The Role of Intermediaries in Facilitating Trade*

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Abstract

This paper documents that intermediaries play an important role in facilitating international trade. We modify a heterogeneous firm model to allow for an intermediary sector. The model predicts that firms will endogenously select their mode of export–either directly or indirectly through an intermediary–based on productivity. The model also predicts that intermediaries will be relatively more important in markets that are more difficult to penetrate. We provide empirical confirmation for these predictions using the firm-level census of China's trade, and generate new facts regarding the activity of intermediaries. We also provide evidence that firms begin to export directly after exporting through intermediaries.

Keywords: China, Intermediaries, Heterogeneous Firms, Middlemen, Trade Costs

JEL classification: F1

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1. Introduction

Research using firm-level data has uncovered that only a fraction of firms directly export products to foreign markets (Bernard and Jensen (1995) and Bernard, Jensen, and Schott (2009)). This fact is now well-grounded in theoretical models featuring firm heterogeneity and fixed export costs (e.g., Melitz 2003). These empirical and theoretical findings, however, ignore the role of intermediary firms in trade. The prominence of intermediaries appears in aggregate trade statistics; in the U.S., wholesale and retail firms account for approximately 11 and 24 percent of exports and imports (Bernard, Jensen, Redding and Schott 2010), respectively. The use of intermediary firms has been especially pervasive in developing economies, particularly in Asia. In the early 1980s, three hundred trading (non-manufacturing) Japanese firms accounted for 80 percent of Japanese trade (Rossman, 1984). Li and Fung, the 100-year-old trading company, is a prominent example of an intermediary that connects clients with thousands of apparel suppliers in low-wage countries. In China today, the setting of our study, 22 percent of Chinese exports are handled by Chinese intermediaries.

In this paper, we develop a simple theoretical framework to explain why firms export their products using intermediaries and document the pattern of intermediated trade using data from China. In the model, manufacturing firms can choose between *direct* and *indirect* export modes to each market. As in Melitz (2003), a firm can directly reach foreign customers by incurring a fixed cost and variable trade cost. The new feature of our model is an intermediation technology. Firms that use the intermediary sector incur a one-time global fixed cost that provides indirect access to all markets which allows firms to save on market-specific bilateral fixed costs. The disadvantage is that intermediation results in higher marginal costs of foreign distribution which raises the price to foreign consumers. Analogous to Helpman, Melitz and Yeaple (2006), this new entry margin creates a third type of firm: an indirect exporter. However, unlike in Helpman et al. (2006), the intermediation technology here benefits *less* productive firms. The presence of intermediaries provides a mechanism by which firms can access the export market even if they are not quite productive enough to establish their own distribution network.

This simple extension has important aggregate implications. The model predicts that the share of exports handled by intermediary firms increases with variable and fixed costs of exporting and decreases with market size. The reason is that firms need to possess higher levels of productivity to overcome smaller profits from direct exports. When barriers to trade are large, a larger fraction of less-productive (e.g., small) firms use intermediaries to export. The share of aggregate exports handled by intermediaries therefore increases with the difficulty of accessing destination markets. This prediction is consistent with observations from the business literature (e.g., Peng and Ilinitch 1998), and with objectives of policies, such as the 1982 U.S. Export Trading Company Act, that encouraged the entry

of intermediary firms to export on behalf of the "tens of thousands" of small- and medium-sized U.S. businesses (Export Trading Company Act of 1982). The model here highlights a particular mechanism–trade costs–that explains why firms may need intermediaries to reach foreign markets.

We exploit information from two databases to verify the predictions of the model. The Enterprise Survey Data for Chinese firms collected by the World Bank records direct and indirect exports at the firm level. These data indicate that the most productive firms directly export their products while firms of intermediate levels are relatively more likely to use intermediation. This evidence is consistent with the sorting pattern predicted by the model. A shortcoming of the data is that they do not provide export information by destination market. To verify the main predictions of the model, we turn to a recently constructed database of firm-level international trade transactions from China's customs. An added advantage of the customs data is that they provide the full census of China's trade and so we can obtain a complete portrait of direct exports and indirect exports handled by intermediary firms.

The customs data reveal several stylized facts about China's overall trade patterns. In 2005, Chinese intermediaries accounted for 22 percent of total exports. Intermediary firms have a relative "country" focus while firms that engage in direct exporting appear to have a relative "product" focus. That is, intermediary firms send relatively more products per country while direct exporters behave in an opposite manner. This finding is intuitive; manufacturing firms likely possess a core competent product line (Bernard, Redding and Schott, 2009), while according to our framework, intermediaries emerge precisely to overcome the market-specific costs of international trade.

We find strong evidence that indirect export shares correlate with market characteristics. Countries that are more distant, smaller in size, and require more documents for importing (a measure of fixed costs of trade) receive a larger fraction of exports through Chinese intermediaries. Intermediary firms also play a relatively smaller role in exporting to countries that have large Chinese-speaking population. This is intuitive if common language and cultural heritage reduce exporting costs. Consistent with our model, indirect export shares also increase with countries' MFN tariffs on imports. Our point estimates imply that increasing a country's distance to China by one log point would increase the share of exports handled by intermediaries to that country by about 10 percent. Likewise, an increase in tariffs by 10 percentage points (roughly one standard deviation in our sample) is associated with a 15 percent increase in intermediary export shares. This evidence, which is robust to several sensitivity checks, strongly supports the hypothesis that intermediaries facilitate trade to more difficult-to-access markets.

In the final section, we provide suggestive evidence that intermediaries may help expand the extensive margin of trade. While this phenomenon is not explicitly formalized

in our (static) model, it seems plausible that once small firms export indirectly by using intermediary services, they could switch to interacting directly with their foreign clients. Firms that use intermediaries could become direct exporters more easily in subsequent periods. We provide two pieces of evidence in support of this hypothesis. First, we compare export values of new and incumbent varieties across markets and find that new varieties have relatively larger transaction values in smaller and high trade costs markets, precisely the markets where intermediaries play a relatively more important role. This suggests that although the customs data identify these varieties as new, it is likely that some firms used intermediaries to previously access these markets. Hence, the varieties in these markets have relatively larger values when they first appear in the customs data. We also provide more direct evidence for this hypothesis using a unique panel-level data on Ghanaian firms which tracks their export status and export mode over time. We observe that firms using intermediaries in previous periods are more likely to export directly in subsequent periods than firms that did not use intermediaries. While these results are only suggestive, they provide the first evidence that intermediaries facilitate direct export participation.

The literature has offered two broad reasons for why intermediaries arise in an economy: facilitating matching of buyers and sellers (e.g., Rubinstein and Wolinsky 1987) and mitigating adverse selection by acting as gauranteers of quality (e.g., Biglaiser 1993 and Spulber 1996). Feenstra and Hanson (2004) have shown support for the latter channel in the context of Hong Kong's exports. They find that between 1988-1993, 53 percent of China's exports were shipped through Hong Kong, and the average markup of Hong Kong re-exports of Chinese goods was 24 percent, which suggests a quality-sorting role for Hong Kong intermediaries. In contrast, our results support previous work by Rauch and Trindade (2002), who document the importance of ethnic Chinese networks in influencing trade patterns, by emphasizing the trade facilitation mechanism. So while we find that intermediaries export higher unit values than direct exporters, which could support the adverse selection story, we observe no systematic differences in unit values according the product characteristics. Such a finding would be expected if the adverse selection mechanism was more dominant in certain products rather than others. We also observe that smaller firms, which are typically less productive and manufacture relatively lower quality products, are more likely to use intermediaries. Instead, our framework predicts differences in unit values because intermediaries aggregate orders from less-efficient firms and they charge a commision for their services.

The three papers most closely related to ours are recent work by Blum, Claro, and Horstmann (2009), Felbermayr and Jung (2009) and Akerman (2010). Blum et al. (2009) find that in the majority of importer-exporter matches between Colombian and Chilean firms, at least one firm is extremely large due to search costs, yet do not identify if the large firm is in fact a non-manufacturing intermediary firm. Their analysis is also restricted

to Chilean-Colombian trading partners. Here, we provide the first systematic evidence of the characteristics of intermediary firms and their overall importance in trade for the second largest exporting economy, China, because we can directly observe the universe of transactions by intermediary and direct exporters. Felbermayr and Jung (2009) and Akerman (2010) use a similar theoretical framework and find that less-productive firms will use intermediary technology. However, their models predict no correlation between intermediary export shares and market distance and size, which is not consistent with our model and empirical results.[1]

The remaining paper is structured as follows. Section 2 lays out the basic model and the predictions that we will verify in the data. Section 3 is broken into three subsections. Section 3.1 describes the data and provides summary statistics, section 3.2 verifies predictions from the model, and section 3.3 provides evidence that intermediaries facilitate direct export participation. Finally, Section 4 concludes.

2. A Theory of International Trade with Intermediaries

This section provides a theoretical framework for understanding the role of intermediation technology in international trade. We provide the basic intuition of the model and discuss the predictions that we take to the data, and refer the reader to the online appendix for the formal derivation of the model.

The model builds upon now standard open-economy heterogeneous firm models. The basic assumptions on market structure, firm heterogeneity and consumer preferences are the same as in Melitz (2003), and there are N asymmetric destination markets.

The novel feature of our approach is an intermediary sector that provides manufacturing firms with an option to export indirectly. Firms face a tradeoff of whether to export their varieties directly or indirectly in each market. Direct exporting requires firms to pay bilateral fixed (f_x^j) and variable costs (τ^j) to each market. Alternatively, firms can choose to export their varieties i*ndirectly* by relying the intermediary sector. Our framework yields three empirically testable implications: 1) firms of intermediate levels of productivity use intermediation while the most productive firms directly reach foreign consumers, 2) exports by intermediaries will be more expensive and 3) countries that are more difficult to access because of higher trade costs or smaller market sizes will have relatively more intermediated trade.

We model the intermediary sector as perfectly competitive sector with (homogeneous) intermediary firms that export on behalf of the manufacturers. Intermediaries purchase varieties from manufacturers at the same price as domestic consumers (there is no price discrimination) and incur an additional marginal cost of selling these varieties abroad.[2] This

[1] Akerman (2010) finds similar empirical results for Sweden as we find in our data.

[2] We assume that intermediaries do not pay a fixed cost to export.

additional marginal cost captures re-labeling, packaging and other per-unit costs associated with taking the title of varieties from the manufacturers. The price of indirectly exported varieties is therefore higher than the price of directly exported varieties by this factor.[3]

From the perspective of the manufacturers, the intermediary sector serves as a warehouse where manufacturing firms can deposit their varieties that they wish to export indirectly. In order to access this sector, manufacturers incur a fixed cost $f_i < f_x^j$, $\forall j$. The fixed cost is global and not market specific. This assumption is natural given that the intermediaries reside in the domestic market and so the intermediation fixed cost captures local search costs. One can think of f_i as a membership fee to deposit varieties at the warehouse where the intermediaries are located.[4] A firm that pays f_i can indirectly access all markets and we assume that if a firm directly exports to n markets, it will continue to service the remaining $N - n$ markets indirectly.

Manufacturers face a tradeoff between incurring a high fixed cost and directly exporting to a market, and incurring a lower fixed cost to access a market through intermediaries. The advantage of using intermediation is that manufacturers avoid establishing their own distribution networks. However, intermediaries provide a service by preparing varieties for the foreign market and pass these costs to the foreign consumer. For a given variety, the indirect export price therefore exceeds the direct export price. Since demand is elastic manufacturer's revenue from direct exports exceeds its revenue from indirect exports.

The profit curves from each export mode according to manufacturing firm productivity are shown in Figure 1.[5] The dashed curve shows the profits from indirectly exporting to the market. This curve starts at the origin because once a firm has incurred the global fixed cost, it does not incur another fixed cost to indirectly export to that market. This curve is flatter than the direct export profit curve (the solid line) because of higher marginal cost of foreign distribution on indirect exports. The direct export profit curve intersects the y-axis at $-f_x^j$, the fixed cost for direct exports. Exports to smaller markets or markets with higher variable trade costs will rotate both curves clockwise. Higher direct export fixed costs will shift the solid line down. The intersection of these two curves determines the cutoff firm (φ_x^j) that is just indifferent between direct and indirect exports.

The dotted curve depicts aggregate profits from indirect exports to all markets. This curve determines the cutoff firm (φ_i) that is just indifferent to paying f_i to reach all markets

[3] Alternatively, the intermediary sector could be modeled as imperfectly competitive. There is an one-time exclusive matching process in which the ex post distribution of the matched manufacturers' productivities is identical across intermediaries. This assumption ensures that all intermediaries operating in a market have equal market shares. These intermediaries would pay a fixed cost to export and they will charge a markup over marginal cost of distribution. This leads to double marginalization and qualitatively similar predictions as the current setup.

[4] While not directly related to intermediation, Hanson and Xiang (forthcoming) provide convincing evidence that the worldwide distribution of movies supports a model with global fixed costs as opposed to bilateral fixed costs.

[5] The online appendix provides the expression for each of these curves.

indirectly and not. We impose an assumption that for firms of all productivities, aggregate profits from indirect exports to all markets exceeds direct export profits to any one particular market.[6] This guarantees that the dotted curve in Figure 1 always lies above the direct export curve. This is a sufficient condition to ensure the case: $\varphi_x^j > \varphi_i$. Although this assumption may seem strong, it follows if no single country is large enough relative to the sum of all the others. Below, we also demonstrate empirical support for two of its implications. First, if aggregate indirect exports were lower than direct exports to any market, there would be countries that receive no indirect exports (and these countries should be the easiest to access). Empirically, hardly any countries report zero indirect exports. Second, this assumption implies that more productive firms will directly export while less productive firms indirectly export; we examine and find evidence for this prediction in the data.[7]

The figure shows that firms sort into export modes for each market based on productivity. The familiar cutoff φ_d (not shown in the figure) determines the marginal firm that is just active. Firms that lie in $[\varphi_d, \varphi_i)$ are not productive enough to cover the fixed cost of intermediation; these firms serve only the domestic market. All firms that fall in the interval $[\varphi_i, \varphi_x^j]$ indirectly export to market j, and firms with productivity greater than φ_x^j directly serve market j . The sorting pattern is similar to the exports versus FDI tradeoff in Helpman, Melitz, and Yeaple (2004), although here, intermediation technology benefits less productive firms. Our model of intermediation yields similar sorting patterns as Akerman (2010) and Felbermayr and Jung (2009).

The intuition behind this sorting pattern is very straightforward. Trade is costly and only firms that are productive enough can establish distribution channels to access foreign consumers directly. If firms are unable to do so, they can rely on intermediaries as a conduit for trade. The intermediaries act as aggregators across domestic firms and incur the marginal costs of selling goods on behalf of the manufacturers. However, the cost of using an intermediary is that the manufacturer receives lower revenues. This intuition rationalizes the sorting pattern and leads to the following prediction that we verify in the data.

Claim 1 *All else equal, the share of exports through intermediaries is larger in countries with (i) smaller market size, (ii) higher variable trade costs, or (iii) higher fixed costs of exporting.*

We show this claim graphically and formally in the online appendix. Figure 2 shows how indirect exports vary with bilateral variable trade cost or market size. Markets with

[6] A weaker assumption is that aggregate profits from indirect exports exceeds direct export profits to any market j *for the marginal firm* φ_x^j. The assumption in the text above implies that the aggregate indirect exports profit curve is steeper than the direct exports profit curve in each market, while this (looser) assumption allows a flatter aggregate indirect profit curve.

[7] See the footnote 13.

higher bilateral variable trade cost or smaller market size have higher indirect export shares. This result uses all three key assumptions discussed above. The first assumption of an intermediary sector that sells varieties at higher marginal costs implies that a larger change in the slope of the direct export profit curve than the market-specific indirect export curve. The second assumption of a global fixed cost of intermediation implies φ_i is common across destination markets. As a result, indirect exports shares depend only on the movements in direct export cutoff, φ_x^j. Finally, the third assumption that the aggregate profits from indirect exports is steeper than profits from any market's direct exports ensures that φ_x^j lies to the right of φ_i. As markets become smaller or more expensive to reach, the two curves rotate clockwise, the direct export cutoff shifts rightward, and this increases indirect export shares. Figure 3 shows that higher fixed direct export cost also increases indirect export shares by shifting down the direct export profit curve and resulting in a higher direct export cutoff. These results formalize the idea that intermediaries can facilitate exports, particularly for small- and medium firms, and that indirect export shares correlate systematically with market characteristics.[8]

The next section verifies the predictions of the model. In particular, we will demonstrate that smaller firms are more likely to use intermediaries to access foreign markets, exports by intermediaries are more expensive than direct exports, and market characteristics strongly correlate with intermediary shares in the manner predicted by the model.

3. Empirical Results

3.1. Customs Data and Summary Statistics

Our main analysis uses Chinese data that record the census of firm-level export transactions across products and countries.[9] Products are classified at the eight-digit HS level. We observe values and quantities for each firm-product-market transaction. The data do not contain information about domestic production or characteristics of the firms; we therefore cannot assign a primary industry to identify if the firm is a manufacturer or a wholesaler,

[8] Our model contrasts to the predictions in recent models of intermediation by Blum et al. (2009), Felbermayr and Jung (2009) and Akerman (2010). Blum et al. (2009) predict that an increase in market size has a non-linear impact of intermediary trade and that higher trade costs will decrease the relative share of intermediaries in a three-country setting. Their model also predicts that intermediary and direct exporters will export varieties at the same unit values, while here, exports by intermediaries result in higher marginal costs of foreign distribution. In Felbermayr and Jung (2009) and Akerman (2010), the share of indirect exports is not correlated with variable trade costs and market size, although Akerman (2010) predicts that higher fixed costs leads to larger intermediary export shares. The reason we obtain a systematic relationship is due to our assumption of the global fixed cost of intermediation, while the other two models assume that firms incur destination-specific costs to use intermediaries. As shown below, the data clearly show that intermediary export shares covary with market characteristics which support the global fixed cost assumption.

[9] The same data have been used by Manova and Zhang (2009) and Manova, Wei, and Zhang (2010). We have checked that aggregate export values match the figures from Comtrade data.

distributer and/or intermediary. We identify the set of intermediary firms based on Chinese characters that have the English-equivalent meaning of "importer", "exporter", and/or "trading" in the firm's name.[10] A useful feature about firm names in China is that they are often very descriptive (a convention that might be traced to a time when the country was under central planning and the planners favored descriptive company names). Many firms founded during the post-1980 reform era continue to adopt this naming convention. Our classification scheme takes full advantage of this convention. Although imperfect, as shown below, firms classified as intermediary firms export many more products than direct exporters, and these products span very unrelated sectors. Our classification therefore yields the intuitive finding that manufacturing firms possess a core competency while intermediary firms act as "forwarders" of products across various sectors.

Nevertheless, our classification might underestimate the importance of intermediaries for two reasons. First, intermediaries could have names that do not contain these phrases. However, misclassifying intermediary exports based on the firm name introduces measurement error that is unlikely to be systematically correlated with market characteristics, the key independent variables. Second, the direct exporters may rely on foreign intermediary partners in their transactions who we cannot observe. In these cases, what we classify as direct exports should be classified as indirect exports. This is unlikely to be an issue for our main analysis that examines export share patterns according to market characteristics if intermediated imports behave similarly to intermediated exports. We discuss this issue in more detail in Section 3.2.3.

Another issue that could potentially complicate our analysis is that the Chinese government issued trading licenses for certain products prior to China's entry into the WTO.[11] The WTO mandated that China liberalize the scope and availability of licenses so that within three years after accession, all enterprises would have the right to trade products without licenses. China's WTO accession document indicates that in the first year of accession, only wholly Chinese-invested firms with registered capital exceeding RMB 5 million could obtain direct trading rights. In the second year after accession, the minimum capital requirement for direct trading was RMB 3 million, and this fell to RMB 1 million by 2004. However, data from the World Bank's Enterprise Survey for China that covers 2002 and 2003 indicate that firms below this cutoff reported direct exports. This could be because export licenses were only required for a limited set of products and/or because these cutoffs were not stringently applied, at least for exports. By 2005, any firm that wished to directly trade with foreign partners was free to do so. So while we are confident that the licenses

[10] Specifically, we search for Chinese characters that mean "trading" and "importer" and "exporter". In pinyin (Romanized Chinese), these phrases are: "jin4chu1kou3", "jing1mao4", "mao4yi4", "ke1mao4" and "wai4jing1".

[11] The products which required (mostly) import and export licenses can be found in the China's WTO Accession document ("Report of the Working Party on the Accession of China" WT/ACC/CHN/49). There were 245 HS8 codes listed for trading license liberalization out of roughly 7,000 HS8 codes.

will not affect the interpretation of our results, the main analysis uses data for 2005 when the licenses had been removed.

Table 1 reports the overall export values by firm type from 2000 to 2005. The figures illustrate China's phenomenal export growth during this period. Total exports originating from China grew 211 percent. In 2005, intermediaries accounted for 22 percent of total Chinese exports. This number is likely to be an underestimate for the reasons given above. The aggregate figures alone highlight the importance of intermediary firms.[12] Moreover, it is not the case that the aggregate numbers are driven by a handful of products or countries with large indirect trade. The average share of intermediary exports across HS6 products is 34.2%, and only 4.5% of products report shares of less than 1%. Across countries, the average intermediary share is 35.3% and only 3 countries (out of 231) report zero intermediary shares.[13]

Direct and intermediary firms differ along several notable and important dimensions. Intermediaries are more likely to engage in both importing and exporting relative to their counterparts that directly trade (table not shown). Table 2 reports overall firm-level summary statistics in 2005 in the left panel, and statistics by firm type in the second and third panels. As is well known in customs data, a small number of exceptionally large firms dominate trade statistics, and so we also report median statistics. The second panel shows that the median direct firm exports 3 products to 3 destination markets. In contrast, the median intermediary exports 11 products to 6 countries. In row 4, we classify HS codes into one of 15 unrelated sectors.[14] The idea is to identify a firm's *core* activity (e.g., animal products, wood products, textiles, etc.). Not surprisingly, the median direct firm only exports products in one of these sectors. This is consistent with theoretical work in multiple-product firm models (e.g., Eckel and Neary (2010), Nocke and Yeaple (2006), or Bernard, Redding and Schott (2009)) who introduce core competencies in a model of multiple-product firms. Intermediary firms, however, handle products that span entirely unrelated sectors; the median intermediary exports products in 4 sectors.

The statistics in Table 2 are suggestive that intermediaries have a relative "country" focus; compared to direct firms, they export more products per country. However, the final row of Table 2 reports that the average intermediary is larger than its direct exporting counterpart. It is perhaps not too surprising, then, that the summary statistics indicate that traders export more products and to more destination markets. In order to verify if

[12] Table reports that the share of intermediaries in exports fell between 2000 to 2005. This fall could reflect in part the liberalization of the export licensing regime, but more likely, declines in trade costs over time that enabled firms to switch towards direct exporting.

[13] These countries are Montserrat, Vatican City, and Wallis and Futuna.

[14] HS 01-05 "Animal and Animal Products"; HS 06-15 "Vegetable Products"; HS 16-24 "Foodstuffs"; HS 25-27 "Mineral Products"; HS 28-38 "Plastics/Rubbers"; HS 41-43 "Raw Hides, Skins, Leathers & Furs"; HS 44-49 "Wood and Wood Products"; HS 50-63 "Textile"; HS 64-67 "Footwear/Headgear"; HS 68-71 "Stone/Glass"; HS 72-83 "Metals"; HS 84-85 "Machinery/Electrical"; HS 86-89 "Transportation"; HS 90-97 "Miscellaneous"; HS 98-99 "Service".

trading firms have a relative country focus, we control for firm size. Column 1 of Table 3 report the average export varieties per country (column 1) by direct and intermediary firms, conditional on a quadratic polynomial in firm size.[15] The table shows that intermediary firms average 10.5 varieties per country compared to direct firms that export 8.3 varieties per country. In column 2, we include additional controls for ownership types and the results continue to hold–intermediary firms export more varieties per country than direct firms. Again, these results are intuitive if manufacturing firms possess a core competency in a single line of business. In contrast, the model suggests that intermediaries arise to facilitate products to destination markets.

An alternative way of understanding how the distribution of export sales over countries and products differs across firm type is to consider the concentration of firms' export sales by products. For each firm, we compute its share of exports in each product, s_{hf}. We then compute its (normalized) herfindahl index by aggregating over the country dimension as:

$$HI_f = \frac{\sum_{h=1}^{N_f} s_{hf}^2 - \frac{1}{N_f}}{1 - \frac{1}{N_f}}, \tag{1}$$

where N_f is the number of products that the firm exports. A higher HI implies that a firm's exports are more concentrated among its product mix. In column 3 of Table 3, we regress the HI measure on firm type controlling for a quadratic polynomial in firm size. The table indicates that intermediaries have lower herfindahls implying that their export sales are more evenly distributed across products compared to their direct exporting counterparts. The 4th column includes ownership type dummies (state-owned enterprises, private firms, and foreign invested firms) and the patterns hold. These results provide evidence that direct exporters, relative to intermediaries, have a relative "product" focus as their firm sales are more heavily skewed towards a concentrated number of products. Thus, intermediaries appear to have a lower product concentration, and export more varieties per country on average than direct exporters.

3.2. Empirical Support for the Model

3.2.1. Productivity and Export Mode

The theoretical model offers a number of predictions that we verify in the data. We first test if the sorting pattern holds in the data. The model predicts that in each market, the most productive firms directly export and firms with intermediate levels of productivity indirectly export. The customs data are unable to verify this prediction directly because we do not observe the firms that use intermediaries as a conduit to export. We therefore provide evidence using the World Bank's Enterprise Survey Data that covers Chinese firms

[15] The regression excludes the constant.

in 2002 and 2003. In addition to firms' export status, these data record the share of firm sales that are exported directly or indirectly through a distributor, and therefore can be used to examine the relationship between export mode and productivity.[16]

If we identify exporters based on their direct export status, 24 percent of the firms in our sample would be identified as exporters. However, 10 percent of the firms export products only through an intermediary. The actual fraction of manufacturing firms that participate in export markets is therefore 34 percent. This fraction is 41 percent higher (.10/.24) than if we had counted firms only with direct export market participation. This evidence provides a sense of the potential undercounting of export market participation if survey instruments do not record information on manufacturing firms' indirect export activity.

For a given market, Figure 1 suggests that we would expect a hockey stick relationship between productivity and direct exports–only high productivity firms directly export while low and intermediate productivity firms do not–and an inverted U-shape relationship with indirect exports. Unfortunately, the Enterprise Survey Data do not separate exports by market, and so we examine firms' indirect and direct exports across all markets. This somewhat complicates the analysis because when firms export to multiple countries, it is possible that firms of intermediate productivity directly export to some markets and indirectly exports to others. Nevertheless, we still expect the most productive firms to export directly, while less productive firms use intermediaries more intensively.

We examine this sorting pattern by regressing firms' direct and indirect export shares with measures of firm productivity and squared productivity, and including industry fixed effects. If the indirect exports exhibit an inverted-U pattern, the coefficient on firm productivity and firm productivity squared should be positive and negative, respectively. We use sales, employment and sales per worker as three different proxies for productivity.[17]

The results for direct exports are reported in the left panel of Table 4. For the three measures, we observe a linear relationship (for sales, the squared term is significant at the 15 percent level)–firms of higher productivity are more likely to export directly. The right panel reports the results for indirect exports. Here, we observe a very robust inverted-U shape prediction as the coefficient on the productivity and the squared term is positive and negative, respectively, for all three proxies. Using the point estimates from column 5, the peak of the inverted U occurs at a firm size, according to sales, of log 10.84; this is 1.14 log points larger than the median firm in the sample. The point estimates in column 6 for employment suggest that the peak occurs at .6 log points larger than the median firm by

[16] While each survey round collects three years of information on firms' output and inputs, it only asks export information for one year, and the firms across survey rounds cannot be linked. So while we are unable to examine the dynamics of export behavior with these data, we can analyze sorting patterns. While there were some restrictions of trading during this period, they were limited to only a subset of products.

[17] We also note that estimating productivity from revenue data is notoriously difficult (see Erdem and Tybout (2003) and De Loecker (2007)). Moreover, there is a one-to-one relationship between size and productivity in the model.

employment. We take this evidence as supportive of the sorting pattern predicted by the model.[18]

3.2.2. Intermediation and Unit Values

The second prediction we examine is the difference between intermediaries' and direct exporters' unit values. Exports by intermediaries should be more expensive than direct exporters. In the model described above, this is because intermediation results in higher marginal costs of foreign distribution and firms with relatively higher unit costs endogenously select to use the intermediation technology. We use the unit value information in the data to test these predictions. Table 5 compares unit values between firm types. In this table, we regress (log) unit values on an intermediary dummy and HS8 product-ownership pair fixed effects. We include ownership type in the fixed effect because of evidence that foreign firms charge higher prices relative to domestic firms (Wang and Wei, 2008). Consistent with the model, column 1 indicates that unit values of intermediaries are about 6.7 percent higher than direct exporters. In column 2, we control for firm size (proxied by total export revenue) using a flexible quadratic polynomial. This lowers the relative difference in unit values to 5.1 percent. In column 3, we include country-HS8-ownership fixed effects and the systematic difference remains. These results are consistent with the model's prediction. We note that this finding also contrasts with the predictions of the model in Blum et al. (2009), who do not predict differences in prices between intermediaries and manufacturers because the costs of using intermediation technology are fixed costs.

If unit values are a proxy for quality, our findings in Table 5 could also be consistent with the quality-sorting role of intermediary firms. For instance, Feenstra and Hanson (2004) have shown that re-exports of Chinese products by Hong Kong intermediaries have higher markups. In order to check this alternative hypothesis, we interact the intermediary dummy with 3 product characteristics that capture differentiation: the coefficient of price variation, the product's quality ladder as measured by Khandelwal (2010), and the elasticities of substitution from Broda and Weinstein (2006). If intermediaries mitigate adverse selection problems by acting as gauranteers of quality, we might expect their relative prices to vary with a product's scope for quality differentiation. However, as shown in columns 3-5, the interaction coefficient is not statistically different from zero. That is, the relative price difference between intermediary and direct exporters is statistically equivalent across products that span a broad range of product heterogeneity. In the last column, the interaction term between the share of intermediaries and the elasticity of substitution is positive, but statistically insignificant. Overall, this table suggests that quality sorting may not be the dominant role among Chinese intermediaries.

[18] Fergal (2010) and Lu, Lu, and Tao (2010) also find this sorting pattern of indirect and direct exporters using the similar data from the World Bank across many countries.

3.2.3. Facilitating Trade

We next examine the central prediction of the model: intermediary shares will be systematically correlated with destination market characteristics. We begin by graphically plotting the relationship between intermediary shares and key variables of the analysis in Figures 4-5. Figure 4 shows a negative relationship between intermediary export shares and the destination's market 2005 GDP; exports to smaller markets are more likely to be handled by intermediaries. In Figure 5, we average the share of intermediary exports by the number of documents required for imports by the country's customs authorities (obtained from the World Bank's Doing Business Report). While admittedly crude, this variable, also used by Helpman, Melitz and Rubinstein (2008), potentially captures the fixed costs of exporting to a market. We see a strong positive relationship between intermediary export shares and the fixed cost of exports.

In Table 6, we formally examine the main predictions of the model in Claim 1. We construct the share of intermediary exports in country-HS6 observations and correlate the shares with proxies for trade costs and market size. We use the following regression model

$$s_{ch} = \alpha_h + X_c'\beta + \varepsilon_{ch} \tag{2}$$

where s_{ch} is the share of intermediary exports from China to country c in HS6 code h and the X_c's contain proxies for trade costs and market size. The regressions include HS6 fixed effects, α_h, which captures inherent differences in the amount of intermediation required for products. In column 1, we regress country-HS6 intermediary share of exports on the distance to the country and the country's GDP. The coefficient on distance, a variable cost, is positive and the coefficient on GDP, a measure of market size, is negative. This is intuitive and accords with the model's predictions. Countries that are smaller and more distant rely relatively more on intermediaries for their imports from China. The results imply that increasing distance to China by one log point increases intermediary shares by 3.2 percentage points. Increasing market size by one log point results in a 2.2 percentage point decline in intermediary export shares. To get a sense of the magnitudes, the average HS6-level intermediary share is about 30 percent; thus, increasing distance to China raises intermediary shares to that country by about 10 percent. In column 2, we include the ethnic Chinese population and find that intermediaries export relatively more to countries with fewer ethnic Chinese, although the coefficient is only significant at the 10% level.[19] This finding is also intuitive: Chinese firms will find it easier to export directly to countries with larger Chinese populations. This finding is related to Rauch and Trindade (2004) who show that bilateral trade flows are larger among countries with larger ethnic Chinese populations. Here, the results indicate that the share of exports through intermediaries is smaller in these

[19] Chinese population figures are obtained from Ohio University's Shao Center Distribution of the Ethnic Chinese Population Around the World.

countries. Presumably trade costs, which also encompass information barriers, are smaller between China and countries with a large Chinese diaspora.

In column 3, we include the number of required documents for imports in the destination market as a proxy for the fixed costs. The coefficient on this variable is positive and statistically significant suggesting that more-difficult-to-export markets are handled by relatively larger shares of intermediaries. The coefficients on market size and distance are also robust.

In column 4, we add the importing country's MFN tariff rates at the HS6 level as an additional variable cost proxy. According to the model, higher trade costs reduce the likelihood that less productive firms can cover the costs of direct exporting and therefore will indirectly export products. The correlation between intermediary shares and tariffs is positive indicating that intermediaries are more important in country-product pairs with higher tariffs. The magnitudes indicate that an 10 percentage point increase in tariffs (roughly one standard deviation in our sample), holding other variables constant, would increase intermediary shares by .59 percentage points.

We note that while our model provides an explanation for the endogenous entry of intermediary firms, there may be other explanations for why intermediary firms arise in equilibrium. For instance, if trade credit is scarce, intermediaries may export on behalf of financially constrained firms. However, the results in Table 6 include HS6 fixed effects and therefore control for product-level heterogeneity, such as differences in financing requirements. Thus, our results suggest that market characteristics are important determinants of intermediary export shares beyond financial constraints.

We assess the sensitivity of the results through a series of robustness checks in Table 7. In column 1, we use manufacturing output, rather than GDP, as the proxy for country size.[20] The results continue to show that intermediary shares are negatively correlated with market size.

In column 2, we include country fixed effects in the baseline regression. This flexible specification controls for all country characteristics that were previously excluded in the baseline regressions, such as rule of law, the price index, market size, level of financial development, etc. The regression identifies the coefficient on tariffs using only cross-product variation within a country. The point estimate is positive, which is consistent with the predictions from the model; however, the coefficient is marginally insignificant (with a p-value of 11%).

Research on the nature of China's trade with Hong Kong has revealed that a large fraction of Hong Kong's exports originate from China, and these Hong Kong exporters are often intermediaries (Feenstra and Hanson, 2004). Our classification of intermediary trade to Hong Kong, in particular, may be imprecise. Moreoever, Fisman, Moustakerski and Wei

[20] Manufacturing output is taken from National Accounts Database collected by the UN Statistics Division.

(2008) present evidence that Hong Kong intermediaries that re-export Chinese products are often used to evade tariffs, and that tariff evasion increases with tariff rates. Thus, we may observe a correlation between tariff rates and intermediary exports due to the incentive to evade tariffs. For these reasons, we introduce a sensitivity check that drops all exports to Hong Kong in column 3 of Table 7, and the results continue to hold.

State-owned enterprises (SOEs) may have an objective function other than profit maximization, and is not consistent with the model's assumptions. In column 4, we perform a robustness check by removing export transactions by SOEs. This check also addresses a potential concern that our identification of intermediaries based on names does not include state-owned trading companies that do not contain our key phrases. The results indicate that the magnitude on distance attenuates somewhat, but the qualitative estimate remains similar to the previous columns. The correlations with the other country characteristics remain statistically significant and have the same signs as the baseline regressions.[21]

Processing and/or assembly trade account for about half of China's exports. Because they receive preferential tariff and tax treatment, the fixed and variable costs faced by these firms may be different from those engaging in normal trade. In column 5, we remove shipments that are classified as processing and/or assembly trade. The coefficients and patterns of signs remain as before. The overall message of these tables is consistent with the prediction that intermediaries facilitate exports to relatively "difficult-to-access" markets.

We next attempt to control for the price indices that appear in the formal expression for indirect export shares provided in equation (A.12) in the online appendix. Since these variables are not directly observed, we estimate the indices via a gravity specification based on Anderson and Van Wincoop (2003). We then include the estimates of the price indices as controls in equation 2. We begin by estimating the gravity equation using bilateral aggregate trade flows for all countries. The data are taken from Comtrade for 2005. Defining aggregate trade flows V_{od} from origin country o to destination country d, the gravity specification is

$$\ln V_{od} = \alpha_o + \alpha_d + \beta_1 \ln dist_{od} + Z'_{od}\gamma + \varepsilon_{od}, \tag{3}$$

where α_o and α_d are origin and destination fixed effects, and Z_{od} includes indicators if the pairs are ever in a colonial relationship, share a border, and share a common official language based on Frankel, Stein, and Wei (1995).[22] The destination fixed effects, α_d, capture the destination country price index, but also include other country-specific variables, such as GDP. In order to separate the price index from other country characteristics, we take the estimated fixed effects and regress them on GDP, ethnic Chinese population and the number

[21] Some of the intermediaries in our sample are likely to have emerged during China's restrictive trade regime. To ensure that our results are not driven by these firms, we drop intermediaries that existed in 2000, and re-compute intermediary shares using exports only from intermediaries that entered between 2000 and 2005. Our results are robust to this sensitivity check and are available upon request.

[22] Indicators for colonial relationships, common language and border are obtained from CEPII.

of documents required for importing. We interpret the residual of this regression as the price index of the destination country, and include this variable as an additional covariation in equation (2). Column 6 shows that the coefficient on the price index variable is negative and statistically significant. This is intuitive since, all else equal, a higher price index implies lower trade barrier (see Anderson and Van Wincoop 2003). We would therefore expect a negative relationship with intermediary shares. Moreover, the pattern of coefficient signs remains for the other variables.

A drawback of the above procedure is that the estimated fixed effect potentially captures more than just the price index, even after partialling out observable market characteristics. In column 7, we use the GDP deflator as an alternative proxy for the price index. While this variable is not theoretically the price index based on the gravity specification, it has the advantage of being directly observed. Importantly, our main results do not change after controlling for this proxy for the price index.

One potential concern regarding our analysis is that we do not observe foreign intermediaries. It is possible that some exports classified as direct are in fact exported via foreign intermediaries; such exports should be classified as indirect exports. Our measured share of indirect exports is therefore likely to be lower than the actual share. While this introduces measurement error, the bias is likely to work against our findings. The importance of market characteristics is understated if intermediaries are more likely to be used when importing from smaller and/or high trade cost markets. If this is the case, our measured intermediary export share to this particular set of markets is biased downwards, and the results are biased against finding an effect of market characteristics. While we do not observe the intermediaries operating in foreign markets, we do observe Chinese-based intermediaries that import products into China. We find that China's share of intermediate imports are indeed larger in higher trade cost and small markets.[23] Assuming that foreign intermediaries behave simililarly to these Chinese-based importing intermediaries, our estimates in (2) will underestimate the role of market characteristics on intermediate exports.

Finally, in Table 8, we compare the sensitivity of exports to country characteristics between intermediaries and direct exporters. We regress the (log) HS6-country export value on a HS6 fixed effect and interact country characteristics with a dummy for exports by intermediaries. The results indicate that exports by intermediaries are *less* sensitive to country characteristics, such as distance and market size, than exports by direct exporters. For instance, a one percent increase in distance implies a 0.7 percent decline in exports by direct exporters compared to 0.47 percent decline of intermediary exports. Likewise,

[23] The significance level of the coefficient on market size varies across different specifications, but the sign remains negative. This is perhaps not surprising since it is not clear that an exporting country's size will affect the decision to import through a Chinese-based intermediary. The measure of fixed cost for this regression is the number of documents required for export for a country (obtained from the World Bank's Doing Business Report). These results are available upon request.

increasing market size by one percent increases direct exports by 0.68 percent compared to 0.59 percent for intermediaries. We observe a similar difference with ethnic chinese population, but not the measure of fixed costs. These results are similar to Bernard et al. (2010) who also find that exports by U.S. wholesale firms are less sensitive to market size and distance relative to manufacturing firms. And consistent with earlier results, as well as the predictions of the model, the evidence here further suggests that intermediaries play an important role in facilitating trade by overcoming trade costs.

3.2.4. Intermediaries and the Extensive Margin of Trade

In this section, we examine the hypothesis that firms may become direct exporters after relying on intermediaries to export. As we discuss in the model, intermediaries provide a services ranging from facilitating matches with foreign clients, dictating quality specifications required in foreign markets and/or helping firms tailor their products for foreign consumers. More generally, they can help firms establish channels to export their products in instances where firms are unable to cover the fixed costs to do so. However, once these services have been provided, it is possible that firms could switch to interacting directly with their foreign clients. In the context of our model, the use of an intermediary may subsequently lower the fixed costs of establishing one's own direct export distribution channels in the future. Intermediaries could therefore help expand the extensive margin of (direct) trade.

We take two approaches to examine this hypothesis. The first approach uses the customs data, but since we do not observe the set of indirect exporting firms, we infer the switching phenomenon by comparing export values between new and incumbent varieties. The idea is as follows. Using data from 2004, we classify firm-product-country pairs as new or incumbent in 2005. A new variety is defined as a new product-firm-market triplet. It can either be a new (HS6) product that a firm begins to export in 2005, or a new market that an existing product by an existing firm begins to export in 2005. An incumbent variety is a product-firm-market triplet that existed in both 2004 and 2005. It is well known that new varieties have smaller exports (by value) than incumbent varieties. However, if firms have used intermediaries in previous periods, we should expect a smaller difference in value between new and incumbent varieties. In other words, a firm that switches from indirect to direct exports should have relatively larger export transactions than a firm that simply begins to export directly without previous use of an intermediary. Based on our earlier results, intermediaries are relatively more important in markets that are smaller and have higher trade costs. We therefore expect that the difference between new and incumbent varieties to be smaller in these markets.

This reasoning suggests a difference-in-differences specification that compares export values (x_{fch}) between new and incumbent varieties (for direct exporters only) across mar-

kets:

$$\ln x_{fch} = \beta_1 new_{fch} + \sum_m \gamma_m X_c^m + \sum_m \delta_m (new_{fch} * X_c^m) + \varepsilon_{fch}, \quad (4)$$

where new_{fch} is an indicator if firm f exported variety ch in 2005 but not 2004. The X_c^m include the market characteristics used in equation (2) and the γ coefficients control for the direct effect that market characteristic m has on export values. The coefficients of interest are the δ's. We expect a positive sign on the distance interaction term: in more distant markets, the difference between new and incumbent export values is smaller compared to nearer markets. Likewise, we expect a positive sign on the interaction with tariffs and the number of documents required for import. In contrast, we expect a negative sign on the GDP and ethnic Chinese interactions. For markets that are easier to access directly, the differences between new and incumbent varieties should be larger.

The results are shown in Table 9. Column 1 presents results without controls to simply show the difference between new and incumbent varieties. On average, export values of new varieties are 1.87 log points smaller than incumbent varieties. In column 2, we introduce the market characteristics and their interaction with the new variety indicator. Consistent with our prediction, we observe a positive coefficient on the distance interaction term and a negative coefficient on the interaction with market size. New varieties are relatively larger in more distant and smaller markets. This suggests that although the customs data identify these varieties as new, it is likely that (some but not necessarily all) firms used intermediaries in the previous year. In column 3, we include the additional measures of trade costs and the signs remain consistent with our hypothesis, with the exception of interactions with import documents variable which is not statistically significant. In column 4, we include country-HS6 fixed effects which imply that the γ coefficients are not identified, but here too, the qualitative results do not change with these additional controls. In column 5, we include the country-HS6 share of intermediaries interaction. This specification shows that even after controlling for the effect of observable market characteristics, new varieties have relatively larger transactions in markets with larger indirect export shares.

We stress that these patterns, while suggestive, are not a definitive proof. One concern in interpreting the results is that the firms we identify as new are firms with no indirect exporting experience, but simply firms that are just at the direct export cutoff. Since cutoffs will be higher for farther and larger trade cost markets, these new firms will have higher exports. While this may be the case, it is useful to note that our specification compares new firms' exports relative to the average exports, and so it controls for the effect of market characteristics on average exports.[24]

[24] If we assume a Pareto distribution, the model indicates that the (simple) average export value relative to the marginal direct exporter will not depend on country characteristics. But this result **need not** hold for other distributions.

Given this concern, we supplement the analysis with a firm-level database from Ghana (the RPED/GMES database).[25] The data track 278 Ghanaian firms over four survey rounds from 1992-1997 and record export status and the share of sales that are exported directly and indirectly through trading companies. The advantage of these data is that we can examine if firms begin to export directly after using trading companies in previous periods. To our knowledge, these are the only data that enable us to address this question. The drawback, however, is that these data are not available for China and the sample size is small. Similar to our findings in Section 3.2.1 for Chinese firms, Kruger (2009) has shown in these data that Ghanaian firms of intermediate productivity levels are more likely to indirectly export while the most productive firms directly export.

We exploit the panel dimension of these data to offer some suggestive evidence that firms that use intermediaries are more likely to export directly in subsequent periods than firms that do not. Of the 278 firms in the data, 67 firms report positive exports, either directly or indirectly, over the sample period. Table 10 presents a cross-tabulation of firms' transition behavior over the sample. We classify firms into three mutually exclusive groups: indirect exporter only, direct exporter, and domestic only.[26] The rows display firms' status in the $t-1$ and the columns report firms' status in period t. The table indicates that conditional on firms that indirectly exported in a previous period, 35.7% begin to directly export. Compare this to only 2.8% of firms that begin exporting directly conditional on serving only the domestic market in the previous period. The raw data therefore suggests that firms using intermediaries have a substantially higher probability of subsequently exporting themselves compared to firms that do not export indirectly.

We complement the analysis of the raw data with regressions that control for other factors that may also contribute to firms selection into exporting directly. In particular, we are interested in learning the determinants of changes in direct export status. The following specification can examine this behavior by regressing the change in direct export status on an indicator of indirect export status in the previous period:

$$\Delta D_{ft} = \alpha_t + \beta I_{f,t-1} + \varepsilon_{ft}, \tag{5}$$

where D_{ft} is an indicator variable that takes a value of one if firm f has positive direct exports at time t. $I_{f,t-1}$ takes a value of one if the firm indirectly exported products in $t-1$, and α_t are year fixed effects. A positive correlation suggests that indirect exports is a positive predictor of direct exports in the next period. The results, presented in Table 11, report a positive and statistically significant coefficient on indirect export status, which is consistent with the cross-tabulations in Table 10. The finding, however, could be spurious if firms that start to export directly also make additional firm-level changes. Moreover, we

[25] The Ghana RPED/GMES (Regional Project on Enterprise Development and Ghana Manufacturing Enterprise Survey) database is available from Centre for the Study of African Economies at Oxford University.

[26] We classify (the very few) firms that report both direct and indirect exports as direct exporters.

know from the theory that indirect export shares is correlated with firm size. In column 2, we therefore control for lag firm sales and lag firm sales squared. The coefficient β remains positive and statistically significant. In column 3, we attempt to control for such additional changes in the firm that may accompany entry into the direct export market by including changes in firm sales as an additional control. The idea is that any firm-level adjustments would be captured by changes in firm sales. We present this specification in column 3, and the results continue to hold. Finally, in column 4 we include firm fixed effects to control for firm-specific trends, and the results remain robust. These results are therefore suggestive that a firm's indirect export status in a previous period makes it more likely to export directly in the subsequent periods.

The ability to offer more stringent tests of this hypothesis, as well as to uncover the mechanisms through which intermediaries help firms learn about their foreign market potential, is limited by data constraints. Nevertheless, the evidence from both databases points to intermediaries facilitating direct export participation.

4. Conclusion

This paper presents the first evidence of the role of intermediary firms in facilitating trade across the entire universe of exporting firms in China. We find that non-manufacturing trading firms mediate a substantial fraction of firm trade. In 2005, they accounted for $168 billion of China's exports, or 22% of aggregate exports. The activity of intermediaries behaves in systematically different ways than their direct exporting counterparts. Intermediaries appear to adopt a relative country focus by exporting more products per market than direct exporters. Consistent with our framework, we observe that firms of intermediate levels of productivity are more likely to use intermediaries, while the most productive firms choose to export directly. This finding is consistent with intermediaries being used by relatively smaller firms who find it difficult to enter the export market on their own. Moreover, we observe a very robust relationship between intermediary export shares and markets that are smaller and have higher trade costs.

This paper demonstrates that further research on intermediary exporting and importing firms is warranted.[27] While the recent literature on firm heterogeneity within international trade has largely ignored the role of intermediaries, our framework predicts that small firms endogenously choose to export via intermediaries. This implies that small firms can, and do, access foreign markets even though they are unable to cover the fixed costs of direct exporting. One might extrapolate what we learn here to the import side: firms may benefit from importing products indirectly even if they do not directly import. The presence of intermediaries implies that analyzing firm-level imports may understate the

[27] A separate but related line of recent research has focused on the distribution of the gains from trade in the presence of intermediaries (Bardhan et al. (2009) and Antras and Costinot (2010)).

true benefits from importing (see Goldberg, Khandelwal, Pavcnik and Topalova (2010)) if indirect imports via intermediaries are ignored.

Intermediaries could also serve as vehicles for small firms to learn their potential in foreign markets and enable firms to select directly into export markets in subsequent periods. These results raise a number of interesting questions about the mechanisms through which this dynamic process occurs. For instance, to what extent do intermediaries help firms learn about their own productivity and/or learn about tailoring their products for foreign markets? Do intermediaries provide a match with foreign clients so that firms subsequently bypass intermediaries to interact direct with their foreign clients? We leave these important open questions for future research.

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Tables

Export Shares by Firm Type

Year	Total Value ($ million)	Direct Export Value	Intermediary Export Value	Intermediary Value Share
	(1)	(2)	(3)	(9)
2000	249,234	163,047	86,187	35%
2001	290,606	198,003	92,603	32%
2002	325,632	230,740	94,892	29%
2003	438,473	323,541	114,931	26%
2004	593,647	450,813	142,835	24%
2005	776,739	608,926	167,813	22%

Notes: Table reports summary statistics from China's export transactions data. The values are in millions of U.S. dollars. See text for definition of intermediary firms. Source: Authors' calculations from the China's transactions data.

Table 1: Export Values by Firm Type, 2000-2005

Firm-Level Summary Statistics

Export Data						
	All Firms (1)		Direct Firms (2)		Intermediary Firms (3)	
	Mean	Median	Mean	Median	Mean	Median
Firms	144,027		121,928		22,099	
Products	15.9	4	10.6	3	45.3	11
Countries	8.0	3	6.9	3	14.3	6
Sectors[a]	2.55	1	2.11	1	4.98	4
Total Export Value ($)	5,393,010	572,964	4,994,145	519,890	7,593,688	994,082

Notes: Table reports export statistics for 2005. [a]Sectors are classified as follows: HS 01-05 "Animal and Animal Products"; HS 06-15 "Vegetable Products"; HS 16-24 "Foodstuffs"; HS 25-27 "Mineral Products"; HS 28-38 "Plastics/Rubbers"; HS 41-43 "Raw Hides, Skins, Leathers & Furs"; HS 44-49 "Wood and Wood Products"; HS 50-63 "Textile"; HS 64-67 "Footwear/Headgear"; HS 68-71 "Stone/Glass"; HS 72-83 "Metals"; HS 84-85 "Machinery/Electrical"; HS 86-89 "Transportation"; HS 90-97 "Miscellaneous"; HS 98-99 "Service". Source: Authors' calculations from Chinese transactions data.

Table 2: Firm-Level Summary Statistics for Exporting Firms, 2005

Margins, by Firm Type

Firm Type	Varieties per Country	Varieties per Country	Product Herfindahl	Product Herfindahl
Direct Firms	8.34	10.03	0.48	0.44
Intermediary Firms	10.56	11.98	0.28	0.27
Quartic Firm-size controls	yes	yes	yes	yes
Ownership FEs	no	yes	no	yes
R-squared	0.24	0.24	0.73	0.73
Observations	144,027	144,027	144,027	144,027

Notes: Column 1 regresses the firm-level products per country on firm type and a quartic polynomial of firm-size controls. Column 2 includes ownership dummies. The dependent variable in Column 3 and 4 regress firm's herfindahl index computed over products (see text). All coefficients are statistically significant at the 1 percent level and so standard errors have been supressed. The coefficients in each column are statistically different from each other. The regressions do not include a constant.

Table 3: Margins, by Firm Type

Firm Size and Export Mode

	Direct Export Share			Indirect Export Share		
	(1)	(2)	(3)	(4)	(5)	(6)
{Log Sales}	0.015			0.034 ***		
	0.013			0.009		
{Log Sales}^{2}	0.0010			-0.002 ***		
	0.0007			0.000		
{Log Employment}		0.041 *			0.039 **	
		0.024			0.016	
{Log Employment}^{2}		0.001			-0.003 **	
		0.002			0.001	
{Log Labor Productivity}			0.024 **			0.016 **
			0.010			0.007
{Log Labor Productivity}^{2}			0.001			-0.001 *
			0.001			0.001
Industry FEs	yes	yes	yes	yes	yes	yes
R-squared	0.12	0.08	0.11	0.05	0.05	0.05
Observations	2,469	2,340	2,364	2,570	2,437	2,461

Notes: Table uses Chinese firm-level information from the World Bank's Enterprise Survey Data. The data cover Chinese firms in 2002 and 2003. The dependent variables in the left and right panels are direct and indirect exports, respectively, as a fraction of sales. All regressions include industry fixed effects. The constant in each regression is not reported. Significance: * 10 percent; ** 5 percent; *** 1 percent.

Table 4: Firm Size and Export Mode

Unit Value Differentials

	(1)	(2)	(3)	(4)	(5)	(6)
$\{Intermediary\}_f$	0.067 ***	0.051 ***	0.023 ***	0.030 ***	0.021 **	0.014
	0.005	0.004	0.004	0.007	0.010	0.033
$\{Intermediary\}_f$ X $\{CV\}_h$				-0.002		
				0.002		
$\{Intermediary\}_f$ X $\{Ladder\}_h$					0.000	
					0.006	
$\{Intermediary\}_f$ X $\{Elasticity\}_h$						0.003
						0.010
Quartic Firm-size controls	no	yes	yes	yes	yes	yes
Fixed effects	po	po	cpo	cpo	cpo	cpo
R-squared	0.79	0.79	0.85	0.85	0.86	0.85
Observations	4,594,598	4,594,598	4,594,598	4,594,598	3,697,495	4,583,207

Notes: Table regresses firms' (f) log unit values (at the country-product level) on intermediary dummy and controls in 2005. Row 2 interacts an intermediary dummy with the coefficient of variation of unit values. Row 3 includes the interactions with the quality ladder taken from Khandelwal (2010). Row 4 uses the elasticity of substitution from Broda and Weinstein (2006). The symbols for the pair fixed effects are product (p), ownership (o) and country (c). The constant in each regression is not reported. Standard errors are clustered by product. Significance: * 10 percent; ** 5 percent; *** 1 percent.

Table 5: Unit Value Differentials

Intermediary Export Share and Country Characteristics

	(1)	(2)	(3)	(4)
{Log Distance}$_c$	0.032 ***	0.026 ***	0.028 ***	0.025 ***
	0.008	0.007	0.007	0.008
{Log GDP}$_c$	-0.022 ***	-0.021 ***	-0.021 ***	-0.019 ***
	0.002	0.002	0.003	0.003
{Log Chinese Population}$_c$		-0.002 *	-0.003 *	-0.004 ***
		0.001	0.001	0.001
{# of Importing Procs}$_c$			0.003 **	0.003 ***
			0.001	0.001
{MFN Tariff}$_{hc}$				0.059 **
				0.022
HS6 FEs	yes	yes	yes	yes
R-squared	0.15	0.16	0.17	0.18
Observations	267,201	221,373	207,594	185,975

Notes: The dependent variable in each regression is the share of intermediary exports of total country-HS6 exports. Column 1 includes distance and market size as covariates. Column 2 adds the share of ethnic Chinese population, taken from Ohio University Shao Center's Distribution of the Ethnic Chinese Population Around the World. Column 3 includes the World Bank's Doing Business Report measure of the number of procedures required for importing a container. Column 4 includes the country's HS6 MFN tariff on Chinese products, obtained from WITS. The constant in each regression is not reported. All standard errors clustered at the country level. Significance: * 10 percent; ** 5 percent; *** 1 percent.

Table 6: Intermediary Shares and Country Characteristics

Intermediary Export Share and Country Characteristics, Robustness Checks

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
{Log Distance}$_c$	0.025 ***		0.020 ***	0.012	0.022 ***	0.025 ***	0.025 ***
	0.009		0.008	0.009	0.007	0.008	0.008
{Log GDP}$_c$			-0.020 ***	-0.024 ***	-0.016 ***	-0.019 ***	-0.019 ***
			0.003	0.003	0.002	0.002	0.002
{Log Manufacturing Ouput}$_i$	-0.016 ***						
	0.003						
{Log Chinese Population}$_c$	-0.004 **		-0.003 **	-0.003 **	-0.003 **	-0.004 ***	-0.003 **
	0.002		0.001	0.001	0.001	0.001	0.001
{# of Importing Procs}$_c$	0.004 ***		0.003 ***	0.004 **	0.003 **	0.004 ***	0.004 ***
	0.001		0.001	0.002	0.001	0.001	0.001
{MFN Tariff}$_{hc}$	0.064 **	0.024	0.046 **	0.078 ***	0.038 *	0.049 **	0.060 ***
	0.027	0.015	0.019	0.023	0.021	0.022	0.022
{Price Index from Gravity}$_c$						-0.015 **	
						0.007	
{GDP Deflator}$_c$							0.007
							0.008
HS6 FEs	yes	yes	yes	yes	yes	yes	yes
Country FEs	no	yes	no	no	no	no	no
R-squared	0.17	0.17	0.17	0.18	0.15	0.18	0.18
Observations	185,975	223,282	181,612	163,044	181,793	185,975	185,975

Notes: The dependent variable in each regression is the share of intermediary exports of total country-HS6 exports. Column 3 excludes exports to Hong Kong. Column 4 excludes exports by state-owned enterprises and re-computes intermediary shares of country-HS6 exports. Column 5 removes all exports classified under processing and assembly trade and re-computes intermediary shares of country-HS6 exports. Column 6 includes the price index estimated from two-step procedure discussed in the text. Column 7 uses the GDP deflator as an alternative measure for the price index. The GDP deflator is obtained from UN Statistical Office. The constant in each regression is not reported. All standard errors clustered at the country level. Significance: * 10 percent; ** 5 percent; *** 1 percent.

Table 7: Robustness Checks

Sensitivity to Gravity, Intermediaries vs. Direct Exporters

	(1)	(2)	(3)
{Log Distance}$_c$	-0.692 ***	-0.662 ***	-0.685 ***
	0.122	0.099	0.098
X Intermediary	0.220 ***	0.187 ***	0.202 ***
	0.044	0.053	0.051
{Log GDP}$_c$	0.684 ***	0.607 ***	0.613 ***
	0.024	0.031	0.034
X Intermediary	-0.099 ***	-0.070 ***	-0.070 ***
	0.009	0.014	0.015
{Log Chinese Population}$_c$		0.085 ***	0.087 ***
		0.021	0.022
X Intermediary		-0.029 ***	-0.029 ***
		0.008	0.008
{# of Importing Procs}$_c$			-0.006
			0.018
X Intermediary			0.016 **
			0.007
HS6 FEs	yes	yes	yes
R-squared	0.412	0.431	0.433
Observations	425,396	357,902	338,956

Notes: The dependent variable in each regression is (log) total country-HS6 export value for intermediaries and direct exporters. Column 1 includes distance and market size as covariates. Column 2 adds the share of ethnic Chinese population. Column 3 includes the measure of the number of procedures required for importing a container. Column 4 includes the country's HS6 MFN tariff on Chinese products. Each covariate is interacted with a dummy for trade by intermediaries (the coefficient on intermediaries is supressed). The constant in each regression is not reported. All standard errors clustered at the country level. Significance: * 10 percent; ** 5 percent; *** 1 percent.

Table 8: Sensitivity to Gravity, Intermediaries vs Direct Exporters

Export Values of New and Existing Varieties

	(1)	(2)	(3)	(4)	(5)
$\{New\}_{fch}$	-1.870 ***	-0.473	-0.319	1.720 ***	1.146 ***
	0.078	0.756	0.656	0.551	0.153
$\{Log\ Distance\}_{c}$		0.021	0.004		
		0.077	0.052		
$\{Log\ Distance\}_{c}$ X $\{New\}_{fch}$		0.226 ***	0.185 ***	0.062 **	0.024 **
		0.073	0.037	0.029	0.011
$\{Log\ GDP\}_{c}$		0.172 ***	0.212 ***		
		0.021	0.022		
$\{Log\ GDP\}_{c}$ X $\{New\}_{fch}$		-0.123 ***	-0.108 ***	-0.137 ***	-0.122 ***
		0.015	0.013	0.013	0.004
$\{Log\ Chinese\ Population\}_{c}$			-0.013		
			0.012		
$\{Log\ Chinese\ Population\}_{c}$ X $\{New\}_{fch}$			-0.018 ***	-0.021 ***	-0.015 ***
			0.006	0.006	0.002
$\{\#\ of\ Importing\ Procs\}_{c}$			0.011		
			0.014		
$\{\#\ of\ Importing\ Procs\}_{c}$ X $\{New\}_{fch}$			-0.010	-0.002	-0.002
			0.008	0.006	0.002
$\{MFN\ Tariff\}_{hc}$			1.348 ***		
			0.272		
$\{MFN\ Tariff\}_{hc}$ X $\{New\}_{fch}$			0.981 **	1.191 ***	0.718 ***
			0.380	0.269	0.066
$\{Intermediary\ Share\}_{hc}$ X $\{New\}_{fch}$					1.364 ***
					0.029
Country-HS6 FEs	no	no	no	yes	yes
R-squared	0.12	0.13	0.15	0.37	0.37
Observations	2,710,790	2,707,541	2,359,078	2,359,078	2,359,078

Notes: The dependent variable is each regressions is the (log) exports at the firm-country-HS6 level in 2005. *New* is an indicator if a firm did not export the country-HS6 pair in 2004 but did in 2005. The second column interacts the indicator of a new variety with distance and GDP of the destination market. Columns 4-5 include country-HS6 fixed effects so the country characteristics and intermediary shares are not identified. The constant for each regression is not reported. Regression excludes exports by intermediaries. All standard errors clustered at the country level, except the final column which clusters at the country-HS6 level. Significance: * 10 percent; ** 5 percent; *** 1 percent.

Table 9: Export values of New and Existing Varities

Status in Period *t-1*	Status in Period *t*: Indirect Only	Direct Exporter	Domestic Only
Indirect Only	35.7	35.7	28.6
Direct Only	15.0	55.0	30.0
Domestic	3.2	2.8	94.0
Share of Firms in *t*	5.8	8.5	85.7

Notes: Table displays transition probabilities firm status in the previous period (*t-1*) against firm status in period *t*. The three groups are mutually exclusive categories. The final row reports the shares of firms in each bin (over the sample period). Each row sums to 100 percent. The data are from the Ghana RPED/GMES database.

Table 10: Cross-tabulation of Lag Export Mode and Change in Direct Export Status

	Change in Direct Exports (1)	(2)	(3)	(4)
{Lag Indicator of Indirect Exports}$_{f,t-1}$	0.285 ***	0.263 ***	0.259 ***	0.287 **
	0.052	0.061	0.061	0.136
{Lag Log Firm Sales}$_{f,t-1}$		-0.045	-0.034	-0.095
		0.094	0.103	0.308
{Lag Log Firm Sales}$^2_{f,t-1}$		0.001	0.001	0.002
		0.003	0.003	0.009
{Change in Log Firm Sales}$_{ft}$			0.013	0.015
			0.018	0.050
Year Fixed Effects	yes	yes	yes	yes
Firm Fixed Effects	no	no	no	yes
R-squared	0.06	0.07	0.07	0.49
Observations	528	311	307	307

Notes: Table uses firm-level data from the Ghana RPED/GMES database for 1992, 1993, 1996 and 1997. The dependent variable is the change in a firm's indicator status if it directly exports. The independent variables are a lag indicator if the firm exports any products indirectly (through a government trading company, a private agent or other means), lag firm sales, lag firm sales squared and the change in firm sales between two periods. The final column includes firm fixed effects. Significance: * 10 percent; ** 5 percent; *** 1 percent.

Table 11: Change in Direct Exports

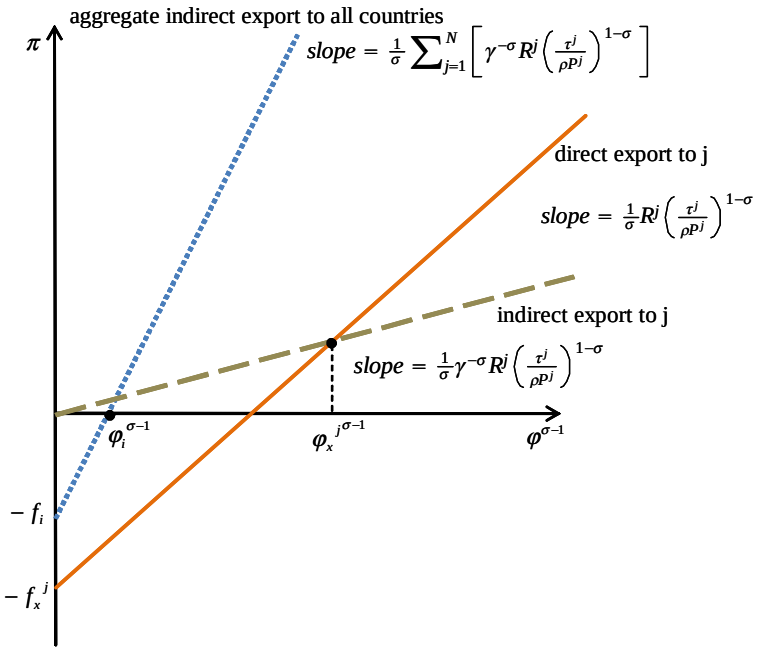

Figure 1: Profit Curves and Firm Productivity

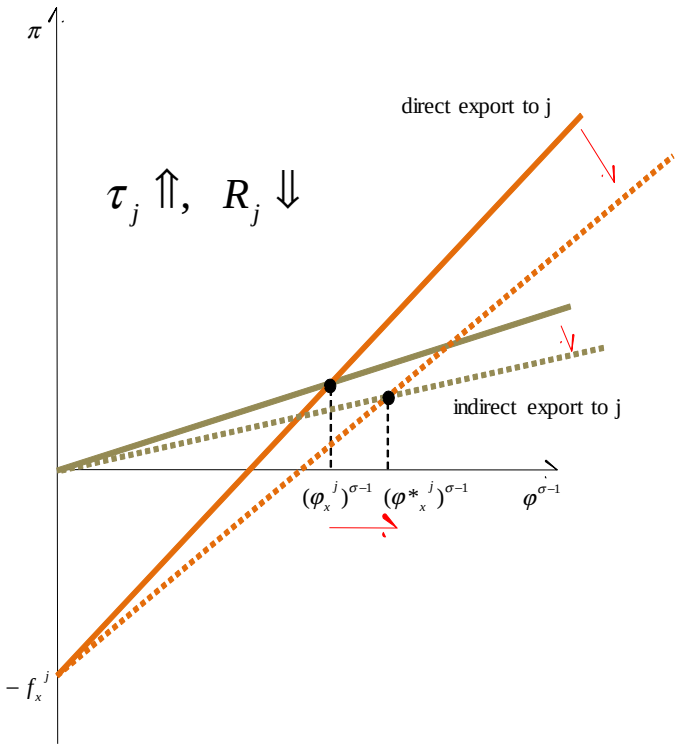

Figure 2: Trade Costs and Market Size and Indirect Exports

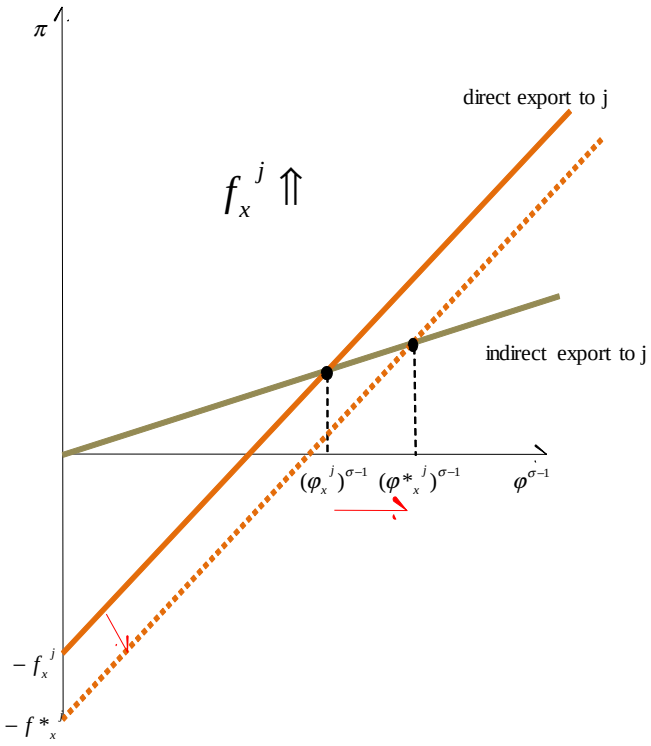

Figure 3: Fixed Costs and Indirect Exports

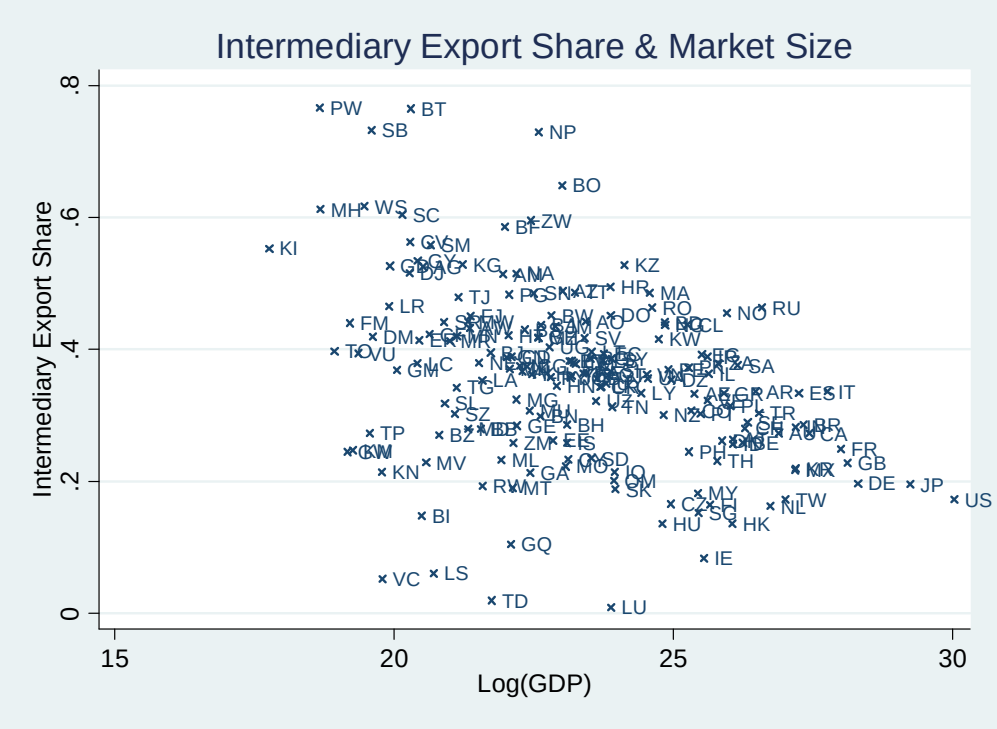

Figure 4: Intermediary export share and market size

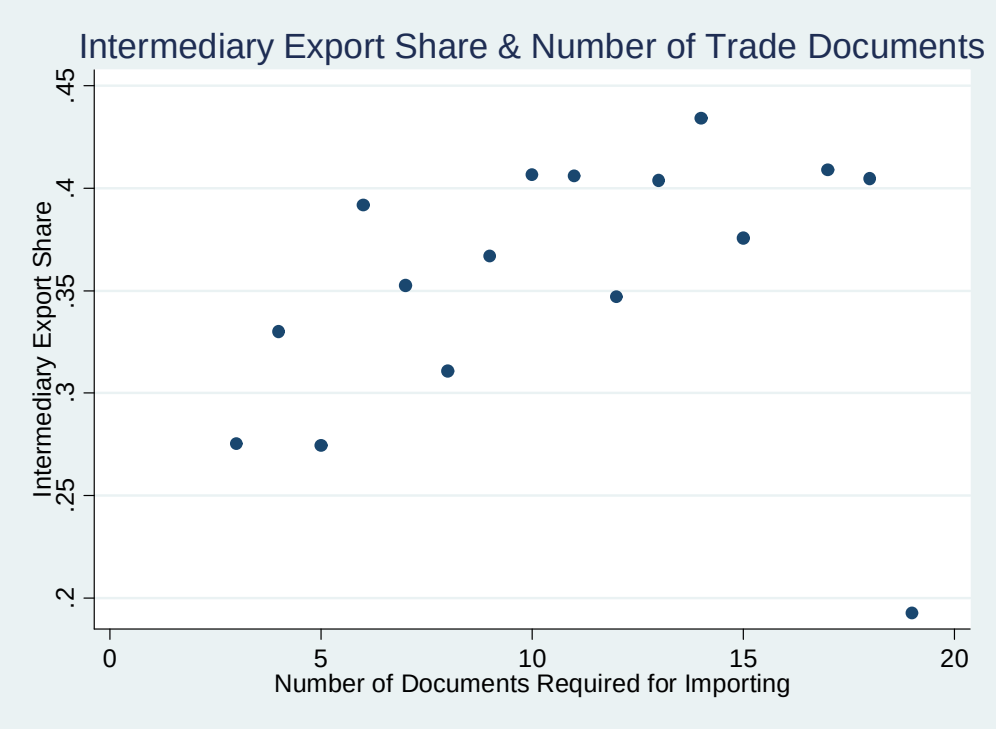

Figure 5: Average intermediary export share by number of documents required for importing