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Wholesalers in International Trade

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WHOLESALERS IN INTERNATIONAL TRADE

NON-TECHNICAL SUMMARY

Recent empirical researches in international trade have documented overwhelming evidence that, in all countries, a remarkably small proportion of firms report exports in the customs statistics. Among those, however, a large share are wholesalers. This finding hints that the number of firms active in foreign markets might be much larger than suggested by a simple count of firms reporting directly their exports. This paper sheds light on the role of wholesalers in international trade. Bernard, Jensen, Redding and Schott (2010) compute that wholesale and retail firms account for approximately 10 percent of the US exports. The share is 22 percent of total exports from China (Ahn, Khandelwal and Wei, 2010), 11 percent of total exports from Italy (Bernard, Grazzi and Tomasi, 2010) and 41 percent of Chilean imports (Blum, Claro and Horstmann, 2010). In France, the country we focus on, intermediaries account for 20 percent to total exports. Two major stylized facts emerge from the examination of these particular exporters. First, the presence of trade intermediaries is greater in difficult markets. For instance, Ahn et al. (2010) find that in China the share of exports via the intermediates is larger in countries with smaller market size and higher variable trade costs. Bernard, Grazzi and Tomasi (2010) further observe on Italian data that intermediary exports are less sensitive to proxies for market entry costs (barriers to import and governance indicator) than direct exports. Second, the few existing datasets that provide information on the firms that export indirectly show that those are less efficient than direct exporters on average.

We propose and empirically test a very simple model that predicts the two stylized facts discussed above: (1) intermediaries are relatively more important in markets that are more difficult to penetrate (i.e. smaller, further, more protected...) and (2) intermediaries channel exports from the least efficient firms which otherwise would not be able to pay the fixed cost of exporting directly.

Similarly to the booming literature extending Melitz (2003) to account for intermediary activity (Ahn et al. 2010, Akerman 2009, Blum, Claro and Horstmann 2009, Bernard, Grazzi and Tomasi 2010, Felbermayr and Jung 2009), we assume an intermediation technology which allows wholesalers to exploit some kind of advantage in exporting (such as economies of scope, better knowledge) over small exporting producers. Our model differs in several ways. First, the prediction that relates the prevalence of intermediary exports to the accessibility of the foreign market is obtained in a very simplistic and intuitive framework that does not involve any restricting hypothesis on the intermediary technology. We just need to introduce in a very standard model of trade a specific (i.e. non ad-valorem) trade cost. Second, while in all the existing literature the firm's decision to export is directly or indirectly driven by productivity only, we also allow an efficiency-ordering of firms based on the quality of their variety. We consider two polar cases. In the first one, the sorting of firms into export markets depends upon individual productivity (or marginal cost) draws. In the second case, firms with higher marginal cost produce higher quality. We obtain an original prediction on the price of wholesalers' exports relative to the one of direct exporters. In the productivity sorting setting, intermediates are predicted to export more expensive varieties because they export on behalf of relatively higher-cost manufacturers. In the quality sorting setting, by contrast, they export the least expensive varieties corresponding to the low quality manufacturers. These contrasted predictions are then brought to the data.

We use French firm-level data for the year 2007 to bring empirical support to the two main predictions of the model. As far as the first prediction is concerned, we develop measures of market attractiveness and fixed cost of entry estimated in firm-level regressions to test the predicted relationship between intermediary exports and country characteristics. Our estimates confirm that wholesalers channel a larger share of total exports in more difficult markets. The analysis of the second prediction is conducted using unit prices of export. Indeed, our model predicts that the average price charged by wholesalers should be lower than the one for direct exporters where quality sorting prevails, but higher when firms' export performance is mainly driven by their productivity. We use this original prediction to test whether wholesalers mainly handle the exports of the least efficient producers in all contexts. Our econometric analysis supports this prediction, showing that wholesalers' prices are lower than that of direct exporters in quality sorting sectors but not in productivity sorting sectors.

ABSTRACT

Recent empirical research in international trade has revealed overwhelming evidence that, in all countries, a remarkably small proportion of firms report exports in Customs statistics. A large share of these are wholesalers. This suggests that the number of firms active in foreign markets might be much greater than that suggested by a simple count of the firms directly reporting their exports. This paper thus sheds light on the role of wholesalers in international trade. Our model, which allows for quality differentiation, uses very general assumptions to show that intermediated exporters may contribute significantly to the extension of countries' export opportunities. The model predicts a twofold role in international trade. First, wholesalers help less-efficient firms to supply foreign markets, thus increasing the number of exported varieties at the aggregate level. Second, they alleviate the difficulty of reaching less-accessible markets. We use French firm-level export data to provide empirical support for these two predictions.

JEL Classification: F1

Keywords: Wholesalers, International trade, Intermediated exports, Heterogenous firms, quality.

LES GROSSISTES DANS LE COMMERCE INTERNATIONAL

RÉSUME NON TECHNIQUE

Les statistiques douanières font apparaître un très petit nombre d'entreprises exportatrices. En France, environs 17 pour cent des entreprises manufacturières déclarent des exportations. Cette faible proportion n'est pas une spécificité française ; on observe des chiffres comparables dans tous les pays pour lesquels on peut disposer de données individuelles de commerce international. Ces chiffres doivent néanmoins relativisés. En effet, les bases statistiques des douanes ne contiennent pas uniquement des déclarations d'exportation émanant d'entreprises produisant des biens. Un grand nombre de déclarants sont en réalité des grossistes. Cette observation indique que le nombre d'entreprises actives sur les marchés étrangers pourrait être beaucoup plus grand que celui suggéré par un simple comptage des entreprises déclarant directement leurs exportations. Ce document cherche à mettre en lumière le rôle des grossistes dans le commerce international. Il décrit rapidement la place qu'occupent ces entreprises dans le commerce extérieur français. Il propose un cadre théorique explicitant leur rôle, soutenu par une analyse économétrique.

La France n'est pas le seul pays pour lequel on peut disposer de données venant éclairer le rôle des grossistes dans le commerce international. Pour les Etats-Unis, l'analyse de Bernard, Jensen, Redding et Schott (2010) évalue la contribution des grossistes à 10 pour cent des exportations américaines. Cette part est de 22 pour cent pour les exportations chinoises (Ahn, Khandelwal et Wei, 2010), 11 pour cent pour les exportations italiennes (Bernard, Grazzi et Tomasi, 2010) et 41 pour cent pour les importations chiliennes (Blum, Claro et Horstmann, 2010). En France, les intermédiaires assurent environs 20 pour cent des exportations totales. Au-delà de ces comptages, deux grands faits stylisés ressortent de ces études. Premièrement, la contribution des grossistes aux exportations est plus importante sur les marchés étrangers relativement difficiles d'accès. Par exemple, Ahn et al. (2010) constatent qu'en Chine de la part des exportations via les intermédiaires est plus grande quand le pays de destination est de petite taille et oppose aux importateurs des barrières au commerce importantes. Bernard, Grazzi et Tomasi (2010) observent, sur des données italiennes, que les exportations intermédiées sont moins sensibles aux entraves commerciales (barrières à l'importation, gouvernance) que les exportations directes, ce qui laisse entendre que les grossistes sont relativement avantagés sur les marchés difficile d'accès et facilitent le commerce vers ces destinations. Deuxièmement, les quelques bases de données qui fournissent des informations sur les entreprises qui exportent indirectement montrent que celles-ci sont moins efficaces, en moyenne, que les exportateurs directs. Nous proposons et testons empiriquement un modèle très simple qui prédit les deux faits stylisés évoqués ci-dessus : (1) le rôle des intermédiaires est relativement plus important sur les marchés qui sont les plus difficiles à pénétrer (plus petits, plus éloignés, plus protégés…) et (2) les intermédiaires véhiculent les exportations pour le compte des entreprises les moins efficaces qui, autrement, ne seraient pas en mesure de payer le coût fixe associé à l'exportation directe. Dans la lignée de la littérature en plein essor qui élargit le cadre théorique de Melitz (2003) pour prendre en compte l'activité des intermédiaires (Ahn et al. 2010, Akerman 2009, Blum, Claro et Horstmann 2009, Bernard, Grazzi et Tomasi 2010, Felbermayr et Jung 2009), nous supposons une technologie d'intermédiation qui permet aux grossistes d'exploiter une forme d'avantage à l'exportation

(comme des économies d'échelle ou une meilleure connaissance des marchés étrangers) par rapport aux petits producteurs-exportateurs. Notre modèle se distingue de plusieurs façons. Tout d'abord, la prédiction (1) qui concerne la prévalence des exportations intermédiées en fonction de l'accessibilité du marché étranger est obtenue à partir d'un cadre très simple et intuitif qui n'implique aucune hypothèse restrictive sur la technologie d'intermédiation. Nous avons juste besoin d'introduire dans un modèle très standard de commerce international un coût de transport spécifique (c'est-à-dire proportionnel à la quantité exportée, et non à la valeur des exportations). Ensuite, alors que dans toute la littérature existante le choix entre exporter directement ou le faire via un grossiste est lié uniquement à la productivité des entreprises, nous permettons également une sélection en fonction de la qualité de leur produit. Nous obtenons ainsi une prévision originale sur le niveau des prix à l'export des grossistes par rapport aux exportateurs directs. En effet, si la sélection des entreprises est guidée par leur productivité (autrement dit, si la compétitivité se joue sur les prix), les intermédiaires devraient exporter les variétés les plus chères parce qu'ils exportent pour le compte de fabricants aux coûts relativement plus élevés. Inversement, si la compétitivité se joue essentiellement sur la qualité des produits, les grossistes devraient exporter les variétés les moins chères correspondant aux fabricants de faible qualité. Nous utilisons ces prédictions sur les prix relatifs des produits exportés par les grossistes pour vérifier l'hypothèse selon laquelle les exportateurs directs sont plus efficaces en moyenne que les exportateurs indirects. L'analyse empirique utilise les données individuelles des douanes françaises pour l'année 2007. Nous tirons des cette base des mesures du degré d'accessibilité des marchés étrangers qui nous servent à vérifier que les grossistes contribuent relativement plus aux exportations nationales sur les marchés difficiles d'accès. L'analyse de notre seconde prédiction théorique (i.e. les grossistes doivent relayer les exportations des entreprises relativement moins efficaces) est réalisée en utilisant les valeurs unitaires des exportations. Nos résultats vont clairement dans le sens attendu. Ils indiquent bien que les prix des grossistes sont inférieurs à ceux des exportateurs directs pour les secteurs où la sélection s'effectue sur la base de la qualité, mais pas pour ceux où la sélection reflète les différences de productivité. Au final, notre étude vient montrer l'importance du rôle des grossistes dans le commerce international. Ces entreprises contribuent à développer les exportations à la fois en facilitant l'accès aux marchés les plus difficiles, et en aidant les entreprises relativement moins compétitives à exporter.

RÉSUMÉ COURT

Les analyses empiriques récentes sur données de commerce international ont documenté dans l'ensemble des pays qu'une proportion remarquablement faible des entreprises déclare des exportations dans les statistiques douanières. Parmi celles-ci, toutefois, une large part correspond à des grossistes. Cette observation indique que le nombre d'entreprises actives sur les marchés étrangers pourrait être beaucoup plus grand que celui suggéré par un simple comptage des entreprises déclarant directement leurs exportations. Ce travail cherche à mettre en lumière le rôle des grossistes dans le commerce international. Notre modèle, qui intègre la différenciation par la qualité, utilise des hypothèses très générales pour montrer que les intermédiaires peuvent contribuer grandement à élargir les possibilités d'exportation des pays. Le modèle prédit que leur rôle dans le commerce international est double. Tout d'abord, les grossistes aident les entreprises les moins efficaces à approvisionner les marchés étrangers, augmentant ainsi le nombre de variétés exportées au niveau agrégé. Deuxièmement, ils atténuent les difficultés d'accès aux marchés les plus difficiles. Nous utilisons des données françaises de douanes au niveau entreprises pour confirmer empiriquement ces deux prédictions.

Classification JEL : F1

Mots clés : Grossistes, commerce international, exportations intermédiées, firmes hétérogènes, qualité.

WHOLESALERS IN INTERNATIONAL TRADE

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1. INTRODUCTION

There is now well-accepted empirical evidence that internationalisation is only for the few (Mayer and Ottaviano, 2007). Only a handful of producers report exports in Customs statistics. In France, about 17% of manufacturing firms export (Eaton, Kortum and Kramarz, 2004), and Bernard, Jensen, Redding and Schott (2007) find an analogous figure of 15% in US data. Economists are thus inclined to think of the process whereby firms engage in international trade as being extremely selective. In the seminal model of Melitz (2003), selectivity results from the requirement that prospective exporters build their own distribution network abroad. This literature has until recently disregarded the possibility that producers may not always ship their goods directly to foreign customers but instead use intermediaries to carry out this task for them. A considerable proportion of the firms filling in export declarations are not producers of goods. Recent evidence on the role of intermediary firms in trade may in fact suggest that selectivity has to date been overestimated. Many more firms than those appearing in official Customs statistics supply their product to foreign consumers.

Bernard, Jensen, Redding and Schott (2010) calculate that wholesale and retail firms account for approximately 10 percent of US exports. The share is 22 percent of total exports from China (Ahn, Khandelwal and Wei, 2010), 11 percent of total exports from Italy (Bernard, Grazzi and Tomasi, 2010) and 41 percent of Chilean imports (Blum, Claro and Horstmann, 2010). In France, the country we focus on here, intermediaries account for 20 percent of total exports. Two main stylized facts emerge from the examination of these particular exporters. First trade intermediaries are more prevalent in difficult markets. For instance, Ahn et al. (2010) find that in China the share of exports via intermediates is greater in countries with smaller market size and higher variable trade costs. Bernard, Grazzi and Tomasi (2010) further note in Italian data that intermediary exports are less sensitive to proxies for market-entry costs (import barriers and a governance indicator) than are direct exports. Second, the few existing datasets providing information on firms that export indirectly reveal that these are on average less efficient than direct exporters. McCann (2010) uses survey data for a large number of Eastern European countries[1] to show that firms which export directly perform better than either those using an

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[1]The data comes from the Business Environment and Enterprise Performance Survey (BEEPS), which is collected by the European Bank for Reconstruction and Development (EBRD) and the World Bank.

intermediary or domestic firms. His finding holds for many different proxy measures of firm performance,[2] and has been confirmed by Abel-Koch (2010) who finds a negative correlation between firm size and the relative importance of intermediated exports in Turkey.[3]

We propose and empirically test a very simple model that predicts the two stylized facts discussed above: (1) intermediaries are relatively more present in markets that are more difficult to penetrate (i.e. smaller, further away, more protected etc.); and (2) intermediaries channel exports from less-efficient firms which otherwise would not be able to pay the fixed cost of exporting directly.

Recent models extending Melitz (2003) to account for intermediary activity[4] assume an intermediation technology which allows wholesalers to exploit some kind of advantage (such as economies of scope or better knowledge) in exporting over small exporting producers (Ahn et al. 2010, Akerman 2009, Blum, Claro and Horstmann 2009, Bernard, Grazzi and Tomasi 2010, and Felbermayr and Jung 2009). Domestic producers are modeled as facing a choice of how to export: by exporting directly to foreign markets, and incurring the fixed costs of exports and trade costs, or via a specialized firm (the trade intermediary). Intermediaries are typically supposed to charge their clients (indirect exporters) an intermediary fixed cost, which is lower than the fixed cost of direct exports, and an additional marginal cost. The intermediation technology thus provides a mechanism by which firms can access export markets even if they are not productive enough to establish their own direct export network.[5] These models of intermediation thus predict a efficiency-ordering of firms into three categories (non-exporters, intermediated exporters and direct exporters): non-exporters are less efficient than those using an intermediary, while the latter are less efficient than firms which export directly. This assumption of wholesalers acting as a trade vehicle for less-efficient firms has so far remained largely untested. In this setting, Ahn et al. (2010) and Akerman (2009) predict that wholesalers will handle a greater share of exports in relatively less-accessible markets than in more open ones.

Along the same lines as the theoretical work noted above, our model assumes an intermediation technology that reduces the fixed cost of exporting in exchange for a higher marginal cost. Our model differs from the existing literature in two ways however. First, the prediction (1) relating the prevalence of intermediary exports to the accessibility of the foreign market is obtained in a very simplistic and intuitive framework, and does not involve any restrictive hypotheses regarding the intermediary technology. We simply introduce a specific (i.e. non ad-valorem)

[2]The performance premium is estimated based on the probability that firms participate in the following activities: importing, having a foreign owner, licensing of foreign technology, research and development and multi-product sales.

[3]The survey data here is from the World Bank Enterprise Survey conducted in Turkey in 2008.

[4]Initial models viewed intermediaries as agents who facilitate matching between sellers/exporters and foreign buyers (Rauch and Watson (2004), Petropoulou (2007), and Antràs and Costinot (2010)).

[5]Debaere et al. (2010) develop a fairly similar approach to model the sourcing decisions of firms in a Melitz and Ottaviano (2008) setting. Firms consider two ways of obtaining the intermediation services required to source inputs: (1) use a service provider, which involves an iceberg-type cost; or (2) internalize the provision of services, which incurs a fixed cost. Their empirical evidence suggests that more productive firms are more likely to internalize the production of services.

trade cost into a very standard trade model. This fairly reasonable assumption suffices to show that the indirect-export share is positively correlated with all possible determinants of foreign-market accessibility. Akerman (2009), Felbermayr and Jung (2009) and Ahn et al. (2010) have proposed theoretical contributions leading to similar conclusions. In Felbermayr and Jung (2009) and Akerman (2009), however, not all of the determinants of market accessibility influence the export share. Only the severity of contractual problems and the fixed cost of exporting play a role in these models; foreign-market size and market crowding have similar effects on both direct and indirect exports. Ahn et al. (2010) do show that all of the determinants of market accessibility influence the extent of indirect exports, but at the cost of a somewhat controversial hypothesis: they assume that once a firm pays to use an intermediary, it will supply all export markets. In our model, the fixed cost of intermediation is destination-specific so that firms are not systematically present on all foreign markets. Second, while the existing literature supposes that the firms' decision to export directly or indirectly is only driven by productivity, we also introduce an efficiency-ordering of firms based on the quality of their variety. We consider two polar cases. In the first, the sorting of firms into export markets depends upon individual productivity (or marginal cost) draws; in the second, firms with higher marginal costs produce higher quality. This yields a novel prediction regarding the price of wholesalers' exports relative to that of direct exporters. In the productivity-sorting setting, we predict that intermediates will export more expensive varieties, as they export on the behalf of relatively higher-cost manufacturers. In the quality-sorting setting, by way of contrast, they export the least expensive varieties corresponding to lower-quality manufacturers. These contrasting predictions will be exploited to test the hypothesis that direct exporters are more efficient on average than indirect exporters.

We use French firm-level data to test the two main predictions of the model. With respect to (1), we develop measures of market attractiveness and the fixed cost of entry estimated in firm-level regressions to better test the predicted relationship between intermediary exports and country characteristics. Our estimates confirm that wholesalers do indeed channel a greater share of total exports in more difficult markets. The analysis of prediction (2) - that intermediaries channel exports from less-efficient firms - is conducted using export unit prices. Only two pieces of work have provided empirical evidence on the price difference between direct and indirect exporters, and they disagree. Ahn et al. (2010) find for China that export prices by intermediaries are about 6 percent higher than those of direct exporters, while Bernard, Jensen, Redding and Schott (2010) conclude that wholesalers in the US have lower (by 14 percent) unit values than do pure producers. Our model and our empirical results, reconcile these apparently contrasting findings. Our model predicts that the average price charged by wholesalers should be lower than that of direct exporters when quality sorting prevails, but higher when firms' export performance is mainly driven by their productivity. We use this original prediction to establish whether wholesalers mainly handle the exports of less-efficient producers in all contexts. Our econometric analysis provides evidence for this prediction, showing that wholesalers' prices are lower than those of direct exporters in quality-sorting sectors, but not in productivity-sorting sectors.

The remainder of the paper is structured as follows. In Section 2, we present our model and

the two propositions (in terms of the prevalence and the prices of intermediaries) that we will test empirically. Section 3 describes the data, and Section 4 presents our empirical results. We conclude in Section 5.

2. THE MODEL

Our model builds on Melitz (2003) and Baldwin and Harrigan (2010). It also takes from Martin (2010) the assumption of per unit freight costs in addition to the standard ad-valorem (so-called iceberg) cost. We maintain the standard Krugman-Dixit-Stiglitz assumption of monopolistic competition and, as in Melitz (2003), firms are supposed to have heterogeneous marginal costs. Finally, we consider that there are two alternative export modes. For each foreign market, firms can decide to export directly or indirectly using the services of an international wholesaler.

We consider the set of firms producing differentiated varieties of a specific good, in a given country. We denote by q_{ij} the demand for a variety produced by firm i in destination country j. This demand will be satisfied only if firm i finds it profitable to export to country j. All consumers in the world have the same CES sub-utility function, yielding the following demand for each variety i:

$$q_{ij} = \frac{E_j}{P_j^{1-\sigma}} \alpha(s_i)^{\sigma-1} (p_{ij}^{CIF})^{-\sigma}, \tag{1}$$

where p_{ij}^{CIF} is the trade-cost inclusive price (CIF) of variety i in destination market j. This naturally is an increasing function of firm i's marginal cost, c_i. E_j is the size of market j for the good we consider, P_j the price index on that market and σ the elasticity of substitution between varieties. The parameter s_i reflects the quality of variety i, and $\alpha(s_i)$ is a function which shifts consumers' CES utility for quality s_i. Following Baldwin and Harrigan (2010), Hallak and Sivadasan (2009), Mandel (2010), Johnson (2010) and Crozet, Head and Mayer (2009), we consider that firms choose quality subject to an upgrading cost. We assume that $\alpha(s_i) = c_i^b$. Two polar cases are considered. In the first case, $b = 0$ and firm-level demand is a negative function of c_i. The sorting of firms into export markets then depends upon individual marginal-cost draws only. The second case assumes that $b = 1$ and exhibits quality sorting rather than marginal-cost sorting. Indeed, if $b = 1$, firms with higher marginal cost produce higher quality. While they charge a higher price, they will also face greater demand for their variety.[6]

With positive international trade costs the price paid by foreign consumers, p_{ij}^{CIF}, differs from the unit revenue received by the producer (p_{ij}). Denoting by T_j the per unit trade cost and τ_j

[6]Denoting the cumulative distribution function of the marginal-cost distribution function by $F(c)$, and its probability density function by $f(c)$, we have to assume that $\frac{xf(x)}{F(x)}$ is decreasing in the productivity-sorting setting and that $\frac{xf(x)}{1-F(x)}$ in increasing in the quality-sorting case. This is a regularity condition and holds for most of the usual distributions, including the Pareto distribution.

the ad-valorem trade cost, the CIF price is:

$$p_{ij}^{CIF} = p_{ij}\tau_j + T_j \tag{2}$$

The ad-valorem trade cost, τ_j, captures tariffs applied by the importing country and all ad-valorem sources of transport costs such as insurance and packaging. The trade cost T_j includes all of the components of transport costs which do not vary with the value of the good. Both τ_j and T_j are assumed to increase with geographical distance and the various barriers to trade.

Assuming that all firms consider the price index in country j, P_j, to be fixed, profit maximization induces the firm to set a different FOB price for each market:

$$p_{ij} = \frac{1}{\sigma - 1}\frac{T_j}{\tau_j} + \frac{\sigma}{\sigma - 1}c_i. \tag{3}$$

The examination of equation (3) reveals that without a per unit transport cost ($T_j = 0$), the FOB price is the same for all destinations, and is a constant mark-up over marginal cost. However, with a non-zero per unit transport cost, the FOB price varies, and increases in T_j.

Considering their expected profit in each destination country, firms must decide whether or not to export there. They can export directly to country j, incurring a sunk cost of F_j^d; alternatively, they may find it more profitable to do so through a domestic wholesaler. Wholesalers provide an intermediation service that reduces the sunk cost of exporting. Firms exporting to country j through a wholesaler thus incur a sunk cost of $F_j^w < F_j^d$. This seems reasonable, as it is certainly easier to find foreign customers through the intermediary, but also because the intermediate firm takes care of some aspects of the fixed cost of exporting, such as filling in customs declarations and organizing the logistic chains to transport the goods.

We assume that Nash bargaining occurs between the wholesaler and the producer, with the intermediaries capturing a share $1 - \delta$ ($0 < \delta < 1$) of export revenues. The Appendix 6 sets out our justification for this simple profit-sharing rule.[7] Equations (1), (2) and (3) then yield the profit functions for direct and indirect exporting, π_j^d and π_j^w:

$$\begin{aligned} \pi_j^d(c_i) &= A_j(c_i)^{b(\sigma-1)}\left[t_j + c_i\right]^{1-\sigma} - F_j, \\ \pi_j^w(c_i) &= A_j\delta(c_i)^{b(\sigma-1)}\left[t_j + c_i\right]^{1-\sigma} - F_j^w, \end{aligned} \tag{4}$$

[7]This simplistic hypothesis is extremely convenient. We might alternatively assume that wholesalers simply purchase and resale domestic varieties, applying an additional margin over FOB prices. This assumption, along with per unit freight costs, introduces too much complexity for us to obtain analytical results. We can however resort to numerical simulations to analyze this model, which confirm that our two testable propositions are robust to this alternative assumption. The Maple files used for these simulations are available on the corresponding author's web page.

where $t_j = T_j/\tau_j$ and $A_j = \left[E_j/P_j^{1-\sigma}\right][1/(\sigma-1)][\sigma/(\sigma-1)]^{-\sigma}\tau_j^{-\sigma}$. The parameter A_j captures the determinants of the demand that are specific to the importing country. We can refer to A_j as the "attractiveness" of country j: this is higher for "easier" markets, i.e. those that are bigger, closer, more open to trade and less competitive.

Figure (1) depicts the profit function of direct and indirect exporters (equation 4) as a function of marginal cost. Panels (a) and (b) refer to respectively the productivity-sorting ($b = 0$) and the quality-sorting ($b = 1$) cases.[8]

Figure (1) shows that firms' indirect export profits are less sensitive to marginal cost than are their direct export profits,[9] and that there are two cutoff points. When firms produce identical qualities ($b = 0$), the profits from both direct and indirect exporting fall monotonically with marginal cost. All firms with $c_i < \bar{c_j}^w$, such that $\pi_j^w(\bar{c_j}^w) = 0$, find it profitable to export indirectly. Amongst these, firms with $c_i < \bar{c_j}^d$, such that $\pi_j(\bar{c_j}^d) = \pi_j^w(\bar{c_j}^d)$, have higher profits than do direct exporters and will not use the intermediation service. Conversely, in the quality-sorting model ($b = 1$), firms with higher marginal cost propose better quality and face greater demand. Profit functions are positively sloped, and the hierarchy of cut-offs is inverted. Firms with $c_i > \bar{c_j}^d$ export directly, while firms with $c_i \in [\bar{c_j}^w, \bar{c_j}^d]$ export via a wholesaler. Firms with $c_i < \bar{c_j}^w$ do not export to country j.

Our simple model sheds light on the role of wholesalers in international trade, which is twofold. They first help firms to reach relatively difficult markets, where firms' expected sales are low relative to the fixed cost of exporting. This effect is summarized in proposition 1.

Proposition 1 *The share of exports channeled by wholesalers will be larger in less accessible foreign markets* ceteris paribus*, i.e. in destination countries with smaller and more competitive markets and with higher trade costs.*

Proof. See the appendix ■

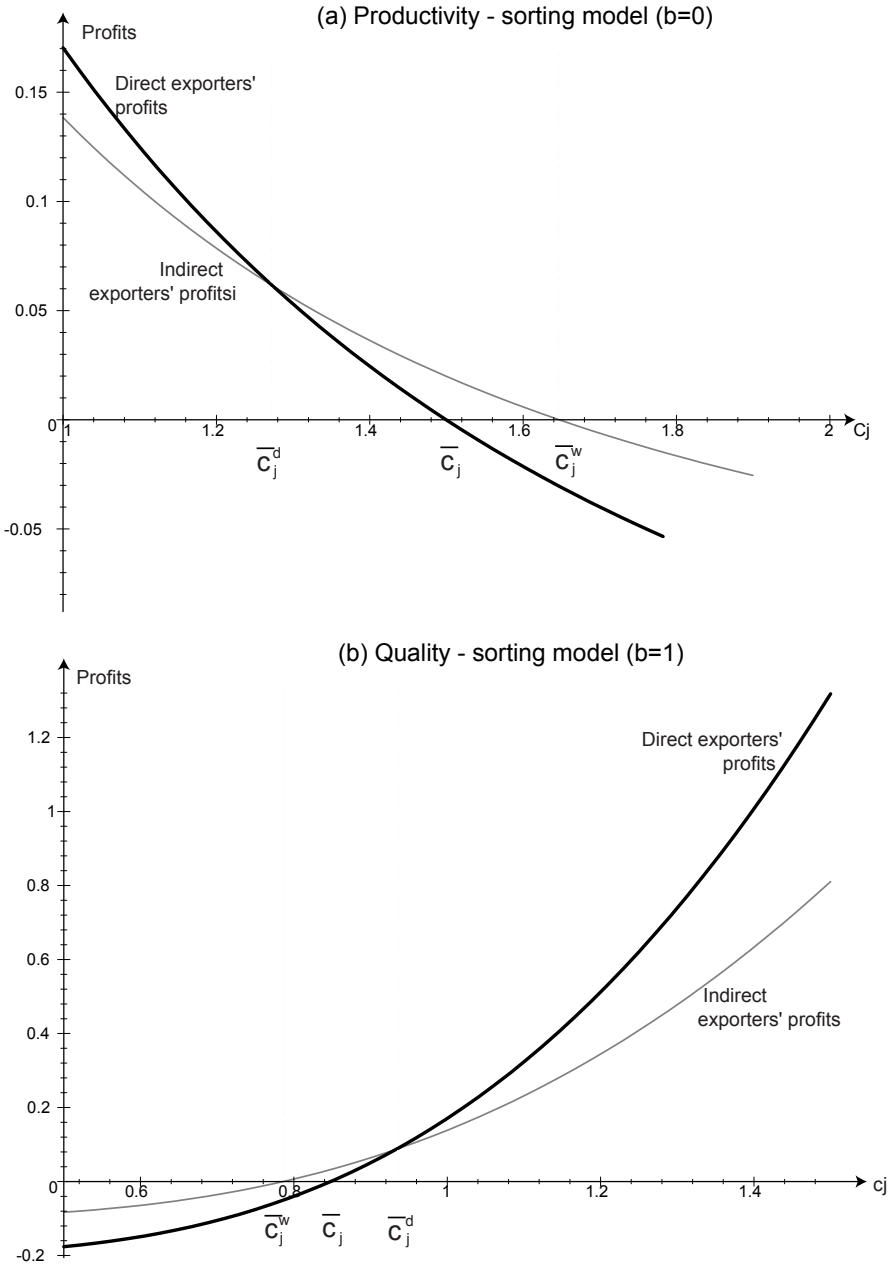
Second, wholesalers help relatively less efficient firms to export. Hence, more firms will be able to sell their products on foreign markets when wholesalers are active. Denoting by $\bar{c_j}$ the marginal cost such that $\pi_j^d(\bar{c_j}) = 0$, we have $\bar{c_j} < \bar{c_j^w}$ if $b = 0$ and $\bar{c_j} > \bar{c_j^w}$ if $b = 1$. In other words, firms with a marginal cost comprised between $\bar{c_j}$ and $\bar{c_j^w}$ now export but would not do so without wholesalers.

The two cutoffs, $\bar{c_j^w}$ and $\bar{c_j^d}$ define three groups of firms. The most efficient firms export directly to country j, the least efficient ones never export to this country, and firms in between export through a wholesaler. Hence, as in Ahn et al. (2010) and Akerman (2010), wholesalers handle the exports of the least efficient trading firms. We cannot test this theoretical finding directly as we do not observe in our data the composition of the basket of varieties exported by whole-

[8] The figures are drawn for the following parameter values: $\sigma = 5$, $F_j^w = 0.1$, $F_j^d = 0.2$, $\delta = 0.8$, $A_j = 30$, and $t_j = 2$.

[9] $\partial\pi_j^d(c_i)/\partial c_i = A_j c_i^{b(\sigma-1)}(\sigma-1)(t_j+c_i)^{1-\sigma}\left[b/c_i - 1/(t_j+c)\right]$ and $\partial\pi_j^w(c_i)/\partial c_i = \delta A_j c_i^{b(\sigma-1)}(\sigma-1)(t_j+c_i)^{1-\sigma}\left[b/c_i - 1/(t_j+c)\right]$. Recalling that $\sigma > 1$, $t_j > 0$, $A_j > 0$ and $c_i > 0$, these two derivatives are positive when $b = 0$ and negative when $b = 1$. Moreover, $\partial\pi_j^d(c_i)/\partial c_i < \partial\pi_j^w(c_i)/\partial c_i < 0$ for $b = 0$ and $\partial\pi_j(c_i)/\partial c_i > \partial\pi_j^w(c_i)/\partial c_i > 0$ for $b = 1$.

Figure 1 – Profits of direct and indirect exporters



salers on each market. However, since firm efficiency is reflected in their prices, we can resort to export prices to test this conjecture. In the productivity-sorting case, the best-performing firms are those with the lowest marginal cost and the lowest FOB price. The average price of wholesalers' exports on a foreign market should then be higher than the average price of direct exporters on the same market. Conversely, under quality sorting, the average price of wholesalers' exports will be lower than that of direct exporters on a given market. This is our second proposition, which will be tested in the empirical section.

Proposition 2 *On each foreign market, the varieties handled by wholesalers are produced by firms which are less efficient than direct exporters. Denoting by* $\tilde{p_j^w}$ *the average wholesalers' export price in country* j *and by* $\tilde{p_j^d}$ *that of direct exporters, we have:*

$\tilde{p_j^w} > \tilde{p_j^d}$ *if* $b = 0$ *and* $\tilde{p_j^w} < \tilde{p_j^d}$ *if* $b = 1$.

3. DATA AND STYLIZED FACTS

We use firm-level export declarations (value and quantity) submitted to French Customs for the year 2007. Customs data is an almost complete record of annual shipments by destination at the 8-digit product level for each French exporting firm. We merge this customs dataset with BRN (Bénéfices Réels Normaux) data. The latter provide us with balance sheet data for almost all French firms, and also records the firm's main activity. Wholesalers are identified as firms whose main activity is 'Wholesale trade and commission trade, except of motor vehicles and motorcycles'. As it is difficult to distinguish wholesalers from direct exporters of 'motor vehicles, motorcycles and related parts', we drop all firms from our sample whose main activity is the 'Sale of motor vehicles' or 'Sale, maintenance and repair of motorcycles and related parts and accessories'. To be consistent, we also exclude the export flows concerning products related to these activities. Our final sample consists of 2,047,087 observations on 95,108 firms accounting for 349 billion Euros of exports in 2007.

Table 1 – Export Values and Firms

	Value	Value Homogenous goods	Quantity	Number of firms	Number of country-product
Total	349.2	23	193.1	95,108	338,706
Wholesalers	68.2	10.8	60.2	30,237	188,641
Direct exporters	281	12.2	133	64,871	284,196
Share of wholesalers	0.20	0.47	0.31	0.32	-

Values are in Billions of Euros, quantities are in Billions of tonnes. See the text for the definition of intermediary firms. Source: Authors' calculations from the French customs data.

Table 1 shows some of the stylized facts in our dataset. We find that 32 percent of exporters are wholesalers in 2007. These firms seem to export less on average than do direct exporters; Wholesalers account for only 20 percent of French exports in value terms and 31 percent in volume terms. Their share in export value rises to 47 percent for homogeneous goods, which are

defined as goods traded on an organized exchange according to Rauch (1999).[10] Wholesalers participate in a far lower share of product-country markets than do direct exporters. The final column of Table 1 shows that wholesalers are active in 56 percent (188,641/336,706) of the active country-product trade pairs (i.e. in which we observe strictly positive French exports), compared to a figure of 84 percent for direct exporters.

Following Bernard, Jensen, Redding and Schott (2010), we investigate wholesalers' "premia" relative to direct exporters. Table 2 presents the results from OLS regressions of different variables on a dummy variable for wholesalers. The left panel of the table investigates three firm-specific attributes. These regressions include firm major product (nc8) fixed effects and use export-value decile dummies to control for firm size. We look in turn at the number of countries, the number of products and the mean GDP per capita of the destination countries. The right panel compares direct and wholesaler exporters with respect to three characteristics of export flows. Within product-country cells and firm size deciles, we compare export value, export quantity and the unit price.

Table 2 – Wholesalers' premia relative to direct exporters

	Firm level			Firm-Product-Country level		
	Number of countries	Number of products	GDP per capita	Value	Quantity	Unit value
Wholesalers	0.027***	0.187***	-0.222***	-0.42***	-0.31***	-0.10***
	(0.007)	(0.009)	(0.013)	(0.005)	(0.005)	(0.002)
Fixed effects	Firm major product			Product-Country		
Number of observations	95,108		91,015	2,047,087		

All dependent variables are in logs. All regressions include export value-decile dummies to control for firm size. Values are in Billions of Euros and quantities are in Billions of tonnes. Unit values are in Euros. Heteroskedasticity-robust standard errors clustered according to the fixed effects are shown in parentheses. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence level respectively. See the text for definition of intermediary firms. Source: Authors' calculations from French Customs data.

In the left-hand panel, we can see that, relative to direct exporters, wholesalers export more products to more countries. Wholesalers also export to poorer countries. In the right-hand panel, wholesalers export significantly lower values and volumes of a given good to a given destination country; they also charge relatively low unit values. On average, the unit value for a given product-country in 2007 is 10 percent lower for wholesalers. This figure is in line with the 14 percent figure found by Bernard, Jensen, Redding and Schott (2010) in the US; it however contrasts with Ahn et al.'s (2010) finding that in China, export prices of intermediaries are about 5 percent higher than those of direct exporters.

[10]Rauch (1999) categorizes SITC Rev. 2 industries into three types: differentiated products, reference priced, or homogeneous goods. We convert SITC to hs6 customs nomenclature following Lall (2000).

4. EMPIRICAL RESULTS

4.1. Prediction 1: The share of wholesalers in exports

This section investigates the determinants of the share of wholesalers in export value. Proposition 1 of our model suggests that resorting to wholesalers rather than direct exporting is more likely when markets are more difficult to reach.

Figures 2 and 3 plot the average share of wholesalers in export value in 2007 by destination country against two proxy measures of market accessibility: market size and import costs. In Figure 2 we find the expected negative relationship between the share of wholesaler exporters and GDP in the destination market. Exports to smaller markets are thus more likely to be handled by wholesalers. Figure 3 looks at the relationship between wholesaler presence and the number of procedures required to import in the destination market (from the World Bank's Doing Business Report, Djankov et al., 2006). Following Helpman, Melitz and Rubinstein (2008), Bernard, Grazzi and Tomasi (2010), and Ahn et al. (2010), this figure takes this measure to be a proxy of the fixed costs of exporting to a market. In Figure 3 this is positively associated with wholesaler export share. The relationships in both Figures are consistent with proposition 1 of our model.

Figure 2 – Wholesaler export share and market size

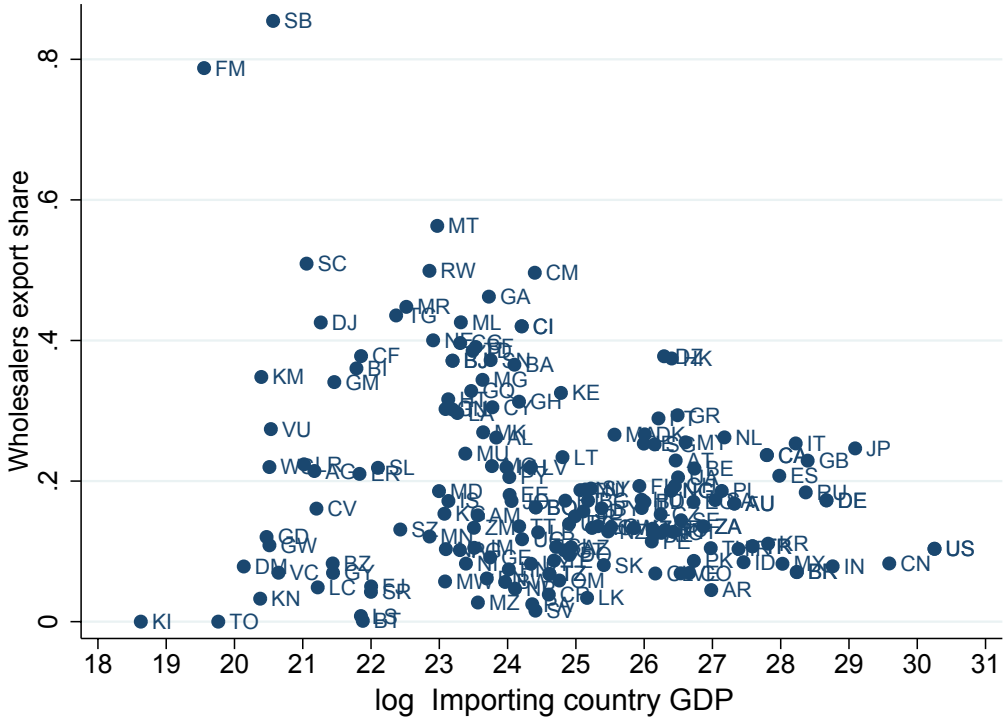
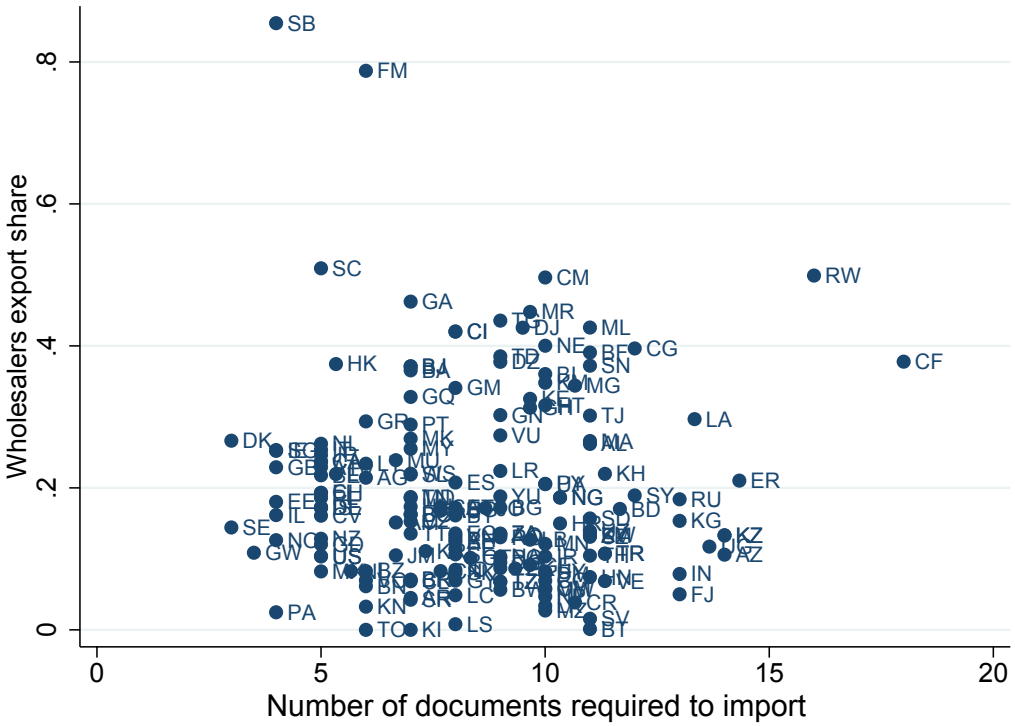


Table 3 shows the econometric results using product-level fixed-effects regressions. The share of wholesalers in exports for each product (nc8)-country pair is regressed on four traditional

Figure 3 – Wholesaler share and market import impediments



indicators of market accessibility: distance,[11], GDP,[12] the number of documents required by the country's customs authorities and trade protection. While the first three indicators have no product dimension, trade protection is measured at the product and country level and combines tariff and non-tariff protection from Macmap 2007 (Boumellassa et al., 2009).[13] From column 4 onwards, the regressions also include the proxy for fixed costs of entry that is product and country specific, as defined in Section 3. We run the regressions restricting our sample of product-country pairs to wholesaler shares strictly above 0% and below 100% (columns 1 to 4).

Column 1 includes the log of distance and the log of GDP, column 2 then introduces the number of importing procedures as computed by the World Bank, column 3 adds a measure of bilateral trade protection while column 4 includes the proxy for fixed costs. Our results across all specifications are very consistent and attest to the prevalence of sales via trade intermediaries (relative to direct sales) in less accessible markets. The two gravity variables (distance and GDP) enter significantly with the expected, respectively positive and negative, signs. Tariffs attract the expected positive sign. In columns (5)-(8) we check that our results hold in a more

[11] We use CEPII geographic data to obtain the distance between France and each destination country. The dataset "geo cepii" is available at http://www.cepii.fr/francgraph/bdd/distances.htm.

[12] GDP data come from the World Development Indicators (World Bank).

[13] This dataset comes from the International Trade Center (ITC) and CEPII. It provides a consistent, ad valorem equivalent measure of tariff duties and tariff rate quotas (TRQs) for 163 countries and 208 partners, at the six-digit level of the Harmonized System (HS), accounting for 5,113 products in 2004. We use the bilateral protection between international countries and the EU as a proxy for the border tariff and non-tariff protection faced by French exporters at the product level.

Table 3 – Determinants of the share of wholesalers

	Dependent variable: Share of wholesalers in export (by product and country)							
	Benchmark				Restriction		No	No
					1%	5%	EU 27	homog.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln distance	0.021^a	0.016^a	0.017^a	0.011^a	0.013^a	0.013^a	0.020^a	0.012^a
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Ln GDP	-0.033^a	-0.033^a	-0.032^a	-0.032^a	-0.030^a	-0.024^a	-0.034^a	-0.030^a
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
No. of importing		0.007^a	0.007^a	0.006^a	0.005^a	0.004^a	0.007^a	0.005^a
procedures		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Trade Protection			0.023^a	0.020^a	0.019^a	0.013^a	0.017^a	0.019^a
			(0.004)	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
Fixed cost				0.005^a	0.002^a	0.001^b	0.010^a	0.002^a
				(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Fixed effects	Fixed effects by product (nc8)							
Observations	126873	124832	121088	121088	104351	82186	47630	101756
R^2	0.045	0.050	0.050	0.051	0.045	0.034	0.066	0.046

Heteroskedasticity-robust standard errors are in parentheses. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence levels respectively. Columns (1)-(4) and (7)-(8) retain all product-country pairs where the share of wholesalers in total exports is strictly positive and less than 100%. Column (5) retains product-country pairs with a share of wholesalers between 1% and 99%; column (6) retains product-country pairs with a share of wholesalers between 5% and 95%. Column (7) considers non-EU countries only, and column (8) considers non-homogeneous products only.

restrictive sample. Column (5) and (6) retain successively product-country pairs with wholesaler shares strictly above 1% and below 99% (column 5) and strictly above 5% and below 95% (column 6). This procedure ensures that our results are not driven by observations for which exports of either wholesalers or direct exporters are zero or marginal. In columns 7 and 8 we check that our results are not driven by a selection bias in terms of product or partner characteristics. Since reporting of trade flows in not mandatory for firms with trade values below 250,000 Euros within the EU, we might worry that this selection effect may bias our estimates. In column 7 of Table 3 we check that our results hold when we exclude EU27 countries from the sample. Despite the sharp reduction in the number of observations, the results continue to hold, showing that the optimal organizational mode for exports is not only driven by France's unique integration with neighboring EU partners. In column 8, we exclude homogeneous products (defined using Rauch (1999)'s classification), for which producers are more likely to resort to wholesalers. Here again, the results are in line with the theoretical predictions.

Table 4 presents the results replacing the various gravity variables by our comprehensive accessibility indicator. In the top panel (A), the regressions include product (nc8) fixed effects, and in the bottom panel (B) we further control for country-level fixed effects. As a robustness check, we replace our various proxies of market accessibility by a comprehensive indicator, which is specific to country-product pairs. We follow Crozet, Head and Mayer (2009) and estimate an attractiveness indicator, A_{jk}, for a particular product, k, in a given market, j, using

Table 4 – Determinants of the share of wholesalers

Panel A - Fixed effects by product						
Dependent variable:	Share of wholesalers in export (by product and country)					
	(1)	(2)	(3)	(4)	(5)	(6)
			Restriction		No	No
			1%	5%	EU 27	homog.
Accessibility	-0.002^a	-0.001^a	-0.001^a	-0.001^a	-0.002^a	-0.001^a
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Fixed cost		0.012^a	0.010^a	0.008^a	0.009 ^{a}	0.010^a
		(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Fixed effects	Fixed effects by product (nc8)					
Observations	126873	126873	109605	86439	51087	106978
R^2	0.008	0.016	0.013	0.011	0.012	0.013
Panel B - Fixed effects by product (nc 8) and by country						
Dependent variable:	Share of wholesalers in export (by product and country)					
	(1)	(2)	(3)	(4)	(5)	(6)
			Restriction		No	No
			1%	5%	EU 27	homog.
Accessibility	-0.001^a	-0.001^a	-0.001^a	-0.001^a	-0.001^a	-0.001^a
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Fixed cost		0.005^a	0.003^a	0.002^b	0.008^a	0.003^a
		(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Fixed effects	Fixed effects by product (nc8) and by country					
Observations	126873	126873	109605	86439	51087	106978
R^2	0.066	0.066	0.060	0.047	0.092	0.061

Heteroskedasticity-robust standard errors are in parentheses. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence levels respectively. Columns (1)-(2) retain all product-country pairs where the share of wholesalers in total exports is strictly positive and less than 100%. Column (3) retains product-country pairs with a share of wholesalers between 1% and 99%; column (4) retains product-country pairs with a share of wholesalers between 5% and 95%. Column (5) considers non-EU countries only, and column (6) considers non-homogeneous products only.

our firm-level export data. The procedure consists in estimating a Tobit model for each product relating the value of exports to firm total factor productivity[14] and country fixed effects. These fixed effect are our measure of the attractiveness index A_{js}. These capture, in an inclusive manner, all country-specific characteristics which affect trade flows to each specific market (such as demand, prices, transport costs, and Customs-related impediments). We also use the firm-level data to construct a variable measuring the fixed cost of exporting at the product-country level. Following Eaton and Kortum (2001) and Crozet, Head and Mayer (2009), we consider the lowest value of exports per product-country pair as a reasonable proxy of this fixed cost of exporting.[15]

[14]For each industry, we regress value added on capital stock and employment at the firm level. Total Factor Productivity is computed as the residual from this regression. Value added, capital and employment come from the BRN dataset.

[15]Export profits are the export value minus $\frac{F_j}{\sigma}$. Hence, the minimum observed export value can be considered as a proxy for $\frac{F_j}{\sigma}$.

Results using our comprehensive accessibility indicator are presented in Table 4. In the top panel (A), the regressions include product (nc8) fixed effects, and in the bottom panel (B) we further control for country-level fixed effects. The results in both panels seem to be very consistent. As expected, the accessibility indicator enters with a negative and significant sign, confirming that intermediary use is a preferred way of exporting in more difficult markets. Column 2 shows that the coefficient on the fixed cost of entry has, again, a significantly positive expected sign. The presence of fixed effects in the two dimensions of the data ensures that these results are not driven by any systematic bias at the country or product level that might affect the presence of wholesalers.

These results continue to hold when the sample of product-country pairs is successively restricted to wholesaler shares strictly above 1% and below 99% (column 3) and strictly above 5% and below 95% (column 4). Findings that the share of exports channeled by wholesalers rises with our measure of market accessibility and declines with that of fixed cost are robust to excluding EU27 countries in column 5 and excluding homogeneous goods in column 6. These results then confirm that product-country pairs with low accessibility and high fixed cost of entry are more likely to be channeled via intermediaries than directly. We can calculate the extent to which the share of wholesalers in exports depends on these two variables. From the estimated coefficients in column 2 of panel B, a ten percent increase in market accessibility yields a one percent fall in the share of wholesalers. The marginal effect of fixed cost is larger: a ten percent increase in fixed cost produces a five percent rise in the share of wholesalers in exports.

4.2. Prediction 2: The sorting process of firms

We now turn to proposition 2 of our model and ask whether wholesalers systematically channel the exports of the least efficient firms. As noted above, our data does not provide information on producers who export indirectly. But, following our model, we compare the average prices charged by wholesalers and direct exporters on each market to identify the firm sorting process. If wholesalers export the goods of the least efficient firms, we expect their prices to be lower than those of direct exporters for quality-sorting products, and higher for productivity-sorting goods.

Our empirical approach is to regress the log of unit value[16] charged by firms at the product and country level on a wholesaler dummy. We then allow the coefficient on the latter to depend on whether the product is identified as being of the productivity- or quality-sorting type. We use firm-level export data to distinguish quality- from productivity-sorting products, following a procedure suggested by Baldwin and Harrigan (2010). Under quality sorting, only high-quality varieties are exported to difficult markets, and these are sold at a high price. Under quality sorting, there is thus a positive correlation between export unit values and destination-market attractiveness. Under productivity sorting, however, only the most productive firms

[16]We carry out some basic cleaning of the price data. We exclude observations for which unit price is less than $1/10^{th}$ or greater than 10 times the average unit value for the product/country pair. Our benchmark regressions further exclude product/country pairs for which wholesalers represent less than 1% or more than 99% of exports.

with the lowest marginal costs manage to export to difficult markets. Since these firms charge lower prices, there will be a negative correlation between export prices and destination-market attractiveness. We appeal to these contrasting predictions to classify all of the 8-digit products in our sample into those for which firm selection into export markets is driven by productivity and quality sorting. For each product separately, we thus regress the average unit value at the country level on the country's attractiveness A_{jk}. If the resulting estimated coefficient is positive and significant at the 10% level, we classify the product as of the productivity-sorting type; if the estimated coefficient is negative and significant at the 10% level, the product is rather considered to be of the quality-sorting type.

Table 5 shows that out of the 8986 8-digit products present in our sample, a majority (65.5 percent) are associated with a negative (although not always significant) association between price and market accessibility. Focusing only on the significant results (at the 10% level), we identify 1,878 products for which firms are selected based on quality and 480 for which firm selection is based on their productivity.

Table 5 – Discriminating between quality and productivity sorting

Products with	<0 coefficient on A_j (quality sorting)		>0 coefficient on A_j (productivity sorting)	
	Number	of which signif. at 10%	Number	of which signif. at 10%
Number	5,878	1,878	3,100	480
Share	65.5%	20.9%	34.5%	5.3%

The test of proposition 2 is conducted on this restricted sample of 2458 (i.e. 1,878+480) products for which firm selection was explicitly identified as being of either the productivity or quality type. Our regressions include product-country fixed effects to account for unobserved factors, including any systematic difference between quality-sorting and productivity-sorting products. The estimations also control for firm size as proxied by the firm's total export value. Moulton (1990) has shown that regressing individual variables on aggregate variables can lead to downward-biased standard errors. All of our regressions are thus clustered at the firm level. Two alternative strategies are used to test our prediction that wholesalers charge lower prices than do direct exporters for quality-sorting products, but not for productivity-sorting products. We first introduce a wholesaler dummy separately for quality-sorting and productivity-sorting products. Second, we split our sample between these two types of goods, and expect the coefficient on wholesaler to be negative and significant only for quality-sorting goods.

The results presented in Table 6 are in line with proposition 2. Column 1 regresses firm-level unit value on a wholesaler dummy separately for the two types of goods. The negative effect of wholesalers on prices is significant for quality-sorting products, as predicted by the model. But we do not find the expected positive coefficient for productivity-sorting products. For these goods, however the coefficient is smaller in size than that for quality-sorting products and, more importantly, clearly insignificant. The test at the foot of the column rejects (at the 5% confidence level) the null hypothesis that the coefficients on wholesaler for the two goods categories are equal. The next two columns (Columns 2 and 3) show the regression of firm-

Table 6 – How do wholesalers compare in terms of pricing?

	Dependent variable: Ln firm-level unit value by product and country					
	(1)	(2)	(3)	(4)	(5)	(6)
	Benchmark			Restriction Wholesaler share>5% &<95%		
Product-sorting type	All	Quality	Productivity	All	Quality	Productivity
Wholesaler in quality-sorting goods	-0.095^a			-0.101^a		
	(0.014)			(0.014)		
Wholesaler in productivity-sorting goods	-0.011			-0.013		
	(0.024)			(0.025)		
Wholesaler		-0.095^a	-0.011		-0.102^a	-0.014
		(0.014)	(0.025)		(0.014)	(0.025)
F-Test β_Q=β_P	12.80^a			13.79^a		
Proba>F	0.001			0.001		
Observations	676767	601306	75461	540298	479133	61165
R^2	0.012	0.008	0.010	0.011	0.008	0.012
Fixed effects	Fixed effects by product-country pair					

Heteroskedasticity-robust standard errors in parentheses. Regressions are corrected for clustering at the firm level. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% levels respectively. All columns include dummies for firm employment deciles. Regressions exclude observations for which the unit price is less than 1/10th or greater than 10 times the average unit value for the product/country pair. Columns 1 to 3 exclude product/country pairs for which wholesalers make up less than 1% or more than 99% of exports, while columns 4 to 6 exclude product/country pairs for which wholesalers make up less than 5% or more than 95% of exports. The F-test shown at the foot of columns 1 and 4 tests the equality of the estimated coefficients on the wholesaler dummy for both types of products. The probabilities (below 0.01) indicate that this equality is rejected at the 1% confidence level.

level unit value on a wholesaler dummy on the sample restricted to quality-sorting products and productivity-sorting products respectively. Our results confirm that wholesaler prices are lower than those of direct exporters only for products for which quality sorting drives firm selection into export markets. The results in columns 4 to 6 show that this finding continues to hold when the sample is restricted to product-country pairs for which the wholesaler share is strictly above 5% and below 95%. Table 7 checks that these results are robust to the exclusion of the EU27 countries (Columns 1 to 3) and to the exclusion of homogeneous goods (Columns 4 to 6).

Tables 8 and 9 in the Appendix reproduce Tables 6 and 7 but excluding product-country pairs with less than 10 active exporting firms (whether wholesaler or not). Despite the sharp decline in the number of observations, the main results are unchanged.

Table 7 – How do wholesalers compare in terms of pricing?

	Dependent variable: Ln firm-level unit value by product and country					
	(1)	(2)	(3)	(4)	(5)	(6)
	No EU 27			No homogeneous products		
Product sorting type	All	Quality	Productivity	All	Quality	Productivity
Wholesaler in quality-sorting goods	-0.101^a			-0.096^a		
	(0.020)			(0.014)		
Wholesaler in productivity-sorting goods	-0.007			-0.011		
	(0.027)			(0.025)		
Wholesaler		-0.105^a	0.001		-0.097^a	-0.010
		(0.020)	(0.027)		(0.014)	(0.025)
F-Test β_Q=β_P	9.57^a			13.12^a		
Proba>F	0.002			0.001		
Observations	256018	216920	39098	666975	592133	71271
R^2	0.003	0.002	0.021	0.011	0.007	0.010
Fixed effects	Fixed effects by product-country pair					

Heteroskedasticity-robust standard errors shown in parentheses. Regressions are corrected for clustering at the firm level. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% levels respectively. All columns include dummies for firm employment deciles. Regressions exclude observations for which the unit price is less than 1/10th or greater than 10 times the average unit value for the product/country pair as well as product/country pairs for which wholesalers make up less than 1% or more than 99% of exports. Columns 1 to 3 exclude EU27 countries while columns 4 to 6 exclude homogeneous goods traded on an organized exchange as defined by Rauch (1999). The F-test shown at the foot of columns 1 and 4 tests the equality of the estimated coefficients on the wholesaler dummy for both types of products. The probabilities (below 0.01) indicate that this equality is rejected at the 1% confidence level.

5. CONCLUSION

In this article, we contribute to the analysis of the role of intermediary exporting firms. We propose a simple model allowing for quality differentiation, and show that intermediate exporters may help to extend export opportunities. The model predicts a twofold role in international trade. First, wholesalers help the least efficient firms to supply the foreign markets, thus increasing the number of exported varieties at the aggregate level. Second, they also reduce the difficulty of reaching less accessible markets. We use French firm-level customs data to provide empirical support for these two predictions. We confirm that the share of exports channeled by wholesalers is larger in less accessible markets, i.e. in countries with smaller market size and higher trade costs. As far as prices are concerned, our model reconciles previous contradictory results by discriminating between productivity- and quality-sorting versions of the Melitz model. We find that wholesalers' prices are lower than those of direct exporters in quality-sorting sectors, but not in productivity-sorting sectors.

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APPENDIX

Profit sharing between the producer and the wholesaler

We assume that the wholesaler captures a share $1-\delta$ of export profits. The easiest way of justifying this assumption is to suppose that Nash bargaining takes place between the wholesaler and the producer.

First, if the wholesaler is a monopolist (for a given destination and product), the surplus of any agreement between bargainers equals the profit, since there is no alternative for the producer from exporting its products. If the bargaining power of the producer is δ, then the previous division of profits prevails.

The data obviously reveal that wholesalers are not monopolists. For a given destination and product, there are many cases where a number of wholesalers are present. However, the previous result can be further extended to the case of competition between wholesalers in a market with search frictions. Assume that the producer can meet only one wholesaler per period and engages in Nash bargaining over profits with this wholesaler. Assume further that the bargaining power of the producer falls over time, reflecting the costs associated with stocking the goods and their depreciation. Let η be the bargaining power of the producer and $\alpha > 0$ the rate at which this bargaining power falls. We denote by Π_j the profit from selling the goods abroad, S_j^t the profit accruing to the producer at the t^{th} period, and W_j^t the profit accruing to the producer in the t^{th} period. Profit-sharing implies

$$S_j^t + W_j^t = \Pi_j \Rightarrow S_j^t - S_j^{t+1} = \eta(1-\alpha)^t(S_j^t - S_j^{n+1} + W_j^t)$$

We can then recursively recover the revenue of the producer who reaches an agreement with a wholesaler at period t:

$$S_j^t = \eta(1-\alpha)^t\Pi_j + (1-\eta(1-\alpha)^t)S_j^{t+1}$$

Iterating this equation forward :

$$S_j^0 = \Pi_j \underbrace{\sum_{t=0}^{\infty} \eta \left(\prod_{i=0}^{t} (1-(1-\alpha)^i\eta) \right) (1-\alpha)^t}_{\delta}$$

The general term of the sum, δ, is bounded above by $\eta(1-\alpha)^t$. The revenue accruing to the producer when meeting a wholesaler is thus a constant share of the profits gross of fixed costs.

Proof of proposition 1

We assume that the marginal-cost distribution function, F, is such that $\frac{xf(x)}{F(x)}$ is decreasing in productivity-sorting industries and $\frac{xf(x)}{1-F(x)}$ is increasing in quality-sorting industries. This

assumption guarantees that the ratio of the number of direct exporters to the total number of exporters is monotonically increasing in c_j^d/c_j^w.

The profit functions (4) yield two cutoff values, c_j^w and c_j^d, defined respectively by $\pi_j^w(c_j^w) = 0$ and $\pi_j^d(c_j^d) = \pi_j^w(c_j^d)$.

The explicit expressions for c_j^w and c_j^w are:

$$\left.\begin{array}{ll} c_j^w & = (A_j\delta/F_j^w)^{1/(\sigma-1)} - t_j \\ c_j^d & = \left[A_j(1-\delta)/(F_j - F_j^w)\right]^{1/(\sigma-1)} - t_j \end{array}\right\} \text{ if } b = 0. \tag{5}$$

Firms with a marginal cost of $c_i < c_j^w$ can make positive profits on market j exporting via a wholesaler; those with $c_i < c_j^d$ decide to export directly. Both cutoffs increase with A_j; on easier markets, more varieties are exported and more firms decide to export directly.

$$\left.\begin{array}{ll} c_j^w & = t_j/\left[(A_j\delta/F_j^w)^{1/(\sigma-1)} - 1\right] \\ c_j^d & = t_j/\left[\left[A_j(1-\delta)/(F_j - F_j^w)\right]^{1/(\sigma-1)} - 1\right] \end{array}\right\} \text{ if } b = 1. \tag{6}$$

Under quality sorting, firms with $c_i > c_j^w$ earn positive profits when exporting via a wholesaler; those with $c_i > c_j^d$ will prefer to export directly. These cutoffs fall with A_j; here again, both the total number of exported varieties and the number of direct exporters increase with the destination country's attractiveness.

Productivity sorting, $b = 0$

A necessary condition for observing indirect exporters is $c_j^d < c_j^w \Leftrightarrow F_j > F_j^w/\delta$. In other words, the cost of intermediation $(1/\delta)$ must be relatively small compared to the advantage provided by wholesalers (F_j/F_j^w). We assume that this condition is satisfied.

We will then observe some direct exporters if $c_j^d > 0 \Rightarrow A_j > t_j^{\sigma-1}(F_j - F_j^w)/(1-\delta)$, i.e. market attractiveness is large enough to ensure that some exporters can overcome trade costs without resorting to intermediaries. Similarly, some firms will export indirectly if $A_j > t_j^{\sigma-1}F_j^w/\delta$. With $F_j > F_j^w/\delta$, $t_j^{\sigma-1}F_j^w/\delta < t_j^{\sigma-1}(F_j - F_j^w)/(1-\delta)$. Then, if $A_j \in [t_j^{\sigma-1}F_j^w/\delta, t_j^{\sigma-1}F_j]$, we will only have indirect exporters and the share of direct exports in total exports, v_j, will be zero. The probability of there being a strictly positive value of v_j increases with market attractiveness.

We now consider the case where both direct and indirect exporters are active in market j, i.e. $0 < c_j^d < c_j^w$. Firms' export values fall monotonically with firm marginal cost. Since direct exporters have strictly lower marginal costs than do indirect exporters, it is sufficient to show that c_j^d/c_j^w increases with A_j to prove proposition 1.

$$\frac{\partial c_j^d/c_j^w}{\partial A_j} = \frac{1}{(\sigma-1)A_j}\left[\frac{\Delta_j^P}{\left[\Lambda_j^P - t_j\right]} - \frac{(\Delta_j^P - t_j)\Lambda_j^P}{\left[\Lambda_j^P - t_j\right]^2}\right],$$

where $\Delta_j^P = \left[A_j(1-\delta)/(F_j - F_j^w)\right]^{1/(\sigma-1)}$ and $\Lambda_j^P = \left[A_j\delta/F_j^w\right]^{1/(\sigma-1)}$.

A sufficient condition for having $\partial(c_j^d/c_j^w)/\partial A_j > 0$ is $\Delta_j^p > \Lambda_j^p$, which is always satisfied since $0 < c_j^d < c_j^w$.

Quality sorting, $b = 1$

Here, as in the productivity-sorting case, a necessary condition to observe indirect exporters in market j is $F_j > F_j^w/\delta$, which involves $c_j^w < c_j^d$. If this condition is satisfied, there will be some direct exporters if $c_j^d > 0 \Rightarrow A_j(F_j - F_j^w)/(1-\delta)$, and indirect exporters if $A_j F_j^w/\delta$. If $A_j \in [t_j^{\sigma-1}F_j^w/\delta, t_j^{\sigma-1}F_j]$, $v_j = 0$ and the probability of having a strictly positive value of v_j increases with A_j.

We now assume that $F_j > F_j^w/\delta$ and consider the case where both direct and indirect exporters are active in market j, i.e. $A_j(F_j - F_j^w)/(1-\delta)$. As in the productivity-sorting case, showing that the share of direct exporters in the total number of exported varieties increases with A_j is sufficient to prove that $\partial v_j/\partial A_j > 0$. Under Assumption 1, the share of direct exporters is a monotonic positive function of $(\bar{c} - c_j^d)/(\bar{c} - c_j^w)$, where $\bar{c}$ is the upper bound of the distribution of marginal costs.

$$\frac{\partial(\bar{c} - c_j^d)/(\bar{c} - c_j^w)}{\partial A_j} = \frac{t_j}{(\sigma-1)A_j}\left[\frac{\Delta_j^Q}{(\Delta_j^Q - 1)^2\left(\bar{c} - t_j/(\Lambda_j^Q - 1)\right)} - \frac{\left(\bar{c} - t_j/(\Delta_j^Q - 1)\right)\Lambda_j^Q}{\left(\bar{c} - t_j/(\Lambda_j^Q - 1)\right)^2(\Lambda_j^Q - 1)^2}\right],$$

where $\Delta_j^Q = \left[A_j(1-\delta)/(F_j - F_j^w)\right]^{1/(\sigma-1)}$ and $\Lambda_j^Q = \left[A_j\delta)/F_j^w)\right]^{1/(\sigma-1)}$. Simple algebra shows that $\frac{\partial(\bar{c}-c_j^d)/(\bar{c}-c_j^w)}{\partial A_j} > 0$ if $\Delta_j^Q > 1 \Rightarrow A_j > (F_j - F_j^w)/(1-\delta)$, i.e. if $v_j > 0$.

Table 8 – How do wholesalers compare in terms of pricing? (No. of firms $>$ 10)

	Dependent variable: Ln firm-level unit value by product and country					
	(1)	(2)	(3)	(4)	(5)	(6)
	Wholesaler share$>1\%$ &$<99\%$			Wholesaler share$>5\%$ &$<95\%$		
Product sorting type	All	Quality	Productivity	All	Quality	Productivity
Wholesaler in quality-sorting goods	-0.100^a			-0.106^a		
	(0.014)			(0.014)		
Wholesaler in productivity-sorting goods	-0.008			-0.010		
	(0.027)			(0.028)		
Wholesaler		-0.101^a	-0.009		-0.106^a	-0.013
		(0.014)	(0.027)		(0.014)	(0.028)
F-Test β_Q=β_P	12.47^a			12.89^a		
Proba$>$F	0.001			0.003		
Observations	553626	495051	58575	443120	395070	48050
R^2	0.015	0.011	0.015	0.015	0.010	0.019
Fixed effects	Fixed effects by product-country pair					

Heteroskedasticity-robust standard errors are shown in parentheses. Regressions are corrected for clustering at the firm level. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence levels respectively. All columns include dummies for firm employment deciles. Regressions exclude observations for which the unit price is less than $1/10^{th}$ or greater than 10 times the average unit value for the product/country pair. Columns 1 to 3 exclude product/country pairs for which wholesalers make up less than 1% or more than 99% of exports, while columns 4 to 6 exclude product/country pairs for which wholesalers make up less than 5% or more than 95% of exports. The F-test reported at the foot of columns 1 and 4 tests the equality of the estimated coefficients on the wholesaler dummy for both types of products. The probabilities (below 0.01) indicate that this equality is rejected at the 1% confidence level.

Table 9 – How do wholesalers compare in terms of pricing? (No. of firms $>$ 10)

	Dependent variable: Ln firm-level unit value by product and country					
	(1)	(2)	(3)	(4)	(5)	(6)
	No EU 27			No homogeneous products		
Product sorting type	All	Quality	Productivity	All	Quality	Productivity
Wholesaler in quality-sorting goods	-0.107^a			-0.102^a		
	(0.020)			(0.014)		
Wholesaler in productivity-sorting sorting goods	-0.006			-0.008		
	(0.030)			(0.027)		
Wholesaler		-0.111^a	-0.003		-0.102^a	-0.008
		(0.020)	(0.029)		(0.014)	(0.028)
F-Test β_Q=β_P	9.17^a			12.92^a		
Proba>F	0.003			0.001		
Observations	184081	154435	29646	546414	488128	58286
R^2	0.001	0.001	0.035	0.014	0.010	0.016
Fixed effects	Fixed effects by product-country pair					

Heteroskedasticity-robust standard errors are shown in parentheses. Regressions are corrected for clustering at the firm level. ^{a}, ^{b} and ^{c} indicate significance at the 1%, 5% and 10% confidence levels respectively. All columns include dummies for firm employment deciles. Regressions exclude observations for which the unit price is less than 1/10th or greater than 10 times the average unit value for the product/country pair as well as product/country pairs for which wholesalers make up less than 1% or more than 99% of exports. Columns 1 to 3 exclude EU27 countries while columns 4 to 6 exclude homogeneous goods traded on an organized exchange as defined by Rauch (1999). The F-test reported at the foot of columns 1 and 4 tests the equality of the estimated coefficients on the wholesaler dummy for both types of products. The probabilities (below 0.01) indicate that this equality is rejected at the 1% confidence level.

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