled foreign workers, but should not directly influence firms' export mode. In addition, this instrument should be orthogonal to province and sector characteristics that could simultaneously affect the employment of skilled foreign workers and the export mode decision.

So far, studies intending to tackle similar endogeneity issues using two stage least square strategies have instrumented the share of foreign workers with the lagged employment of foreign workers, the immigration stock in the region, the sector of the firm, or the immigration stock in a neighbouring country (among others, see Hatzigeorgiou and

Lodefalk, 2016; Hiller, 2013; Andrews, Schank and Upward, 2017). Some other studies, such as Mitaritonna, Orefice and Peri (2017), use a shift-share instrument which exploits the spatial distribution of immigrants over time (Card, 2001; Bartik, 1991).

Given the cross-sectional nature of the data at hand, instruments exploiting the time variation of foreign employment are excluded. To obtain causal results, we instrument the share of *skilled* foreign workers employed by firm i using the share of *unskilled* foreign workers employed by the firm. The employment of unskilled foreign workers is highly correlated with the supply of skilled foreign workers to which firms are exposed to due to network effects or to the international profile of the firm. The correlation between the shares of skilled and unskilled foreign workers is 11.5 per cent. The employment of unskilled foreign workers should, however, be orthogonal to the firm export mode decisions since unskilled workers do not hold positions in which they can transfer operative knowledge about foreign markets to their employer. The correlation between the export mode of the firm and its employment of skilled foreign workers is equal to 19.7 per cent, while it is equal to 5 per cent for the employment of unskilled foreign workers. The validity of this instrumentation strategy is further discussed below.

4.3 Main Results

4.3.1 Foreign Workers Relax the Productivity Constraint of Exporters

Proposition 1 implies that only the largest and most productive firms export, and that (skilled) foreign workers help firms export by relaxing the constraint they face in terms of size and productivity.

To test this proposition, we first estimate our baseline model (equation 27) using the entire sample of firms, including non-exporting firms, where the dependent variable is a binary variable equal to one if firm i exports and zero otherwise. Results are presented in Table 1. In column (1), we report the results of an IV-Probit estimation. We find a positive and significant impact of the size of the firm on its probability to export. The share of skilled foreign workers employed by the firm also determines positively its probability to export. Although the instrument is weak, it positively predicts the share of skilled foreign workers. Control variables display the expected signs. Older firms tend to export more, while mono-product firms tend to export less than multi-product firms.

We perform two tests to assess the validity of our results. In column (2), we report the results of a Probit estimation. The coefficient associated to the size of the firm is upward biased compared to column (1), which corrects for endogeneity concerns with

an instrumentation strategy. In column (3), we augment our Probit regression adding the instrument used in column (1) as an additional explanatory variable. The size of the firm still has a positive and significant impact on the probability to export. The instrumental variable is significant at the 10% level only while the coefficient associated to the endogenous variable remains positive and significant at the 5% level. This indicates that the instrument has little effect on the probability to export, except through the endogenous variable. In other words, the instrument primarily influences the probability to export indirectly through its impact on the endogenous variable, and does not have a significant direct effect.

In column (4), we add the interaction of the firm size and the share of skilled foreign workers to our baseline IV strategy presented in column (1). In doing so, we test whether the employment of these workers affects how the size of the firm determines its export performance. When the firm employs no skilled foreign workers, the effect of the size on the export probability is significant and positive: A one per cent increase in the size of the firm increases its probability to export by 0.56 percentage point. However, the interaction term is negative which indicates that this effect decreases as the share of skilled foreign workers increases. Here again the instruments are weak, but the stand alone term that instruments for the share of skilled foreign workers positively predicts the share of skilled foreign workers.

We then evaluate at which level of foreign employment the effect of the firm size on its export probability becomes insignificant. We plot the marginal effects of the firm size on the export dummy over the distribution of skilled worker shares in Figure 6. We find that the size increases the export probability, yet only for firms employing less than 70 per cent of foreigners among their skilled workers. This is the case of most firms since the average firm employs 15.7 per cent of skilled foreign workers. This result is consistent with Proposition 1: the size of the firm, which is a proxy for its productivity level, matters less for exporting when the firm hires a large share of skilled foreign workers. These workers thus relax the size/productivity constraint faced by exporters. From a theoretical angle, skilled foreign workers shift downward the productivity threshold at which firms can export.

We reproduce this set of results using the export share of the firm as the dependent variable. Results are reported in Appendix, Table A.5 and show that our findings generalise to the intensive margin of trade. We find a positive and significant effect of size on the export share (columns 1 to 4). In addition, hiring skilled foreign workers lowers the size constraint faced by exporters (column 4).

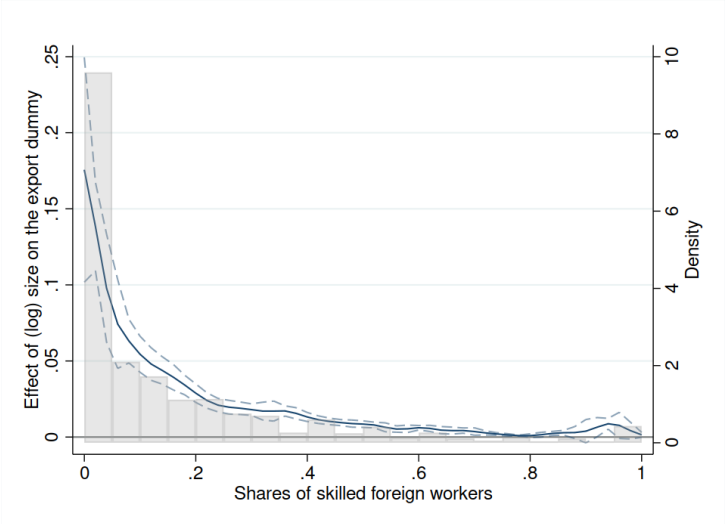
Finally, we estimate our baseline specification (equation 27) splitting the sample into four bins of skilled foreign worker shares. The first bin includes all firms not hiring skilled foreign workers and the three remaining bins split the distribution of firms employing a positive share of skilled foreign workers into three sub-samples. Results are reported in Appendix, Table A.6 and show that size impacts more the export probability of firms employing a small share of skilled foreign workers (1st and 2nd bins), than firms hiring a large share of skilled foreign workers (3rd and 4th bins). Foreign workers thus reduce the importance that size plays for exporting.

Table 1: Validation of Proposition 1

	Export dummy			
	(1)	(2)	(3)	(4)
For_i	4.9708***	0.9411***	0.8493**	18.5451***
	(0.2537)	(0.3380)	(0.3364)	(2.6790)
$\ln Size_i$	0.1295**	0.2829***	0.2844***	0.5632***
	(0.0594)	(0.0657)	(0.0666)	(0.0867)
IV_i			11.8466*	
			(6.5125)	
$For_i * \ln Size_i$				-2.5979***
				(0.5432)
$\ln Age_i$	0.1944***	-0.0954	-0.0902	0.1285
	(0.0619)	(0.0952)	(0.0949)	(0.0806)
$Mono_i$	-0.3050***	-0.0782	-0.0772	-0.1722*
	(0.0642)	(0.1085)	(0.1090)	(0.0943)
Observations	1,057	1,057	1,057	1,057
Sector FE	yes	yes	yes	yes
Province FE	yes	yes	yes	yes
Estimator	IV-Probit	Probit	Probit	IV-Probit
1st stage coefficients	0.7241**			5.4726** ; -2.2368
	(0.3610)			(2.2362) ; (2.0164)
1st stage F stat.	5.99			6.05 ; 5.74

Note: IV-Probit and Probit estimation results. The dependent variable is a binary equal to one if the firm exports and zero otherwise. In columns (1) and (4), the share of skilled foreign workers (For_i) and the interaction term are instrumented using the share of unskilled foreign workers, denoted IV_i. Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.

Figure 6: Marginal Effects of Firm Size on the Export Participation



Note: Marginal effects of (log) size measured as total employment on the export participation at different shares of skilled foreign workers, based on the IV-Probit estimation presented in column (4), Table 1. Dashed lines indicate 95% confidence intervals. Size has a statistically significant effect on the export probability when the upper and lower bounds of the confidence interval are either both above or both below zero. The histogram and the right vertical axis depict the distribution of our sample over shares of skilled foreign workers.

4.3.2 Foreign Workers Facilitate Exports

According to Proposition 2, the shares of exporters, indirect exporters, and direct exporters *among total firms* should increase with the employment of skilled foreign workers. In other words, we expect the export probability of the firm to increase with the employment of skilled foreign workers, in general and whether it exports through an intermediary or directly.

We already investigated the effect of skilled foreign workers on the probability to export (disregarding the export mode of the firm) in Table 1, column (1). We found that a one per cent increase in the share of skilled foreign workers employed by a firm increases its probability to export by 4.97 percentage points.

We further test the validity of Proposition 2 using two alternative dependent variables. Results are reported in Table 2. In column (1), the dependent variable is a binary equal to one if the firm is exporting indirectly and zero otherwise. Note that the variable equals one whether the firm exports only indirectly, or uses both export modes (indirect and

direct exports). In column (2), the dependent variable is a binary equal to one if the firm exports directly and zero otherwise. Here again, the variable equals one whether the firm exports only directly, or uses both export modes.

We find no significant effect of the share of skilled foreign workers on the probability to export indirectly (column 1). This may be due to the fact that when the share of skilled foreign workers increases, some firms that were not exporting start exporting indirectly, while some firms that were exporting indirectly start exporting directly. The two flows may compensate each other so that the mean effect of an increase in the share of foreign workers seems null. On the contrary, we find a strong and positive effect on the probability to export directly (column 2). A one per cent increase in the share of skilled foreign workers leads to a significant 4.64 percentage point increase in the probability to export indirectly. In sum, the share of exporters among total firms increases with the share of skilled foreign workers employed by the firm, and this increase is driven by direct exporters. This finding reinforces the theoretical predictions from our model under the assumption of a Pareto distribution, as put forward in Proposition 3.

Control variables are either non significant (column 1) or display the expected sign. The size of the firm in terms of employment has a positive impact on exporting directly (column 2). Older firms tend to export more directly while mono-product firms tend to export less directly (column 2). Finally, the instrument is weak, but it positively predicts the share of skilled foreign workers in both columns.

Table 2: Validation of Proposition 2

	Indirect export dummy	Direct export dummy
	(1)	(2)
For_i	0.4121	4.6433***
	(1.1457)	(0.2730)
$\ln Size_i$	-0.0050	0.1473**
	(0.0584)	(0.0649)
$\ln Age_i$	0.1332	0.1508**
	(0.1216)	(0.0734)
$Mono_i$	-0.2607	-0.2904***
	(0.1687)	(0.0731)
Observations	837	899
Sector FE	yes	yes
Province FE	yes	yes
Estimator	IV-Probit	IV-Probit
1st stage coefficients	0.6910**	0.7159**
	(0.3358)	(0.3521)
1st stage F stat.	5.03	4.87

Note: IV-Probit estimation results. The dependent variable is a binary equal to one if the firm exports indirectly and zero otherwise in column (1), and a binary equal to one if the firm exports directly and zero otherwise in column (2). Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.

4.3.3 Foreign Workers Facilitate More Direct Exports

Proposition 3 predicts that the share of direct exporters *among exporters* is increasing in the share of skilled foreign workers, when firms' productivity follows a Pareto distribution. This implies that these workers can be seen as helping firms to access foreign markets for both export modes, yet even more for direct exports.

The results presented in Table 2 already point out that skilled foreign workers help firms to export directly, rather than indirectly. To further test proposition 3, we estimate a similar model as before on the sub-sample of exporting firms. Results are reported in Table 3. In column (1), the dependent variable is a binary equal to one if the firm exports only directly and zero if it exports only indirectly. The sample thus excludes firms using both export modes. We find that skilled foreign workers increase significantly the probability of their firms to export directly (versus indirectly). Among exporting firms,

a 1 per cent increase in the share of skilled foreign workers leads to a 3.44 percentage point increase in the probability to export directly (versus indirectly).

We confirm this result in column (2), where the dependent variable is a binary equal to one if the firm exports larger quantities directly than indirectly. The sample thus includes all exporting firms, including those using both export modes. Among all exporting firms, a 1 per cent increase in the share of skilled foreign workers leads to a 3.22 percentage point increase in the probability to export more directly than indirectly. Together with Table 2, these findings validate Proposition 3 according to which foreign workers facilitate more direct exports than indirect exports (under reasonable assumptions on the distribution of firms' productivity). These results suggest that indirect exporters become direct exporters at a stronger pace than non-exporters become indirect exporters, as suggested by the results in Table 2.

Table 3: Validation of Proposition 3

	Direct export dummy Sample of exporting firms	
	(1)	(2)
For_i	3.2174**	3.4393***
	(1.4453)	(0.9634)
$\ln Size_i$	0.1328*	0.1499***
	(0.0700)	(0.0566)
$\ln Age_i$	0.0919	0.0789
	(0.1562)	(0.1505)
$Mono_i$	-0.2741	-0.2152
	(0.1769)	(0.1400)
Observations	485	623
Sector FE	yes	yes
Province FE	yes	yes
Estimator	IV-Probit	IV-Probit
1st stage coefficients	0.5951**	0.6629**
	(0.2543)	(0.3033)
1st stage F stat.	2.96	3.58

Note: IV-Probit estimation results. The dependent variable is a binary equal to one if the firm exports directly and zero if it exports indirectly in column (1), and a binary equal to one if the firm exports more directly than indirectly in column (2). Column (1) thus excludes firms using both export modes. Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.

4.4 Robustness Tests

We report a set of robustness test in Tables A.7 to A.12, where we use alternative model specifications and samples of observations. All results are reported in the Appendix and discussed hereafter.

4.4.1 Alternative Model Specifications

Results reported in Tables A.7 to A.9 demonstrate the robustness of our findings to alternative model specifications, for each of the three propositions. First, in columns (1) and (2), we control for the share of foreign ownership. This additional variable controls

for the fact that skilled foreign workers may be posted workers or expatriates when hired by a foreign owned firm. Adding control variable is challenging given the small size and the cross-sectional nature of our sample. For each of the three propositions, we obtain results that are in line with the baseline findings. The share of foreign ownership does not impact the dependent variable except in the first specification of Table A.9 where it has a negative and significant effect. However, the share of foreign ownership has a positive and significant impact on the first stage regression, that is a positive effect on the share of high skilled foreign workers hired by the firm.

In columns (3) and (4), we use an alternative proxy for the size of the firm, that is the logarithm of the total assets of the firm. Although the effect of size is no longer significant (except in Table A.7, column 4), the coefficients associated to skilled foreign workers and the associated interaction term (in Table A.7, column 4) remain significant and in line with the baseline results.

Finally, in columns (5) and (6), we use an alternative measure for the employment of skilled foreign workers: a binary variable equal to one if the firm employs at least one skilled foreign worker and zero otherwise, instead of using the share of skilled foreign workers as in the baseline specification. Except for the regressions related to Proposition 1 where the coefficients are no longer significant when adding the interaction term, the effect of skilled foreign workers is in line with the baseline findings. Finally, in some cases, the effect of the firm size is negative, suggesting that the probability to hire at least one skilled foreign worker is, on average, negatively correlated with the firm size (Table A.7, column 6 and Table A.8, column 6).

4.4.2 Alternative Samples

Results reported in Tables A.10 to A.12 show the robustness of our findings to the use of alternative samples of observations, for each of the three propositions. We perform these tests to exclude the hypothesis that our results are driven by a sample selection bias induced by the small size and the survey nature of the data at hand. First, we exclude non-manufacturing firms in columns (1) and (2), and state-owed firms in columns (3) and (4). Then, we exclude the top-5 per cent of firms in terms of foreign capital in columns (5) and (6). We keep multinational firms in columns (7) and (8). In Tables A.10 and A.11, we exclude firms using both export modes in columns (9) and (10) as it is unclear whether exporting both indirectly and directly is an export activity that is more or less complex and costly than exporting using one export mode only. Finally, in the

last two columns of Tables A.10 to A.12, we exclude exporting firms that do not serve their domestic market. For each of these samples, we obtain very similar results to the baseline findings.

5 Conclusions

The pro-trade effect skilled foreign workers have on firm export performance in developed economies is well-documented in the literature, both empirically and theoretically (Hatzigeorgiou and Lodefalk, 2021). Similarly, the role played by trade intermediaries in the export process, as well as the rationale as to why firms choose to conduct trade through this channel, have been the object of recent studies (Abel-Koch, 2013; Felbermayr and Jung, 2011; Crozet, Lalanne and Poncet, 2013). Our paper lies at the intersection of these two seemingly related but distinct strands of literature. We rely on Crozet, Lalanne and Poncet (2013) to build a model with heterogeneous firms featuring an intermediary sector and foreign workers. Our model predicts that when foreign workers decrease the fixed export cost for both direct and indirect exports, the shares of direct and indirect exporters among all firms increase in the share of foreign workers. Additionally, if we assume that firm productivity is distributed according to a Pareto distribution, as is standard in the trade literature, our model predicts that the share of direct exporters among exporters increases in the share of foreign workers.

We then leverage the 2010 UNIDO Viet Nam Industry Investor Survey to study the effect skilled foreign workers have on firms' export modes. Our contribution is two-fold. First, in line with the model's predictions, we show that these workers relax the productivity constraint faced by firms to access foreign markets: the higher the share of skilled foreign workers, the lower the effect of the size of the firm on its probability to export. This implies that a firm employing skilled foreign workers is able to increase its profits by accessing foreign markers, because of the presence of reduced fixed export costs and the increasing returns to scale they entail. This result is in line with the assumption that skilled foreign workers help their employing firms thanks to their business network. Second, we find that skilled foreign workers help their employing firm export directly, while we do not find an impact on the average firm's probability to export indirectly. The latter finding comes with a caveat if interpreted through our theoretical model: while foreign workers do have an impact on both modes of export, if we assume a Pareto productivity distribution, the amount of non-exporters transitioning into indirect exporters is less than the amount of indirect exporters transitioning into direct exporters, rendering

the effect virtually invisible in a cross-sectional analysis. Further research is needed in this area.

Our focus on Viet Nam is in line with a nascent but increasing literature on the role intermediaries play in developing economies, and contributes to that literature by considering the role of skilled foreign workers. This is, to the best of our knowledge, the first paper to study the pro-trade effect of skilled foreign workers and trade intermediaries in unison within the context of a developing economy. This is particularly relevant for Southeast Asian economies that have chosen development strategies based on trade openness, implementing important trade liberalisation reforms in the 1990s. It is well-understood that economic under-development translates into an economic environment that diminishes both firm-level and aggregate productivities (Banerjee and Moll, 2010; Moll, 2014). Factors that help alleviate productivity constraints faced by firms in such environments and allow them to increase their potential have positive aggregate externalities and are thus natural lines of further inquiry. Our results show that the employment of skilled foreign workers is one such factor.

Finally, while the UNIDO Industry Investor Survey provides a valuable source of information on firms' activities in developing countries, the cross-sectional nature of the data is a severe limitation on the scope of our empirical analysis, pointing to a line of future research. Subsequent studies on this topic could leverage panel data so as to track the evolution of firms' export strategies across time and pinpoint with more certainty the pro-trade effect of skilled foreign workers identified here.

References

Abel-Koch, Jennifer. 2013. "Who Uses Intermediaries in International Trade? Evidence from Firm-level Survey Data." *The World Economy*, 36(8): 1041–1064.

Ahn, JaeBin, Amit K. Khandelwal, and Shang-Jin Wei. 2011. "The Role of Intermediaries in Facilitating Trade." *Journal of International Economics*, 84(1): 73–85.

Akerman, Anders. 2018. "A Theory on the Role of Wholesalers in International Trade Based on Economies of Scope." *Canadian Journal of Economics/Revue canadienne d'économique*, 51(1): 156–185.

Andrews, Martyn, Thorsten Schank, and Richard Upward. 2017. "Do Foreign Workers Reduce Trade Barriers? Microeconomic Evidence." *The World Economy*, 40(9): 1750–1774.

Ariu, Andrea. 2020. "Foreign Workers, Product Quality, and Trade: Evidence from a Natural Experiment." CEPR Discussion Paper No. DP14859.

Banerjee, Abhijit V., and Benjamin Moll. 2010. "Why Does Misallocation Persist?" *American Economic Journal: Macroeconomics*, 2(1): 189–206.

Bartik, Timothy J. 1991. *Who Benefits from State and Local Economic Development Policies?* W.E. Upjohn Institute for Employment Research.

Bas, Maria, and Ivan Ledezma. 2020. "Trade Liberalization and Heterogeneous Firms' Adjustments: Evidence from India." *Review of World Economics*, 156: 407–441.

Bastos, Paulo, and Joana Silva. 2012. "Networks, Firms, and Trade." *Journal of International Economics*, 87(2): 352–364.

Bernard, Andrew B., Jonathan Eaton, J. Bradford Jensen, and Samuel Kortum. 2003. "Plants and Productivity in International Trade." *American Economic Review*, 93(4): 1268–1290.

Bernard, Andrew B., Marco Grazzi, and Chiara Tomasi. 2015. "Intermediaries in International Trade: Products and Destinations." *Review of Economics and Statistics*, 97(4): 916–920.

Bitzer, Jürgen, Erkan Gören, and Sanne Kruse-Becher. 2021. "Absorption of foreign knowledge: the impact of immigrants on firm productivity." *Industrial and Corporate Change*, 30(3): 706–739.

Bodewig, Christian, Reena Badiani-Magnusson, Kevin Macdonald, David Newhouse, and Jan Rutkowski. 2014. *Vietnam Development Report 2014. Skilling up Vietnam: Preparing the workforce for a modern market economy.* World Bank Publications.

Bombardini, Matilde, Gianluca Orefice, and Maria D. Tito. 2019. "Does exporting improve matching? Evidence from French employer-employee data." *Journal of International Economics*, 117: 229–241.

Card, David. 2001. "Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration." *Journal of Labor Economics*, 19(1): 22–64.

Cho, Jaehan. 2018. "Knowledge transfer to foreign affiliates of multinationals through expatriation." *Journal of International Economics*, 113: 106–117.

Crozet, Matthieu, Guy Lalanne, and Sandra Poncet. 2013. "Wholesalers in international trade." *European Economic Review*, 58: 1–17.

Dang, Ngoc-Tram, and Tuan-Duong Nguyen. 2021. "Labor Immigration in Vietnam: Policy and Practice." In *Immigration Policy and Crisis in the Regional Context*. 107–119. Springer.

Egger, Peter H., Katharina Erhardt, and Andrea Lassmann. 2019. "Immigration and Firms' Integration in International Production Networks." *European Economic Review*, 111: 1–34.

Felbermayr, Gabriel, and Benjamin Jung. 2011. "Trade Intermediation and the Organization of Exporters." *Review of International Economics*, 19(4): 634–648.

Foged, Mette, and Giovanni Peri. 2016. "Immigrants' Effect on Native Workers: New Analysis on Longitudinal Data." *American Economic Journal: Applied Economics*, 8(2): 1–34.

Hanson, Gordon H. 2010. "Chapter 66 - International Migration and the Developing World." In *Handbooks in Economics*. Vol. 5 of *Handbook of Development Economics*, , ed. Dani Rodrik and Mark Rosenzweig, 4363–4414. Elsevier.

Hatzigeorgiou, Andreas, and Magnus Lodefalk. 2016. "Migrants' Influence on Firm-level Exports." *Journal of Industry, Competition and Trade*, 16(4): 477–497.

Hatzigeorgiou, Andreas, and Magnus Lodefalk. 2021. "A Literature Review of the Nexus between Migration and Internationalization." *The Journal of International Trade & Economic Development*, 30(3): 319–340.

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

Hiller, Sanne. 2013. "Does Immigrant Employment Matter for Export Sales? Evidence from Denmark." *Review of World Economics*, 149(2): 369–394.

Kerr, William R., and William F. Lincoln. 2010. "The Supply Side of Innovation: H-1B Visa Reforms and U.S. Ethnic Invention." *Journal of Labor Economics*, 28(3): 473–508.

Kogut, Bruce, and Udo Zander. 2003. "Knowledge of the firm and the evolutionary theory of the multinational corporation." *Journal of International Business Studies*, 34(6): 516–529.

Lewis, Ethan. 2011. "Immigration, skill mix, and capital skill complementarity." *Quarterly Journal of Economics*, 126: 1029–1069.

Marchal, Léa, and Clément Nedoncelle. 2019. "Immigrants, occupations and firm export performance." *Review of International Economics*, 27(5): 1480–1509.

Masso, Jaan, Kärt Rõigas, and Priit Vahter. 2015. "Foreign market experience, learning by hiring and firm export performance." *Review of World Economics*, 151: 659–686.

Melitz, Marc J. 2003. "The impact of trade on intra-industry reallocations and aggregate industry productivity." *econometrica*, 71(6): 1695–1725.

Melitz, Marc J., and Stephen J. Redding. 2015. "New Trade Models, New Welfare Implications." *American Economic Review*, 105(3): 1105–46.

Mitaritonna, Cristina, Gianluca Orefice, and Giovanni Peri. 2017. "Immigrants and firms' outcomes: Evidence from France." *European Economic Review*, 96: 62–82.

Moll, Benjamin. 2014. "Productivity Losses from Financial Frictions: Can Self-Financing Undo Capital Misallocation?" *American Economic Review*, 104(10): 3186–3221.

Ottaviano, Gianmarco. I. P., Giovanni Peri, and Greg C. Wright. 2013. "Immigration, Offshoring, and American Jobs." *American Economic Review*, 103(5): 1925–59.

Ottaviano, Gianmarco. I. P., Giovanni Peri, and Greg C. Wright. 2018. "Immigration, Trade and Productivity in Services: Evidence from UK firms." *Journal of International Economics*, 112: 88–108.

Parsons, Christopher R., and L. Alan Winters. 2014. "Chapter 4: International migration, trade and aid: a survey." *International Handbook on Migration and Economic Development*, Chapter 4, 65–112. Edward Elgar Publishing.

Peri, Giovanni, and Chad Sparber. 2009. "Task Specialization, Immigration, and Wages." *American Economic Journal: Applied Economics*, 1(3): 135–69.

Sala, Davide, and Erdal Yalcin. 2015. "Export Experience of Managers and the Internationalisation of Firms." *The World Economy*, 38(7): 1064–1089.

Spulber, Daniel F. 1996. "Market Microstructure and Intermediation." *Journal of Economic Perspectives*, 10(3): 135–152.

UNIDO. 2012. "Understanding the Impact of Foreign Direct Investment on Industrial Development." United Nations Industrial Development Organization and Ministry of Planning and Investment, Viet Nam Viet Nam Industrial Investment Report 2011.

Wacziarg, Romain, and Karen Horn Welch. 2008. "Trade Liberalization and Growth: New Evidence." *The World Bank Economic Review*, 22(2): 187–231.

Williams, Allan M. 2007. "International labour migration and tacit knowledge transactions: a Multi-level perspective." *Global Networks*, 7(1): 29–50.

Winters, L. Alan, Neil McCulloch, and Andrew McKay. 2004. "Trade Liberalization and Poverty: The Evidence So Far." *Journal of Economic Literature*, 42(1): 72–115.

A Online Appendix

A.1 Maximisation Programmes

The maximisation programme of firm k for domestic production is:

$$\max_{p_{kh}} \pi_{kh} = (p_{kh} - c_k)\, q_{kh}\,(p_{kh}) - F_h \tag{A.1}$$

with $q_{kh}\,(p_{kh}) = {(p_{kh})}^{-\sigma} E_h / {P_h}^{1-\sigma}$ according to equation (3).

The maximisation programme of firm k in country h for direct export to country $j \neq h$ is:

$$\max_{p_{kj}} \pi^d_{kj} = (p_{kj} - c_k)\, q_{kj}\left(p^{\text{CIF}}_{kj}\right) - F_j\,(\theta_k) \tag{A.2}$$

with $q_{kj}\left(p^{\text{CIF}}_{kj}\right) = {(p^{CIF}_{kj})}^{-\sigma} E_j / {P_j}^{1-\sigma}$ according to equation (3), and $p^{\text{CIF}}_{kj} = p_{kj}\tau_j + T_j$.

In case of indirect export, the maximisation programme of an intermediary taking the price of firm k as given is:

$$\max_{p^w_{kj}} \pi^w_{kj} = \left(p^w_{kj} - p^i_{kj}\right) q_{kj}\left(p^{w\ \text{CIF}}_{kj}\right) - f \tag{A.3}$$

with $q_{kj}\left(p^{w\ \text{CIF}}_{kj}\right) = {(p^{w\ \text{CIF}}_{kj})}^{-\sigma} E_j / {P_j}^{1-\sigma}$ according to equation (3), and $p^{w\ \text{CIF}}_{kj} = p^w_{kj}\tau_j + T_j$.

Profit maximisation yields the optimal prices and quantities for the intermediary as a function of manufacturer k's price:

$$p^w_{kj} = \frac{\sigma}{\sigma - 1}\left(p^i_{kj} + \frac{T_j}{\sigma\tau_j}\right), \tag{A.4}$$

$$p^{w\ \text{CIF}}_{kj} = \frac{\sigma}{\sigma - 1}\left(p^i_{kj}\tau_j + T_j\right), \tag{A.5}$$

$$q_{kj}\left(p^{w\ \text{CIF}}_{kj}\right) = \frac{E_j}{{P_j}^{1-\sigma}}\left(\frac{\sigma}{\sigma - 1}\right)^{-\sigma}\left(p^i_{kj}\tau_j + T_j\right)^{-\sigma}. \tag{A.6}$$

A.2 Proof of Proposition 3

The share of direct exporters among exporters is given by $\phi\left(\bar{c}^d_{j\theta_k}\right)/\phi\left(\bar{c}^i_{j\theta_k}\right)$. Differentiating with respect to θ_k and rearranging, we get:

$$\frac{\mathrm{d}}{\mathrm{d}\theta_k}\left[\frac{\phi\left(\bar{c}^d_{j\theta_k}\right)}{\phi\left(\bar{c}^i_{j\theta_k}\right)}\right] = \frac{\phi\left(\bar{c}^d_{j\theta_k}\right)}{\phi\left(\bar{c}^i_{j\theta_k}\right)}\left[\frac{1}{\phi\left(\bar{c}^d_{j\theta_k}\right)}\frac{\mathrm{d}\phi\left(\bar{c}^d_{j\theta_k}\right)}{\mathrm{d}\theta_k} - \frac{1}{\phi\left(\bar{c}^i_{j\theta_k}\right)}\frac{\mathrm{d}\phi\left(\bar{c}^i_{j\theta_k}\right)}{\mathrm{d}\theta_k}\right] \tag{A.7}$$

$$= \frac{\phi\left(\bar{c}^d_{j\theta_k}\right)}{\phi\left(\bar{c}^i_{j\theta_k}\right)}\frac{\mathrm{d}\bar{c}^i_{j\theta_k}}{\mathrm{d}\theta_k}\left[a\frac{\phi'\left(\bar{c}^d_{j\theta_k}\right)}{\phi\left(\bar{c}^d_{j\theta_k}\right)} - \frac{\phi'\left(\bar{c}^i_{j\theta_k}\right)}{\phi\left(\bar{c}^i_{j\theta_k}\right)}\right]. \tag{A.8}$$

Thus, the share of direct exporters among exporters is increasing in the share of foreign workers if and only if:

$$a\frac{\phi'\left(\bar{c}^d_{j\theta_k}\right)}{\phi\left(\bar{c}^d_{j\theta_k}\right)} \geqslant \frac{\phi'\left(\bar{c}^i_{j\theta_k}\right)}{\phi\left(\bar{c}^i_{j\theta_k}\right)}. \tag{A.9}$$

Inequality A.9 remains inconclusive without specifying a functional form for ϕ. Yet, the firm size distribution in terms of both revenue and employees is documented to display power law behaviour in the right tail. Given that our sample of Vietnamese firms is restricted to firms with over 225,00 USD in capital stock, the power-law approximation is particularly well-suited to represent it. We can thus assume that firm productivity is Pareto-distributed.

Suppose that, in country h, firm productivity is distributed according to a Pareto distribution. By definition, productivity z is the inverse of marginal cost c, so that $c = 1/z$. Denote its cumulative distribution function by $F_{z_k}(z) = \mathrm{P}\{z_k \leqslant z\} = 1-(z_h/z)^\eta$, with $\eta > 1$ and $z_h = 1/\bar{c}^h$. According to the model, firms with a marginal cost above $\bar{c}^h$ (defined in equation 18) do not serve the market, so that the probability of firm k with productivity $z_k < z_h$ to be active in the market is zero.

We derive the marginal cost distribution from the productivity distribution (with support on the interval $(0, \bar{c}^h]$):

$$\phi(c) = \mathrm{P}\{c_k \leqslant c\} \tag{A.10}$$

$$= 1 - F_{z_k}\left(\frac{1}{c}\right) \tag{A.11}$$

$$= \left(\frac{c}{\bar{c}^h}\right)^\eta \tag{A.12}$$

Taking the derivative with respect to c we get

$$\phi'(c) = \frac{\eta}{c}\phi(c) \tag{A.13}$$

Plugging that result in equation A.8 and using equation 22, we get:

$$\frac{\mathrm{d}}{\mathrm{d}\theta_k}\left[\frac{\phi\left(\bar{c}^d_{j\theta_k}\right)}{\phi\left(\bar{c}^i_{j\theta_k}\right)}\right] = \frac{\phi\left(\bar{c}^d_{j\theta_k}\right)}{\phi\left(\bar{c}^i_{j\theta_k}\right)}\frac{\mathrm{d}\bar{c}^i_{j\theta_k}}{\mathrm{d}\theta_k}\left[(1-a)\frac{\eta}{c_{j\bar{\theta}_k}{}^d c_{j\bar{\theta}_k}{}^i}\frac{T_j}{\tau_j}\right] \geqslant 0 \tag{A.14}$$

The share of direct exporters among exporters is thus increasing in the share of foreign workers when firm productivity is Pareto-distributed.

A.3 Descriptive Statistics

Table A.1: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Age of the firm	12.985	10.198	2	87	1,152
Nr. of permanent full-time employees	620.012	1218.19	7	18650	1,150
Sh. of skilled workers among permanent full-time employees	0.138	0.117	0.002	0.967	1,150
Sh. of foreigners among permanent full-time employees	0.017	0.039	0	0.889	978
Sh. of foreigners among skilled permanent full-time employees	0.157	0.224	0	1	976
Total costs (in VNN Dong)	3.42e+07	3.03e+08	0	7.26e+09	1,048
Total wage bill (in VNN Dong)	1.48e+06	3.82e+06	0	8.00e+07	1,143
Total fixed assets (in VNN Dong)	5.90e+07	5.23e+08	5,860	9.34e+09	1,137
Total sales (in VNN Dong)	5.32e+07	5.17e+08	12,599	1.10e+10	1,150
Mono-product firm dummy	0.347	0.476	0	1	1,152
Multinational firm dummy	0.631	0.483	0	1	1,152
Sh. of foreign ownership	0.607	0.477	0	1	1,152
Exporter dummy	0.701	0.458	0	1	1,152
Indirect exporter dummy	0.112	0.316	0	1	1,103
Direct exporter dummy	0.691	0.462	0	1	1,103
Exporter using both export modes dummy	0.068	0.251	0	1	1,152
Nr. of destinations served	1.748	1.705	0	9	1,103

Note: Summary statistics for the main variables of interest for the baseline sample of firms.

Table A.2: Characteristics of Non-Exporting and Exporting Firms. Firms using both export modes are included in the sample of exporting firms.

	Non-exporters		Exporters			
Variable	**N**	**Mean**	**N**	**Mean**	**Diff.**	**p-value**
Age of the firm	344	16.393	808	11.534	4.534	0
Nr. of permanent full-time employees	344	341	806	739	-398	0
Sh. of skilled workers among permanent full-time employees	344	0.187	806	0.117	0.067	0
Sh. of foreigners among permanent full-time employees	247	0.011	731	0.019	-0.009	0
Sh. of foreigners among skilled permanent full-time employees	246	0.081	730	0.182	-0.102	0
Total costs (in VNN Dong)	324	1.73e+07	724	4.17e+07	-2.44e+07	0.074
Total wage bill (in VNN Dong)	342	1.06e+06	801	1.66e+06	-604,310	0.001
Total fixed assets (in VNN Dong)	339	2.18e+07	798	7.47e+07	-5.29e+07	0.018
Total sales (in VNN Dong)	343	2.37e+07	807	6.57e+07	-4.20e+07	0.056
Mono-product firm dummy	344	0.343	808	0.349	-0.006	0.845
Multinational firm dummy	344	0.293	808	0.775	-0.481	0
Sh. of foreign ownership	344	0.263	808	0.754	-0.491	0
Nr. of destinations served	295	0.000	808	2.386	-2.386	0

Note: Summary statistics for the main variables of interest and independent group t-tests between sub-samples of non-exporters and exporters for a number of firm characteristics.

Table A.3: Characteristics of Indirect and Direct Exporting Firms

	Indirect exporters		Direct exporters			
	N	**Mean**	**N**	**Mean**	**Diff.**	**p-value**
Age of the firm	46	12.239	684	11.179	1.061	0.473
Nr. of permanent full-time employees	46	468	682	764	-295	0.004
Sh. of skilled workers among permanent full-time employees	46	0.112	682	0.116	-0.004	0.768
Sh. of foreigners among permanent full-time employees	41	0.028	620	0.018	0.009	0.087
Sh. of foreigners among skilled permanent full-time employees	41	0.285	619	0.176	0.109	0.017
Total costs (in VNN Dong)	42	8.73e+06	613	4.60e+07	-3.72e+07	0.022
Total wage bill (in VNN Dong)	46	894,836	677	1.73e+06	-832,101	0.001
Total fixed assets (in VNN Dong)	46	8.95e+06	676	8.50e+07	-7.60e+07	0.004
Total sales (in VNN Dong)	46	9.82e+06	683	7.34e+07	-6.35e+07	0.014
Mono-product firm dummy	46	0.369	684	0.359	0.010	0.895
Multinational firm dummy	46	0.696	684	0.780	-0.085	0.233
Sh. of foreign ownership	46	0.696	684	0.760	-0.064	0.367
Nr. of destinations served	46	1.804	684	2.373	-0.569	0.007

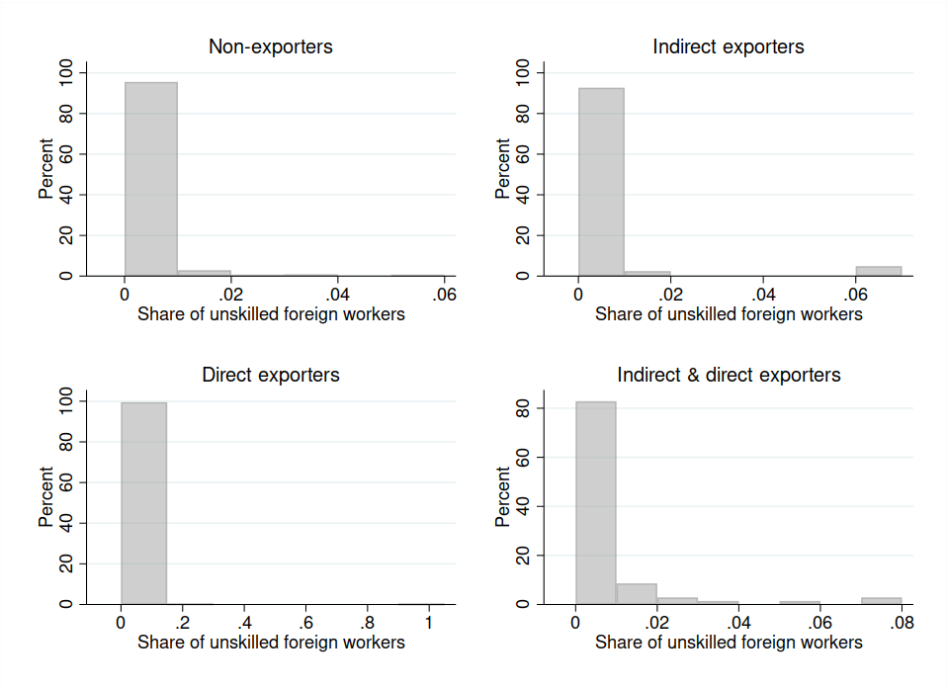
Note: Summary statistics for the main variables of interest and independent group t-tests between sub-samples of indirect-only and direct-only exporters for a number of firm characteristics. Firms using both export modes are excluded from these sub-samples.

Table A.4: Comparison of the 2010 UNIDO Viet Nam Industry Investor Survey and the 2009 World Bank Enterprise Survey

	UNIDO					World Bank				
	Mean	**Std. Dev.**	**Min.**	**Max.**	**N**	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Full sample										
Nr. of permanent full-time employees	736.374	1,442.450	50	18,650	714	658.496	1,119.433	50	7,200	125
Total wage bill (in VNN Dong)	1.70e+06	4.25e+06	0	8.00e+07	709	3.66e+10	1.18e+11	4.00e+07	1.20e+12	122
Mono-product firm dummy	0.392	0.489	0	1	716	0.624	0.486	0	1	125
Sh. of foreign ownership	0.961	0.138	0.100	1	716	0.826	0.291	0.100	1	122
Exporter dummy	0.862	0.345	0	1	716	0.896	0.306	0	1	125
Indirect exporter dummy	0.130	0.337	0	1	692	0.184	0.389	0	1	125
Direct exporter dummy	0.848	0.359	0	1	692	0.792	0.408	0	1	125
Indirect exporters										
Nr. of permanent full-time employees	564.422	781.606	58	5,890	90	831.478	1,669.007	70	7,200	23
Total wage bill (in VNN Dong)	1.22e+06	1.50e+06	0	9.00e+06	90	4.37e+10	7.96e+10	2.54e+08	2.80e+11	22
Mono-product firm dummy	.322	0.470	0	1	90	0.739	0.449	0	1	23
Sh. of foreign ownership	0.971	0.134	0.100	1	90	0.816	0.331	0.100	1	22
Direct exporters										
Nr. of permanent full-time employees	803.386	1,572.366	50	18,650	585	702.758	1,038.783	60	6,200	99
Total wage bill (in VNN Dong)	1.78e+06	4.58e+06	0	8.00e+07	582	3.96e+10	1.28e+11	4.00e+08	1.20e+12	98
Mono-product firm dummy	0.383	0.487	0	1	587	0.596	0.493	0	1	99
Sh. of foreign ownership	0.971	0.121	0.100	1	587	0.824	0.282	0.130	1	97

Note: Summary statistics for firm characteristics common across the 2010 Viet Nam Industry Investor Survey and the 2009 World Bank Enterprise Survey, for firms larger than 50 employees with at least 10% of foreign ownership. The first, second and third panels show the characteristics of the full sample, the sub-sample of indirect-only and the sub-sample of direct-only exporters respectively. Firms using both export modes are excluded from these sub-samples.

Figure A.1: Share of Unskilled Foreign Workers by Export Status



Note: The four figures depict the distributions of the shares of unskilled foreign workers observed across non-exporters, indirect-only exporters, direct-only exporters, and firms using both export modes.

A.4 Additional Results

Table A.5: Validation of Proposition 1 - Export Share

	Export share			
	(1)	(2)	(3)	(4)
For_i	4.3669*	0.1555***	0.1529***	2.6712***
	(0.2051)	(0.0585)	(0.0582)	(1.2084)
$\ln Size_i$	0.0730***	0.0708***	0.0708***	0.1346***
	(0.0128)	(0.0128)	(0.0128)	(0.0333)
IV_i			0.1563	
			(0.1936)	
$For_i * \ln Size_i$				-0.3774**
				(0.1818)
$\ln Age_i$	-0.1295***	-0.1393***	-0.1392***	-0.1200***
	(0.0217)	(0.0203)	(0.0203)	(0.0243)
$Mono_i$	0.0620***	0.0747***	0.0747***	0.0592**
	(0.0214)	(0.0195)	(0.0195)	(0.0249)
Observations	1,093	1,093	1,093	1,093
Sector FE	yes	yes	yes	yes
Province FE	yes	yes	yes	yes
Estimator	IV-2SLS	OLS	OLS	IV-2SLS
R-squared		0.0985	0.0987	
1st stage coefficients	0.7303**			5.5185** ; -2.2756
	(0.3710)			(2.2755) ; (2.0544)
1st stage F stat.	3.88			8.14 ; 6.67

Note: IV-2SLS and OLS estimation results. The dependent variable is the share of exports over total sales. In columns (1) and (4), the share of skilled foreign workers (For_i) and the interaction term are instrumented using the share of unskilled foreign workers, denoted IV_i. Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.

Table A.6: Validation of Proposition 1 - Bins of Foreign Employment

	Export dummy			
	(1)	(2)	(3)	(4)
$\ln \text{Size}_i$	0.2881***	0.2419*	0.1596	0.2511
	(0.0888)	(0.1339)	(0.2272)	(0.1615)
$\ln \text{Age}_i$	0.0198	-0.0908	-0.6470	-0.0124
	(0.1266)	(0.2596)	(0.4064)	(0.3534)
Mono_i	-0.1948	-0.4452	-0.2554	0.1886
	(0.1804)	(0.2733)	(0.3709)	(0.2588)
Bins (sh. of skilled for. workers)	1	2	3	4
Observations	373	159	138	151
Sector FE	yes	yes	yes	yes
Province FE	yes	yes	yes	yes
Estimator	Probit	Probit	Probit	Probit

Note: Probit estimation results. The dependent variable is a binary equal to one if the firm exports and zero otherwise. Column (1) includes all firms not hiring any skilled foreign workers and columns (2) to (4) split the distribution of firms employing a positive share of skilled foreign workers into three sub-samples. Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.

Table A.7: Validation of Proposition 1 – Alternative Model Specifications

	Export dummy					
	Additional control		Size proxy		Binary for foreign empl.	
	(1)	(2)	(3)	(4)	(5)	(6)
For_i	4.8061***	17.1676***	4.9615***	17.4123***	2.3797***	8.5821
	(0.7183)	(3.6675)	(0.2514)	(2.1041)	(0.0644)	(27.7550)
$\ln Size_i$	0.1800***	0.5418***	0.0267	0.1467***	-0.1108***	0.7333
	(0.0569)	(0.1111)	(0.0240)	(0.0301)	(0.0361)	(4.1932)
For_i * $\ln Size_i$		-2.3419***		-0.8111***		-1.1381
		(0.7426)		(0.1350)		(5.5084)
Observations	1,057	1,057	1,039	1,039	1,057	1,057
Sector FE	yes	yes	yes	yes	yes	yes
Province FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Estimator	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit
1st stage coefficients	0.5436*	3.4335 ; -0.6481	0.7363*	-5.5239*** ; 9.2375***	0.8044**	8.1486*** ; -4.3026*
	(0.2899)	(2.5808) ; (2.2213)	(0.3757)	(1.6014) ; (1.8712)	(0.3210)	(2.8833) ; (2.5043)
1st stage F stat.	11.39	11.17 ; 10.27	5.77	5.91 ; 6.27	6.83	6.75 ; 10.97

Note: IV-Probit estimation results. The dependent variable is a binary equal to one if the firm exports and zero otherwise. Controls include the (log) age of the firm, and a binary variable equal to one for mono-product firm and zero otherwise. In columns (1) and (2), we also control for the share of foreign ownership of the firm. In columns (3) and (4), the size proxy, denoted $\ln Size_i$, is the logarithm of the firm's assets. In columns (5) and (6), we define For_i as a binary variable equal to one if the firm employs at least one skilled foreign worker, and zero otherwise. Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.

Table A.8: Validation of Proposition 2 – Alternative Model Specifications

	Indirect/Direct Export dummy					
	Additional control		Size proxy		Binary for foreign empl.	
	(1)	(2)	(3)	(4)	(5)	(6)
For_i	-0.0357	4.4856***	0.7002	4.5797***	0.2914	2.4094***
	(1.5571)	(0.7396)	(1.0980)	(0.3201)	(0.9692)	(0.0697)
$\ln Size_i$	-0.0245	0.2043***	-0.0402	0.0518	-0.0271	-0.0978**
	(0.0702)	(0.0687)	(0.0368)	(0.0406)	(0.0770)	(0.0487)
Observations	837	899	827	885	837	899
Sector FE	yes	yes	yes	yes	yes	yes
Province FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Estimator	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit
1st stage coefficients	0.5284*	0.5445*	0.7009**	0.7271**	0.7198***	0.7761***
	(0.2788)	(0.2881)	(0.3496)	(0.3665)	(0.2528)	(0.2931)
1st stage F stat.	9.55	9.15	4.79	4.66	6.42	6.20

Note: IV-Probit estimation results. The dependent variable is a binary equal to one if the firm exports indirectly and zero otherwise in odd-numbered columns, and a binary equal to one if the firm exports directly and zero otherwise in even-numbered columns. Controls include the (log) age of the firm, and a binary variable equal to one for mono-product firm and zero otherwise. In columns (1) and (2), we also control for the share of foreign ownership of the firm. In columns (3) and (4), the size proxy, denoted $\ln Size_i$, is the logarithm of the firm's assets. In columns (5) and (6), we define For_i as a binary variable equal to one if the firm employs at least one skilled foreign worker, and zero otherwise. Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.

Table A.9: Validation of Proposition 3 – Alternative Model Specifications

	Export dummy					
	Additional control		Size proxy		Binary for foreign empl.	
	(1)	(2)	(3)	(4)	(5)	(6)
For_i	3.6693***	3.4149**	3.2604**	3.2536**	2.3489***	2.1923***
	(1.0031)	(1.6230)	(1.3125)	(1.5453)	(0.2569)	(0.5123)
$\ln Size_i$	0.1626***	0.1459**	0.0973	0.1076	-0.0424	-0.0252
	(0.0564)	(0.0698)	(0.0609)	(0.1013)	(0.0562)	(0.0806)
Observations	623	485	616	481	623	485
Sector FE	yes	yes	yes	yes	yes	yes
Province FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Estimator	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit
1st stage coefficients	0.5432*	0.4756**	0.6673**	0.5736**	0.5886***	0.6512***
	(0.2800)	(0.2328)	(0.3204)	(0.2488)	(0.1367)	(0.1751)
1st stage F stat.	5.82	5.48	3.30	2.68	4.26	3.94

Note: IV-Probit estimation results. The dependent variable is a binary equal to one if the firm exports more directly than indirectly in odd-numbered columns, and a binary equal to one if the firm exports directly and zero if it exports indirectly in even-numbered columns which excludes firms using both export modes. Controls include the (log) age of the firm, and a binary variable equal to one for mono-product firm and zero otherwise. In columns (1) and (2), we also control for the share of foreign ownership of the firm. In columns (3) and (4), the size proxy, denoted $\ln Size_i$, is the logarithm of the firm's assets. In columns (5) and (6), we define For_i as a binary variable equal to one if the firm employs at least one skilled foreign worker, and zero otherwise. Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.

Table A.10: Validation of Proposition 1 – Alternative Samples

	Export dummy					
	Manufacturers only		Excl. state-owned firms		Excl. top 5% MNEs	
	(1)	(2)	(3)	(4)	(5)	(6)
For_i	4.9573***	17.9309***	4.7737***	18.0299***	4.9708***	18.5451***
	(0.2527)	(6.0169)	(0.2609)	(2.7104)	(0.2537)	(2.6790)
$\ln Size_i$	0.1266**	0.5055**	0.1267**	0.5712***	0.1295**	0.5632***
	(0.0592)	(0.2179)	(0.0594)	(0.0889)	(0.0594)	(0.0867)
For_i * $\ln Size_i$		-2.4266*		-2.5400***		-2.5979***
		(1.2634)		(0.5403)		(0.5432)
Observations	1,050	1,050	987	987	1,057	1,057
Sector FE	yes	yes	yes	yes	yes	yes
Province FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Estimator	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit
1st stage coefficients	0.7274**	5.7028*** ; -2.3798	0.7109**	5.3157** ; -2.1911	0.7241**	5.4726** ; -2.2368
	(0.3640)	(2.2101) ; (2.0092)	(0.3536)	(2.3106) ; (2.0649)	(0.3610)	(2.2362) ; (2.0164)
1st stage F stat.	6.09	6.16 ; 5.84	4.91	4.96 ; 4.78	5.99	6.05 ; 5.74
	MNEs only		Excl. if using both modes		Excl. only exporters	
	(7)	(8)	(9)	(10)	(11)	(12)
For_i	4.2816***	16.2638***	4.9482***	18.4730***	5.1875***	18.5860***
	(0.4276)	(2.7935)	(0.3134)	(2.7426)	(0.3035)	(2.5976)
$\ln Size_i$	0.1397***	0.5893***	0.1389*	0.5758***	0.0665	0.4307***
	(0.0506)	(0.1087)	(0.0760)	(0.0874)	(0.0487)	(0.0841)
For_i * $\ln Size_i$		-2.2485***		-2.6112***		-2.5336***
		(0.5427)		(0.5494)		(0.4930)
Observations	668	668	990	990	758	758
Sector FE	yes	yes	yes	yes	yes	yes
Province FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Estimator	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit
1st stage coefficients	0.5464*	3.5439 ; -1.1368	0.7469**	6.0276*** ; -2.5921	0.3860***	4.3063*** ; -2.1099*
	(0.2891)	(2.7118) ; (2.3081)	(0.3803)	(2.2079) ; (2.0281)	(0.0903)	(1.6065) ; (1.1910)
1st stage F stat.	3.11	3.09 ; 2.69	5.70	5.80 ; 5.57	5.14	5.08 ; 4.99

Note: IV-Probit estimation results. The dependent variable is a binary equal to one if the firm exports and zero otherwise. Controls include the (log) age of the firm, and a binary variable equal to one for mono-product firm and zero otherwise. In columns (1) and (2), we exclude non-manufacturing firms. In columns (3) and (4), we exclude state-owned firms. In columns (5) and (6), we exclude the top 5% of firms in terms of foreign ownership. In columns (7) and (8), we keep multinational firms (MNEs) only. In columns (9) and (10), we exclude firms using both export modes. In columns (11) and (12), we exclude exporting firms that do not serve their domestic market. Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.

Table A.11: Validation of Proposition 2 – Alternative Samples

	Indirect/Direct Export dummy					
	Manufacturers only		Excl. state-owned firms		Excl. top 5% MNEs	
	(1)	(2)	(3)	(4)	(5)	(6)
For_i	0.4121	4.6252***	0.3867	4.4525***	0.4121	4.6433***
	(1.1457)	(0.2751)	(1.1994)	(0.3337)	(1.1457)	(0.2730)
$\ln Size_i$	-0.0050	0.1455**	-0.0501	0.1498**	-0.0050	0.1473**
	(0.0584)	(0.0649)	(0.0615)	(0.0713)	(0.0584)	(0.0649)
Observations	837	892	791	845	837	899
Sector FE	yes	yes	yes	yes	yes	yes
Province FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Estimator	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit
1st stage coefficients	0.6910**	0.7195**	0.6804**	0.7031**	0.6910**	0.7159**
	(0.3358)	(0.3553)	(0.3303)	(0.3454)	(0.3358)	(0.3521)
1st stage F stat.	5.03	4.93	4.33	4.11	5.03	4.87

	MNEs only		Excl. if using both modes		Excl. only exporters	
	(7)	(8)	(9)	(10)	(11)	(12)
For_i	-0.4128	4.0940***	-2.2962	4.5708***	1.8406	4.9408***
	(1.8768)	(0.5237)	(2.9360)	(0.3618)	(1.9195)	(0.2773)
$\ln Size_i$	-0.1217	0.1800***	-0.0872	0.1568**	0.0063	0.0900
	(0.0794)	(0.0643)	(0.0759)	(0.0785)	(0.0821)	(0.0595)
Observations	544	583	573	832	535	600
Sector FE	yes	yes	yes	yes	yes	yes
Province FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Estimator	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit
1st stage coefficients	0.5356*	0.5497*	0.5963**	0.7433**	0.3228***	0.3745***
	(0.2769)	(0.2868)	(0.2647)	(0.3747)	(0.0509)	(0.0686)
1st stage F stat.	2.91	2.77	3.83	4.59	4.18	4.08

Note: IV-Probit estimation results. The dependent variable is a binary equal to one if the firm exports indirectly and zero otherwise in odd-numbered columns, and a binary equal to one if the firm exports directly and zero otherwise in even-numbered columns. Controls include the (log) age of the firm, and a binary variable equal to one for mono-product firm and zero otherwise. In columns (1) and (2), we exclude non-manufacturing firms. In columns (3) and (4), we exclude state-owned firms. In columns (5) and (6), we exclude the top 5% of firms in terms of foreign ownership. In columns (7) and (8), we keep multinational firms (MNEs) only. In columns (9) and (10), we exclude firms using both export modes. In columns (11) and (12), we exclude exporting firms that do not serve their domestic market. Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.

Table A.12: Validation of Proposition 3 – Alternative Samples

	Indirect/Direct Export dummy					
	Manufacturers only		Excl. state-owned firms		Excl. top 5% MNEs	
	(1)	(2)	(3)	(4)	(5)	(6)
For_i	3.4393***	3.2174**	3.3866***	3.1194**	3.4393***	3.2174**
	(0.9634)	(1.4453)	(0.9631)	(1.5904)	(0.9634)	(1.4453)
$\ln Size_i$	0.1499***	0.1328*	0.1601***	0.1541*	0.1499***	0.1328*
	(0.0566)	(0.0700)	(0.0614)	(0.0823)	(0.0566)	(0.0700)
Observations	623	485	606	475	623	485
Sector FE	yes	yes	yes	yes	yes	yes
Province FE	yes	yes	yes	yes	yes	yes
Controls	yes	yes	yes	yes	yes	yes
Estimator	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit	IV-Probit
1st stage coefficients	0.6629**	0.5951**	0.6610**	0.5936**	0.6629**	0.5951**
	(0.3033)	(0.2543)	(0.3037)	(0.2547)	(0.3033)	(0.2543)
1st stage F stat.	3.58	2.96	3.27	2.68	3.58	2.96

	MNEs only		Excl. only exporters	
	(7)	(8)	(9)	(10)
For_i	3.6522***	3.3468**	3.4089*	2.3064
	(0.7770)	(1.5830)	(1.8983)	(4.2597)
$\ln Size_i$	0.1935**	0.2127*	0.1051	0.1344
	(0.0765)	(0.1184)	(0.0909)	(0.1273)
Observations	455	313	329	261
Sector FE	yes	yes	yes	yes
Province FE	yes	yes	yes	yes
Controls	yes	yes	yes	yes
Estimator	IV-Probit	IV-Probit	IV-Probit	IV-Probit
1st stage coefficients	0.5441*	0.4552**	0.3366***	0.3707***
	(0.2782)	(0.2156)	(0.0569)	(0.0445)
1st stage F stat.	2.26	1.31	2.30	2.25

Note: IV-Probit estimation results. The dependent variable is a binary equal to one if the firm exports more directly than indirectly in odd-numbered columns, and a binary equal to one if the firm exports directly and zero if it exports indirectly in even-numbered columns which excludes firms using both export modes. Controls include the (log) age of the firm, and a binary variable equal to one for mono-product firm and zero otherwise. In columns (1) and (2), we exclude non-manufacturing firms. In columns (3) and (4), we exclude state-owned firms. In columns (5) and (6), we exclude the top 5% of firms in terms of foreign ownership. In columns (7) and (8), we keep multinational firms (MNEs) only. In columns (9) and (10), we exclude exporting firms that do not serve their domestic market. Regressions include a binary variable for an observation's survey year source, taking the value zero for 2009 and one for 2010. ***, **, and * denote significance at the 1%, 5%, and 10% level. Errors clustered at the province-sector level are reported in parentheses.