On the Role of Import-Intermediaries in Canada*

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Abstract

The paper investigates empirically the role of import intermediaries in Canada and discusses how public policies can affect them. Among the main results, intermediaries are shown to play a very different role with respect to manufacturers and to retailers regarding differentiated and complex products, but their role is qualitatively the same across NAFTA and non-NAFTA countries, and the share of intermediary's imports is always boosted by a greater mass of small domestic manufacturers and retailers. These results suggest that import-wholesalers play an important role in the Canadian economy, especially with respect to domestic manufacturers, and that policy makers should be mindful of policy impacts on this sector.

1 Introduction

In this paper, we investigate the role of import intermediaries (or wholesalers) in Canada and discuss the public policies affecting this sector.

Import intermediaries have two main domestic customers, manufacturers and retailers, who often also import directly themselves. To investigate the role of intermediaries, we first establish three hypotheses about their share of imports (indirect imports) at the product-country level. Some aspects of these hypotheses are standard (such as whether trade barriers and distance boost their imports) but others are less so. In particular, we want to know the role of intermediaries with respect to product differentiation and service-related activities, and whether indirect imports are sensitive to aspects of market structure both among their domestic customers and within the wholesale sector itself.

Using a Canadian data set matching firms and annual country-specific imports at the (HS-6) product level over the 2002-12 period, we show that the share of indirect imports is higher for more distant countries for the imports of intermediate/capital goods and for countries that do not share a common language with Canada. Importantly, we show that the role of import-intermediaries with respect to manufacturers is significantly different from the role of import-intermediaries with respect to retailers. Specifically, whereas import-intermediaries tend to deal with *more* differentiated and complex intermediate/capital products than manufacturers, import-intermediaries tend to deal with *less* differentiated and complex consumption products than retailers. We attribute this result to service-related activities associated with product differentiation and to who is best able to provide such services between direct and indirect importers. In particular, we argue that there is a more natural division of roles between wholesalers and manufacturers than between retailers and wholesalers contributing to explain this difference.

But import-intermediaries are also sensitive to market structure. In particular, a bigger mass of small retailers and manufacturers increases the share of indirect imports and so are lower concentration levels at the wholesaler's level. This result is particularly important for Canada, an economy often characterized by its large mass of small firms (Baldwin et al. (2013, 2014), Leung et al. (2008), Ranasinghe (2017)) and with some entry restrictions in wholesaling.

The paper differs in two ways from the literature on intermediation in international trade. First, unlike most of the existing literature, it concentrates its attention on imports, not on exports. Import-intermediaries are at least as interesting as export-intermediaries for the roles they play and for the products they sell. In particular, the range of imported products is typically wider than on the export side. This is the case because, generally, manufacturing firms need imported intermediate inputs for production and exports, and in addition, import-intermediaries help retailers who typically do not export.

Second, the analysis is about Canada.[1] It is an interesting case because it deals with sharply different groups of source-countries. One of them is NAFTA countries and especially the US, Canada's main trading partner, while the second group is composed of all its other trading partners (ROW countries). Canada's ROW countries are, on average, significantly more distant than NAFTA partners and, for all intent and purpose, imports from these countries are subject to tariff duties (MFN or other schedules).[2] We show that this sharp difference does not make the intermediaries play a different role across these two sources.

In fact the Canadian data indicate that the share of indirect imports with respect to NAFTA countries is high: Canadian import intermediaries handle 32.6% of the value of imports from the US over the 2002-12 period (33.8% of imports from Mexico). This share even rose during this period. Not surprisingly, this share is smaller than the corresponding share from non-NAFTA sources (45.8% of the value of imports from Europe and 51.5% from Asia), but these high shares confirm that import-intermediaries play an important role in Canada, one that is not waning with increased economic integration.[3]

There is no reason to think that the role of intermediaries has diminished recently. On the contrary, trade tensions, the COVID-19 pandemic, and regional conflicts disrupting global supply chains make them more attractive to domestic agents. Although the wholesale trade sector is rarely a direct target of policies, intermediaries should get more attention from policy makers especially at a time when there are growing concerns about

[1] See Hays (2005) for the only paper we are aware of about intermediation in Canada.

[2] During the 2002-12 period, in addition to the US and Mexico, Canada had bilateral free-trade agreements with Chile (1997), Columbia (2011), Costa Rica (2002), EFTA countries (2009), Israel (1997), and Peru (2009); see https://www.international.gc.ca/trade-commerce/trade-agreements-accords-commerciaux/agr-acc/index.aspx?lang=eng .

[3] These shares are also high by international comparison. Based on 2002 data and for both pure (15%) and mixed wholesalers (8%), Bernard et al. (2010) for instance reports that US wholesalers import 23% of the total value of imports. Similarly, Blum et al. (2010) report a share of 35% for imports carried by wholesalers in Chile in 2007, and Utar (2017) reports a share of 31% for Denmark.

import risks and vulnerabilities. But what could policy makers do with respect to wholesalers and indirect imports? How are current policies affecting intermediation and indirect imports? One goal of this paper is to address these points and to show that policy makers need to be mindful of the impact of a number of policies on intermediaries and indirect imports.

The paper is organized as follows: Section 2 discusses the approach and three hypotheses, Section 3 provides some data description, Section 4 develops the empirical results and discusses the results, Section 5 considers policy aspects associated with intermediaries and indirect imports, and Sections 6 concludes.

2 Approach and Hypotheses

In this paper, we include domestic manufacturers and retailers. Both are choosing either to import directly the goods they need, or to import them indirectly through domestic import-intermediaries.[4] This choice is based on three important roles played by intermediaries with respect to domestic manufacturers and retailers (Spulber, 1999): providing product immediacy, searching and matching, and being a product 'guarantor'.

Providing immediacy allows manufacturers and retailers to get products when they need them, avoiding thereby costs associated with inventory, financing, delays, or defective shipments (Ganapi, 2021). This role is especially relevant in the case of foreign products given the often long lag between order and delivery. It also has the advantage of generally not requiring long-term commitments between buyers and sellers.

Providing product guarantee is associated with the fact that import-intermediaries typically sell a subset of substitute products. When these products are not easily verifiable because of their differentiation and/or complexity, it forces intermediaries to be careful with their selection so as to avoid having 'bad' products negatively impacting their reputation and the sales of other products. This gives value to the role provided by intermediaries, especially with respect to foreign products.[5] But the difficulty to verify

[4]This contrasts with how domestic intermediaries are generally viewed in the literature. For instance, Blum et al. (2012) views them as helping foreign manufacturers, not domestic ones. See Medin (2021), and Grazzi and Tomasi (2016) for recent articles with both export and import intermediaries, Utar (2017) for a detailed analysis of Danish export and import intermediaries, and Virtanen et al. (2022) for a survey of the literature on intermediaries and their usefulness in an international environment.

[5]Feenstra and Hanson (2004), and Feenstra, Hanson and Lin (2004) show that guaranteeing product

a product also places limits to the intermediary's credibility. It is why, for such products, import intermediaries are often involved as foreign manufacturer's exclusive agents, especially when these products require services.

Unlike immediacy, the third role, searching and matching, is more likely to involve commitments between parties as the main goal is to find the appropriate foreign products on behalf of domestic manufacturers/retailers (Blum et al., 2018; Antras and Costinot, 2011). By specializing in the searching and matching process, intermediaries allow buyers, whether manufacturers or retailers, to save on costly searches.

Of course, manufacturers and retailers have also the choice to import directly the product they need. Various models applied to *exports* have been proposed where large manufacturers choose to export directly, while smaller ones rely on intermediaries (Ahn et al., 2011; Akerman, 2018; Abel-Koch, 2013; Crozet et al., 2013; Felbrmayr and Jung, 2011). In the online appendix, we present a similar model with imports where large manufacturers or retailers import directly the product they need, while smaller ones either source domestically or through import intermediaries. In all these models, the firm's sorting comes from intermediaries offering an alternative 'technology' to trade with respect to direct trading. In particular, international trade involves both fixed and variable costs that have different levels depending whether trade is direct or indirect through intermediaries.

In the case of imports, the sorting of large and small manufacturers/retailers is obtained as soon as the variable cost of direct imports is lower but the fixed cost is higher than the corresponding costs of indirect imports. The intuition is the following: the variable cost of indirect imports is the price paid by manufacturers/retailers to intermediaries which includes transport and trade cost as well as the intermediary's markup. Unless bulk imports make this variable cost very low, this unit cost is higher than with direct imports. But the fixed cost of indirect imports is lower than for direct imports. This is because, unless intermediaries charge a two-part tariff, there is no fixed cost of indirect imports, and manufacturers/retailers face all the fixed costs of trading internationally. The advantage of intermediaries is to have lower fixed costs through specialization and to be able to spread them across products and customers.

quality plays a role in the case of products imported from China and re-exported by Hong Kong intermediaries. Ahn et al. (2011) shows that it is not a role played by export-intermediaries in China. Utar (2017) finds little evidence for this role in Denmark.

This approach points to several testable hypotheses. First, the share of imports handled by intermediaries increases with higher barriers to trade whether these costs are fixed or variable. Higher trade costs boost directly (with fixed costs) or indirectly (with variable costs) the comparative advantage that intermediaries enjoy through specialization and product pooling. A challenging legal environment in source countries, for instance, is likely to favor indirect imports.[6]

Second, indirect imports depend on market structure in both the wholesale sector and in the manufacturing/retail industries. In the wholesale sector, greater competition among intermediaries lowers their markup, making indirect imports more attractive. In the manufacturing/retail industries, a larger mass of small firms boost indirect imports irrespective of the source countries. This is an important aspect for Canada, a country often characterized by a relatively high share of small retailers and manufacturers. Summarizing,

Hypothesis 1: *Everything else being equal, the share of imports by intermediaries for a product is expected to be higher:*

1. *the higher its barrier to trade;*
2. *the smaller the average size of the domestic manufacturers/retailers using/selling this product;*
3. *the greater the competition among intermediaries importing this product.*

For the three intermediary's roles mentioned at the top of this Section, the product characteristics, for instance whether they are homogeneous or differentiated matter. But it is not obvious to determine a priori whether intermediaries deal with more or less differentiated products; an ambiguity reflected by the literature (see for instance Virtanen et al (2022)). On the one hand, we expect more homogeneous products to be dealt with by intermediaries rather than directly by manufacturers/retailers because volumes matter and there is little product specificity that requires manufacturers/retailers to be involved.[7] Product immediacy has a re-enforcing effect since it is more relevant for products that

[6]See Bernard et al. (2015); Felbermayr and Jung, 2011 for such considerations on the export side. Basker and Van (2010) note however that large retailers predominantly import from less developed countries.

[7]See Trabold (2002), Peng et al. (2006) for empirical evidence consistent with intermediaries dealing more with homogeneous than with differentiated products on export markets.

are not perishable, do not become quickly obsolete, have relatively low value-added, and low inventory costs. Generally, these products are not very differentiated.

But this does not imply that differentiated products should be expected to be imported predominantly by manufacturers/retailers. Yes, product specificity and complexity push toward direct dealings between agents to avoid costs arising from misaligned incentives and holdup issues. But there are two countervailing forces that are especially relevant in an international trade environment and pushing toward the use of intermediaries. One is that domestic manufacturers and retailers, especially small ones, are likely to need intermediaries to find the foreign differentiated inputs they need. Through them, they benefit from specialization, knowledge, network and their abilities to provide quality assurance (Spulber, 1999; Biglaiser, 1993). The second force is that foreign manufacturers may want domestic intermediaries to represent them, especially when differentiated products are complex and/or involve services. This can be achieved through product exclusivity such as exclusive territory contracts granted to domestic intermediaries. This is done when a foreign manufacturer wants to protect the value of its brand name or product by providing incentives to intermediaries to invest in advertising, maintenance, after-sales services, etc (see Raff and Schmitt, 2006). These contracts are typically used for high value-added and thus differentiated products whether arising from the complexity or the uniqueness of the products. Even without product exclusivity, intermediaries are likely to have a comparative advantage in providing such services-related activities as compared to direct importers, especially domestic manufacturers for which such services do not belong to their core activities. Importantly, the benefits associated with the provision of such services by intermediaries in the case of differentiated products need to outweigh the expected costs arising from incomplete contracting (such as with holdup issues).[8]

The above analysis implies that a non-monotonic relationship between the share of

[8] Papers arguing that intermediaries deal more with differentiated products (such as quality) in exports markets include Crozet et al. (2013), Tang and Zhang (2012), Feenstra and Hanson (2004), Felbermayr and Jung (2011). The management literature lists several services associated with intermediaries including international market research, after sales services, negotiating collaborative agreements on behalf of suppliers, quality control, in addition to the usual services such as freight, documentation, and warehousing (Balabanis, 2000). Ha-Brookshire and Dryer (2009) shows that more 'services capabilities' provide advantages to export intermediaries, while Vedel and Ellegaard (2013) emphasizes the roles of import intermediaries in the clothing industry about quality, access, delivery, and design. Interestingly, Bello and Willamson (1985) shows empirically that 'transaction-creating services' (such as market research, after-sales services, etc) are associated with more differentiated products for export intermediaries.

indirect imports and product differentiation cannot be excluded. This leads to our second hypothesis:

Hypothesis 2: *Everything else being equal, the share of imports by intermediaries is higher when:*

1. *products are less differentiated;*
2. *products are more differentiated provided that they are also complex and/or intensive in service-related activities.*

Higher barriers to trade raise the share of indirect imports (Hypothesis 1) and more differentiated products do likewise when they require services (Hypothesis 2). These two variables being important at the product level, should we expect an interaction between them, making the response of higher barriers to trade on the share of indirect imports (at the product-country level) depends on the degree of product differentiation? This is ultimately an empirical issue but we briefly discuss how this could come about.

When products are more differentiated, importers (direct and indirect) become less sensitive to barriers to trade since greater differentiation among products implies that they have less substitutes. If intermediaries have an advantage in the provision of services, a higher barrier to trade may re-enforce this advantage since intermediaries are also good at overcoming barriers to trade. Because service-related activities are associated with differentiated products, this implies that the interaction between the degree of product differentiation and the level of barriers to trade may be positive and thus the impact of barriers to trade on indirect imports be positively related to the level of product differentiation.

Hypothesis 3: *Everything else being equal, a higher share of indirect imports is consistent with higher barriers to trade when products become more differentiated and require service-related activities.*

3 Data Description

To test the above hypotheses, we use a comprehensive firm-level data set, the T2LEAP data, linked with highly disaggregated data on imports by firm-product-source country.

The firm-level data, the T2LEAP data, is the corporate income tax data (T2) combined with the Longitudinal Employment Analysis Program (LEAP). The data set includes the universe of Canadian firms that have filed corporate income tax and hire employees. The T2LEAP data are combined with Business Register and it includes information on firm industry classification (at the NAICS 4-digit level) for the top three activities, province, sales, employment, and other variables. The import data are in value (Canadian dollars) at the HS 10-digit level (and aggregated to 2002 HS 6-digit level for analysis) and by source country.[9] By combining these two data sets for the period 2002-12, we can identify industry classification of importers and industry characteristics.

We focus our attention on three sectors: manufacturing, retail and wholesale (NAICS 2 digit: 41). Table 1 shows sectoral import shares by aggregating the share per sector of firms with a positive value of imports with respect to total imports. The manufacturing sector is the largest import sector, comprising 45% of total imports. The wholesale trade sector ranks second, and the retail trade sector third with, respectively, 33% and 9% of imports (across all sources and products). As the other sectors play a minor role in imports, we ignore them and we identify manufacturing and retailing firms as direct importers, and wholesalers as indirect importers.[10]

Table 1: Import Share by Sector

Sector	Share in Import Value (%)
Manufacturing	45.67
Wholesale	33.19
Retail	9.24
Services	5.66
Mining	2.57
Transportation	1.80
Utility	0.92
Construction	0.73
Agriculture	0.20
Total	100.00

When analyzing the behaviour of direct and indirect importers, we differentiate be-

[9] We convert the 2007 and 2012 HS 6 code back to 2002 HS 6 code to make product classification consistent over time.

[10] See Acharya (2016), Tapp and Yan (2021) for firm-level characteristics of manufacturing firms in Canada regarding exports, imports and foreign direct investments. Note that custom brokers are considered as wholesalers in the data, and Services include information & culture, finance & insurance, real estate, professional, scientific & technical services, management. administrative & support, food & accommodation, arts & entertainment.

tween firms engaged in a single sector from those engaged in multiple sectors (wholesale/retail/manufacturing). For instance, wholesalers also engaged in manufacturing may be the wholesale unit of a large firm and may not act as intermediaries for other firms. Since intermediaries help manufacturers/retailers with imports, this relation should not be limited to within firms or firms with the same ownership. The T2LEAP data is at the enterprise level so that different units under the same enterprise are reported together. The industry classification of the top three activities of the enterprise is used to classify firms into those engaged in a single activity (wholesale, retail or manufacturing) and in multiple activities. Firms engaged in a single sector are defined as 'pure' firms and those in more than one sector as 'mixed' firms. In the following analysis, we primarily use 'pure' wholesalers as a proxy of indirect importers and pure manufacturers/retailers as direct importers. Table 2 reports the share of pure and mixed firms with respect to import values for each of the three sectors. During the sample period, nearly half of the imports by manufacturers, and more than half of the imports by retailers, were through pure firms. This contrasts with imports by wholesalers which were clearly dominated by pure firms. The empirical analysis will mainly focus on the pure firms and we will use both types of firms for robustness tests.

Table 2: Relative Importance of Pure and Mixed Firms within Sector

Sector	Type	Share of Import Value (% within Sector)
Manufacturers	Pure	47.84
	Mixed	52.16
Retailers	Pure	56.40
	Mixed	43.60
Wholesalers	Pure	87.48
	Mixed	12.52

We also use firm-level data to construct two variables: a measure of buyer's smallness and the degree of competition among indirect importers. The first variable, called 'smallness', comes from Hypothesis 1 suggesting that indirect imports play a more important role when the mass of small domestic users is larger. We construct an index at the product level (HS6) capturing the smallness of potential direct manufacturing/retailing users (see Appendix A.1 for details).

Hypothesis 1 also indicate that indirect imports may be more important when import intermediaries charge a lower unit price premium. This can come from product homogeneity or from competition at the wholesale level. Although we do not observe unit price premium, we can measure the degree of competition among import intermediaries at the product level by using an Herfindahl index (at the 4-digit HS level). Both the smallness measure and the Herfindahl index vary across products and time.

Because of the broad spectrum of products imported and the fact that manufacturing and retailers are not expected to import the same types of products, we use the Broad Economic Category (BEC) codes to divide products into separate groups: capital, consumption and intermediate goods. During the sample period, intermediate products represent 58% of imports, while capital and consumption goods represent respectively 22% and 20%.

In all three product categories, the United States, China and Mexico are the three most important source countries. The United States is a dominant source of imports of intermediate and capital goods, comprising 60% and 56% of imports, and China is a distant second. The gap between imports from the United States and China is smaller for consumption goods. The United States consist of 40% of imports of consumption goods while China accounts for 21%. Mexico accounts for around 4% of imports of intermediate and capital goods, and 7% of consumption goods.

Imports of intermediate, capital and consumption goods are dominated by importers from different sectors. Table 3 summarizes the import shares of wholesalers, retailers and manufacturers by product category. Manufacturers (direct importers) are the primary importers of intermediate goods, and wholesalers (indirect importers) dominate in the imports of consumption goods and to a smaller extent of capital goods. Importantly, it shows that capital and intermediate goods are predominantly imported by manufacturers and wholesalers, while consumption goods are primarily imported by wholesalers and retailers. In the empirical analysis, we separate products into two groups: intermediate and capital goods, and consumption goods. For the first group, we investigate the imports by manufactures and wholesalers and for the second group, retailers and wholesalers.

In addition to measures of firm smallness and wholesale competitiveness mentioned above, we also use measures of product differentiation, product complexity, bilateral tariff rates, and measures of country characteristics such as distance from Canada, indicator of common languages, GDP and GDP per capita per import source country. Appendix A.1 provides details about these variables.

Table 3: Import Share by Sector within Product Categories

	Category		
Sector	Capital	Consumption	Intermediate
Manufacturers	35.02	17.86	59.30
Wholesalers	42.13	50.52	23.23
Retailers	6.34	24.68	5.18
others	16.51	6.94	12.30
Total	100.00	100.00	100.00

4 Empirical Analysis

4.1 Determinants of the Share of Indirect Trade

To examine the hypotheses discussed in Section 2, we investigate the determinants of the share of indirect imports by country and product. We do this simply because data on firm sourcing decisions is not available. The approach is similar to the one adopted by Ahn et al (2011) and Felbermayr and Jung (2011) for instance. Thus aggregating import data from the firm-product-country level to product-country-sector level, the explained variable is the share of indirect imports from country c of product j in year t. The equation can be written as:

$$\frac{M_{cjt}^{W}}{M_{cjt}} = \alpha + \beta_1 \ln \mathrm{GDP}_{ct} + \beta_2 \ln \mathrm{GDPPC}_{ct} + \beta_3 \ln \mathrm{D}_c + \beta_4 \mathrm{Lang}_c + \gamma \mathrm{Tariff}_{cjt} + \theta_1 \mathrm{Diff}_j + \theta_2 \mathrm{Complexity}_j + \theta_3 \mathrm{HHI}_{jt}^{W} + \theta_4 \ln \mathrm{Small}_{jt} + \delta_i + \delta_t + \varepsilon_{cjt}, \quad (1)$$

where M_{cjt}^{W} is the value of imports from country c of product j by wholesalers (denoted by superscript W), and M_{cjt} is the total imports by country and product. The ratio is the share of indirect imports in total imports. We include the following source-country determinants: the size of source country measured by GDP ($\ln \mathrm{GDP}$), income measured by GDP per capita ($\ln \mathrm{GDPPC}$), distance from Canada (in kilometres, $\ln \mathrm{D}$) and an indicator of common language (Lang). We also account for product-level determinants by including measure of product differentiation (Diff), product complexity (Complexity), wholesaler

HHI (HHI^W), and a measure of smallness of potential direct importers ($\ln \text{Small}$). Product differentiation is mainly assessed by the coefficient of variation (CV) of import unit value. We use an indicator of differentiated product based on Rauch classification as an alternative measure in some specifications. We use Nunn (2007)'s relation specificity measure for complexity which we consider as being related to service intensity. The variable Tariff_{cjt} is import tariff rates in Canada. We also control for product level fixed effects at the HS2-digit level (δ_i) and year fixed effects (δ_t). Here, the aggregate product fixed effects are used to control for the market condition of the final products that use the imported products as inputs (thus assuming that the final products and inputs belong to the same HS2 product category).

As discussed in Section 3, direct importers tend to import different types of products: retailers importing mainly consumption products, and manufacturers importing mainly intermediate and capital products. For this reason, we start the analysis by splitting our sample into two sub-samples: (i) indirect (wholesalers) and direct importers (manufacturers only) of intermediate and capital goods, and (ii) indirect (wholesalers) and direct importers (retailers only) of consumption goods. We start by investigating the case of intermediate and capital products.

4.1.1 Indirect Imports of Intermediate and Capital Goods

Columns 1 to 8 of Table 4 report the results of estimating Eq. (1) for the share of wholesale imports of intermediate and capital goods (as a fraction of imports by manufacturers and wholesalers in the same category).[11] The results suggest that the share of wholesale imports is larger when the source country is smaller and per capita income is lower (implying lower quality of institution), is farther away from Canada, and does not share a common language with Canada.[12] The results also indicate that the share of wholesale imports is larger when the tariff rate is higher. None of the results are surprising: they indicate that wholesalers have an advantage with respect to more 'costly' products and source countries whether these costs are related to distance, barriers to trade, culture or

[11] Because we concentrate on pure importers, the share is the ratio of imports by pure indirect importers with respect to total imports by pure direct and indirect importers of capital and intermediate products.

[12] Instead of per capita income to capture quality of institution, we could have used the World Bank's Doing Business and World Wide Governance indicators. These indicators are highly correlated with GDP per capita.

institutions associated with these countries.

More interesting are the results about product characteristics and market structure. In particular, the shares of intermediate imports are larger when products are more differentiated and more complex. These results do not depend on how product differentiation is measured (Rauch measure of differentiated products (Differentiated Product) in Col.1 or price dispersion (Coef. of Variation) in Col.2). The fact that both product differentiation and product complexity go in the same direction are consistent with Hypothesis 2 insofar as more complex products are also more intensive in product-related services, whether these services involve search or after-sales services. It is of course not possible to know the contractual relationship (if any) between wholesalers and domestic manufacturers but this wholesaler's role with respect to product differentiation and to product complexity are consistent with wholesalers acting as manufacturer's agents with the mandate to find the most appropriate capital and intermediate products given the manufacturer's production technology requirements.

It is also when the ultimate buyers of capital and intermediate goods are small that wholesalers acting as agents can be expected to play a more important role. In that regard, Table 4 confirms that the larger the mass of small manufacturers using intensively the imported products, the higher the share of indirect imports (Hypothesis 1.2). Finally we find that the share of intermediate imports is larger when the wholesalers are more competitive (Hypothesis 1.3). We choose Col. 2 as the preferred specification as using continuous coefficient of variation of Canadian import unit values as a measure of product differentiation allows for a better identification of the degree of product differentiation as compared to the Rauch classification.

To test the robustness of our results, we use alternative specifications, all presented in Col. 3 to 9 in Table 4. The first one is to investigate whether our results depend on specialization of direct or indirect importing. Our previous results are based on all country-product pairs including those with a share of indirect trade equal to zero (direct imports only) and 1 (indirect imports only). Similar to Crozet et al (2013), we restrict the sub-sample to include only the shares of indirect imports to be strictly above zero and below 1. This is important as, among all the country-product pairs, more than half of them take either a value of 0 or 1. The results are reported in Col. 3. In general, the results are qualitatively similar to the ones reported in Col. 2 except for the coefficient estimate for GDP now positive and significant. This is not very surprising as direct or indirect import specialization is more common for smaller markets. Interestingly, the estimate for distance is smaller, suggesting that this specialization is also for more distant markets. Overall, however, the results found in Col. 3 are very robust to those found in Col. 2 despite eliminating more than half the observations.

As the United States and Mexico comprise a large share of Canada's imports, we also investigate if the results are driven by these two countries. Col. 4 reports the results after excluding them; they are qualitatively similar to the results reported in Col. 2.

The next two sets of results introduce two different types of fixed effects. Similar to Ahn et al (2011) and Felbermayr and Jung (2011) and instead of using country-specific variables (GDP, GDP per capita, Distance and Language), we include country fixed effects to control for time invariant country characteristics. The results are summarized in Col. 5; they show that the coefficient estimates for tariff, market structures and product characteristics are all qualitatively similar to the main results reported in Col. 2.

Similar to Bernard et al (2015), we control for product characteristics by introducing product (HS6) fixed effects and the results are reported in Col. 6. The coefficient estimates for country-specific variables are also qualitatively similar to the main results in Col. 2. However, the coefficient estimate for tariff rate becomes smaller, but still significant, suggesting that the impact of tariff is mainly driven by differences at the product level. The effects of the two variables that vary by product and time, wholesale HHI and smallness index, become either smaller or insignificant, suggesting that the effects are also mainly driven by cross-product differences.

To examine if the exclusion of firms engaged in multiple sectors (the 'mixed' firms) affects the results, we include imports by mixed firms in the calculation of share of indirect imports. The results are presented in Col. 7.[13] This inclusion adds less than 20,000 product-country observations, a relatively small number. However, as Table 2 indicates, mixed firms, especially mixed manufacturers, play an important role, suggesting that, on average, these transactions are large. The results however are qualitatively similar to the main results.

[13]This implies a change in the definition of the shares, computed here with respect to both pure and mixed firms.

Instead of using the number of firms below the 25^{th} percentile to capture smallness, we use the number of non-importers in the 4-digit NAICS industries. We do this because the firms that use wholesalers to import are likely to be non-importers. The results are reported in Col. 8 and the coefficient estimates of this alternative smallness index is also positive and significant.

Finally, we include in the denominator imports of intermediate and capital goods by retailers so that the denominator include imports by pure importers in all major importing industries. The results are summarized in Col. 9. The results are qualitatively similar to those in Col. 2 with smaller coefficient estimates for variables such as distance, tariff rates, product differentiation, product complexity and smallness. These result suggest that imports of intermediate and capital goods by pure retailers may be slightly different from those by manufacturers and wholesalers.

4.1.2 Indirect Imports of Consumption Goods

We now analyze the share of indirect imports of consumption goods relative to retail direct imports and to wholesale imports in the same category. The results are reported in Table 5. Like for intermediate and capital products, we first concentrate on the imports by pure retailers and wholesalers. There are noticeable similarities and differences with the previous case. The results are similar regarding the direction of the effects of tariff and common language. In both instances, wholesalers help overcoming Canadian tariff and foreign language barriers. The tariff effect however is very small as compared to the intermediate and capital good cases and is insignificant in Col. 1.

Results are also similar for the two market structure variables: smallness of direct retailers and import concentration at the wholesaling level. Thus, the higher is the share of small retailers selling products that belong to sectors where direct imports are observed, the higher the share of indirect imports, and the more concentrated indirect importers are, the smaller the share of indirect import. As discussed in the previous section, these results are consistent with Hypothesis 1. Although this point will be developed in Section 4.3, we note that the first result is bigger than for intermediate/capital products.

Among the differences, wholesale import shares are higher when the source county is bigger and with higher income per capita (Col. 1). These effects are not always significant

Table 4: Share of Indirect Imports, Intermediate and Capital Goods

VARIABLES	Differentiated Product	CV Price	0<Share <1	Excl NA	Country FE	HS6 FE	Mixed Importers	Non-Importer	W+M+R As Denominator
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
α : Constant	0.3556***	0.2720***	0.2617***	0.3012***	0.5601***	0.4055***	0.1997***	0.2716***	0.3006***
	(0.0274)	(0.0325)	(0.0495)	(0.0470)	(0.0159)	(0.0784)	(0.0323)	(0.0325)	(0.0315)
β_1 : ln(GDP)	-0.0151***	-0.0144***	0.0065***	-0.0147***		-0.0154***	-0.0146***	-0.0145***	-0.0120***
	(0.0006)	(0.0008)	(0.0013)	(0.0009)		(0.0024)	(0.0008)	(0.0008)	(0.0008)
β_2 : ln(GDP per capita)	-0.0169***	-0.0158***	-0.0184***	-0.0161***		-0.0154***	-0.0197***	-0.0159***	-0.0045***
	(0.0009)	(0.0011)	(0.0016)	(0.0011)		(0.0040)	(0.0011)	(0.0011)	(0.0010)
β_3 : ln(Distance)	0.0530***	0.0595***	0.0405***	0.0572***		0.0524***	0.0683***	0.0595***	0.0398***
	(0.0025)	(0.0030)	(0.0042)	(0.0046)		(0.0076)	(0.0029)	(0.0030)	(0.0029)
β_4 : Common Language	-0.0287***	-0.0240***	-0.0338***	-0.0245***		-0.0299***	-0.0133***	-0.0240***	-0.0260***
	(0.0022)	(0.0026)	(0.0036)	(0.0028)		(0.0110)	(0.0026)	(0.0026)	(0.0025)
γ : Tariff	0.0038***	0.0032***	0.0022***	0.0031***	0.0031***	0.0017**	0.0028***	0.0033***	0.0018***
	(0.0003)	(0.0004)	(0.0005)	(0.0004)	(0.0008)	(0.0008)	(0.0003)	(0.0004)	(0.0003)
θ_{1a} : Differentiated Product	0.0225***								
	(0.0037)								
θ_{1b} : Coef of Variation		0.0021***	0.0020***	0.0020***	0.0021**		0.0009***	0.0021***	0.0012***
		(0.0004)	(0.0005)	(0.0004)	(0.0009)		(0.0004)	(0.0004)	(0.0003)
θ_2 : Product Complexity	0.0984***	0.1404***	0.1411***	0.1322***	0.1429***		0.1325***	0.1405***	0.0823***
	(0.0100)	(0.0115)	(0.0160)	(0.0121)	(0.0333)		(0.0115)	(0.0115)	(0.0112)
θ_3 : Wholesale HHI	-0.2121***	-0.1845***	-0.1785***	-0.1935***	-0.1857***	-0.0489***	-0.1647***	-0.1847***	-0.1836***
	(0.0095)	(0.0101)	(0.0147)	(0.0111)	(0.0203)	(0.0103)	(0.0098)	(0.0101)	(0.0096)
θ_{4a} : ln(Smallness) a	0.0259***	0.0197***	0.0176***	0.0178***	0.0189***	0.0023	0.0275***		0.0080***
	(0.0022)	(0.0025)	(0.0034)	(0.0027)	(0.0061)	(0.0331)	(0.0025)		(0.0024)
θ_{4b} : ln(Smallness) b								0.0163***	
								(0.0020)	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HS2 Fixed Effects	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Country Fixed Effects	No	No	No	No	Yes	No	No	No	No
HS6 Fixed Effects	No	No	No	No	No	Yes	No	No	No
Observations	638,395	467,510	200,225	420,530	469,380	643,995	487,045	467,510	492,785
R-squared	0.067	0.069	0.063	0.055	0.080	0.188	0.064	0.069	0.049

In columns 1-8, the denominator is the sum of imports of intermediate and capital goods by pure wholesalers and manufacturers in columns 1 to 8. In column 9, imports of intermediate and capital goods by retailers are added into the denominator. * $p<0.10$, ** $p<0.05$, *** $p<0.01$. Standard errors adjusted for clustering at the product (HS6) and source country level are reported in the parentheses in columns 1 to 4 and 7-9. Standard errors in column 5 (country FE) are adjusted for clustering at the product (HS6) level. Standard errors in column 6 (HS 6 FE) are adjusted for clustering at the country level. Smallness b is the mass of non-importers in the manufacturing industries that also have direct importers of the product.

however and, when they are, their magnitude is small.

It is the role of product differentiation and product complexity that shows the most striking difference with the previous case. When coefficient of variation is used as a measure of product differentiation, both effects go in the opposite direction with respect to the case with intermediate and capital products.[14] Thus, the share of indirect imports of consumption products is now higher when products are less differentiated and less complex. This result, consistent with Hypothesis 2, suggests that service-related activities are either not as important for consumption products as they are for intermediate/capital goods, or that wholesalers of consumption products do not play the same role with respect to retailers as they do when importing intermediate/capital goods for manufacturers.[15] For instance, retailers may have a stronger incentive to control the quality of consumption products by themselves rather than to delegate this task to wholesalers. This result may also reflect exclusivity if it is the case that retailers, more than wholesalers, hold exclusive rights to import differentiated products.

Similar to Section 4.1.1, we have estimated Eq. (1) for the imports of consumption goods by retailers and wholesalers using alternative sub-samples or specifications. The results are presented in Col. 3 to 9 of Table 5. Col. 3 reports the results with the subsample where the share of indirect trade is strictly between zero and one. The results are similar to the main results reported in Col. 2 although the coefficient estimate for GDP per capita becomes negative and significant and the effects of tariff becomes insignificant. These indicate that the positive effects of GDP per capita and tariff observed in the main results (Table 5, Col.1) are driven by specialization (i.e. whether by wholesalers or by retailers). Thus, these country-specific characteristics matter more in the presence of import specialization than they do without it. This is consistent with indirect importers overcoming country-specific barriers linked to institutions and tariffs at least for some products.

Col. 4 summarizes the results when North America is excluded. The results are qualitatively similar to the main results in Col. 2. Col. 5 shows that after controlling for country fixed effects, variables that vary across product and product-country are quali-

[14]We use coefficient of variation as the preferred measure of product differentiation as most consumption products are differentiated, making the differentiated product dummy less informative.

[15]Although the effects of product differentiation and product complexity tend to go in the same direction, these two variables are moderately correlated. The correlation coefficient is 0.26.

tatively similar to the main results. Col. 6 reports the results when product fixed effects (at the HS6 level) are accounted for. Compared to the main results, two of the country level variables: GDP and distance now become insignificant, suggesting that the positive coefficient estimate for the size of source country (GDP) and negative effect for distance in the main results are driven by variation across products. The coefficient estimates for the wholesale HHI and smallness also become insignificant as these two variables are mainly driven by cross-product differences. Col. 7 summarizes results when mixed firms are included. The results are qualitatively similar to the main results except the coefficient estimate for GDP per capita which becomes positive and significant. This may suggest that part of the indirect imports by mixed firms may be from higher income countries. Col. 8 presents the results when the number of non-importers, instead of the number of small firms, are used to construct measures of smallness. The results are qualitatively similar to the main results. Col. 9 summarizes the results with imports of consumption goods by manufacturers included in the denominator. Similar to the pattern found in Section 4.1.1, the results are qualitatively similar to the main results in Col. 2 but the coefficient estimates for coefficient of variation and product complexity are smaller in magnitude. This implies that consumption goods imported by manufactures are different from those imported by wholesalers and retailers.

4.2 Trade Barriers and Product Characteristics

Hypothesis 3 posits that the interaction between trade barriers and product differentiation/complexity may have a re-enforcing effect on the share of indirect imports. In order to investigate this interaction, three forms of barriers to trade are considered: tariff, distance, and common language. Tariff is a variable cost of trade, distance is a proxy for variable costs of transportation and fixed costs of communication, while common language typically reduces communication costs. To investigate this relationship, we need to disregard NAFTA especially when the barriers to trade are tariffs. Thus considering only product-country imports from non-NAFTA countries and adding terms that interact each of these three variables with product differentiation (coefficient of variation of unit cost

Table 5: Share of Indirect Imports, Consumption Goods

VARIABLES	Differentiated Product	CV Price	0<Share <1	Excl NA	Country FE	HS6 FE	Mixed Importers	Non-Importer	W+M+R As Denominator
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
α : Constant	0.4988***	0.6560***	0.7291***	0.6536***	0.5883***	0.7062***	0.6287***	0.6291***	0.4418***
	(0.0348)	(0.0368)	(0.0491)	(0.0466)	(0.0479)	(0.1538)	(0.0368)	(0.0373)	(0.0374)
β_1 : ln(GDP)	0.0042***	0.0020**	0.0049***	0.0023**		0.0035	0.0011	0.0021**	-0.0025***
	(0.0008)	(0.0008)	(0.0011)	(0.0009)		(0.0036)	(0.0008)	(0.0008)	(0.0008)
β_2 : ln(GDP per capita)	0.0027**	0.0016	-0.0080***	0.0018		0.0022	0.0050***	0.0016	0.0009
	(0.0011)	(0.0012)	(0.0015)	(0.0012)		(0.0051)	(0.0012)	(0.0012)	(0.0012)
β_3 : ln(Distance)	-0.0053*	-0.0093***	-0.0127***	-0.0094**		-0.0052	-0.0097***	-0.0092***	0.0090***
	(0.0031)	(0.0033)	(0.0042)	(0.0045)		(0.0093)	(0.0033)	(0.0033)	(0.0033)
β_4 : Common Language	-0.0360***	-0.0377***	-0.0231***	-0.0379***		-0.0345***	-0.0405***	-0.0376***	-0.0446***
	(0.0028)	(0.0030)	(0.0038)	(0.0032)		(0.0129)	(0.0030)	(0.0030)	(0.0030)
γ : Tariff	0.0001	0.0002**	-0.0003	0.0002**	0.0002	0.00003	0.0002***	0.0002**	0.0003***
	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.00022)	(0.0001)	(0.0001)	(0.0001)
θ_{1a} : Differentiated Product	0.0826***								
	(0.0080)								
θ_{1b} : Coef of Variation		-0.0014***	-0.0013***	-0.0013***	-0.0015***		-0.0014***	-0.0014***	-0.0008***
		(0.0002)	(0.0003)	(0.0003)	(0.0005)		(0.0002)	(0.0002)	(0.0002)
θ_2 : Product Complexity	-0.0888***	-0.1277***	-0.1811***	-0.1177***	-0.1354***		-0.1148***	-0.1265***	-0.0848***
	(0.0159)	(0.0169)	(0.0225)	(0.0177)	(0.0488)		(0.0170)	(0.0169)	(0.0174)
θ_3 : Wholesale HHI	-0.1132***	-0.1961***	-0.1710***	-0.2161***	-0.1930***	-0.0288	-0.2081***	-0.1951***	-0.2057***
	(0.0163)	(0.0176)	(0.0247)	(0.0187)	(0.0528)	(0.0200)	(0.0178)	(0.0176)	(0.0183)
θ_{4a} : ln(Smallness) a	0.0616***	0.0659***	0.0706***	0.0627***	0.0674***	-0.0473	0.0612***		0.0619***
	(0.0060)	(0.0065)	(0.0096)	(0.0068)	(0.0205)	(0.0681)	(0.0065)		(0.0066)
θ_{4b} : ln(Smallness) b								0.0623***	
								(0.0056)	
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HS2 Fixed Effects	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Country Fixed Effects	No	No	No	No	Yes	No	No	No	No
HS6 Fixed Effects	No	No	No	No	No	Yes	No	No	No
Observations	345,020	290,560	138,975	272,945	293,205	348,525	295,085	290,560	300,390
R-squared	0.117	0.122	0.146	0.118	0.147	0.176	0.118	0.122	0.085

The denominator is the sum of imports of consumption goods by pure retailers and wholesalers in columns 1 to 8. In column 9, imports of consumption goods by manufacturers are added into the denominator.* p<0.10, ** p<0.05, *** p<0.01. Standard errors adjusted for clustering at the product (HS6) and source country level are reported in the parentheses in columns 1, 2, 5 and 6. Standard errors in country FE column are adjusted for clustering at the product (HS6) level. Standard errors in product FE column are adjusted for clustering at the country level. Smallness 2 is the number of non-importers in the retail industries that also have direct importers of the product.

of imports), and with product complexity, the equation to be estimated is:

$$\begin{aligned}\frac{M^W_{cjt}}{M_{cjt}} &= \alpha + \beta_1 \ln \mathrm{GDP}_{ct} + \beta_2 \ln \mathrm{GDPPC}_{ct} + \beta_3 \ln \mathrm{D}_c + \beta_4 \mathrm{Lang}_c + \gamma \mathrm{Tariff}_{cjt} \\ &+ \theta_1 \mathrm{Diff}_j + \theta_2 \mathrm{Diff}_j \times \mathrm{Cost}_{ct} + \theta_3 \mathrm{Complexity}_j + \theta_4 \mathrm{Complexity}_j \times \mathrm{Cost}_{ct} \\ &+ \theta_5 \mathrm{HHI}^W_{jt} + \theta_6 \ln \mathrm{Small}_{jt} + \delta_i + \delta_t + \varepsilon_{cjt}, \qquad (2)\end{aligned}$$

where Cost_{cjt} is one of three proxies of trade costs: tariff, distance, and common language. In this equation, coefficient of variation, product complexity and distance are expressed as deviation from the annual mean so that the effect of trade costs can be interpreted as the effects when product differentiation and product complexity are at means. Col. 1 to 3 of Table 6 report the results for wholesalers and manufacturers importing intermediate and capital goods, and Col. 4 to 6 present the results for wholesalers and retailers importing consumption goods. Col. 1 (respectively, Col. 4) presents the results with tariff rate as the only measure of trade costs, Col. 2 (respectively, Col. 5) has the results with distance and common language, while Col. 3 (respectively, Col. 6) presents the results with the three measures. The results are stable across the specifications within each category of products.

Consider the case of intermediate and capital products (Col. 1-3). Except for the interaction between tariff and product differentiation, all the other interaction terms with tariff and distance are positive and significant. The interaction terms with common language indicator are negative and significant. Thus whether tariff with product complexity, or distance and common language with product differentiation and with product complexity, the message is that, for more complex and differentiated intermediate/capital products, the indirect import share tends to be larger with higher barriers to trade. This result, consistent with Hypothesis 3, re-enforces our previous findings. This is the case because, as compared to manufacturers, import-intermediaries were found to have an advantage to overcome barriers to trade and to provide service-oriented differentiated products. Now the interactions re-enforce these effects on indirect imports.

Consider now consumption products (Col. 4-6). When the interaction terms are significant as for product differentiation and product complexity with tariff, the sign is negative. Thus, indirect imports of more differentiated or more complex consumption products fall relative to direct imports when tariffs rise. Hypothesis 3 does not hold but the results also re-enforce previous findings. Now the interaction term tends to re-enforces the separate negative effects of barriers to trade and of product differentiation/complexity on indirect imports. But the implication is that all these effects, including the interaction, are positive for the retailer's direct import share. In other words, we find again that the retailers are playing a similar role for consumption products as the wholesalers do for capital/intermediate products.

Still, the results are weaker for consumption products than they are for intermediate/capital products. The sign of the interaction between distance and product differentiation or product complexity is never significant. It likely reflects the fact that distance is a weak determinant of the cost of indirect imports for consumption products, and thus that wholesalers of consumption products do not have a particular advantage over retailers when buying from distant countries. Common language however, whether interacted with product differentiation or with product complexity, has a strong and significant negative impact on indirect imports of consumption products showing some advantage by wholesalers over markets that do not share the same languages with Canada.

Overall, these results confirm that wholesalers do not play the same role for intermediate/capital products as they do for consumption products mainly because, relative to wholesalers, retailers choose to deal more with differentiated and complex products than manufacturers do.

4.3 Discussion of Results

In this Section, we discuss three issues all about the role of import-wholesalers. The first one is to understand better why, regarding product differentiation and complexity, wholesalers play a different role with respect to retailers and to manufacturers. The second one is to ask whether sourcing from NAFTA countries influences the wholesalers' role, while the third issue is about the impact of small domestic buyers on indirect imports and in particular whether they are more sensitive to a greater mass of small retailers or manufacturers. The three issues are important to understand the roles and contributions of Canadian wholesalers.

Consider the first issue. The empirical analysis has uncovered an important and, to

Table 6: Share of Indirect Imports, Trade Costs, Product Complexity and Product Differentiation

	Wholesalers and Manufacturers Intermediate and Capital Goods			Wholesalers and Retailers Consumption Goods		
	(1)	(2)	(3)	(4)	(5)	(6)
α : Constant	0.8949***	0.8990***	0.8988***	0.5046***	0.5010***	0.5037***
	(0.0100)	(0.0100)	(0.0100)	(0.0154)	(0.0153)	(0.0154)
β_1 : ln(GDP)	-0.0147***	-0.0148***	-0.0148***	0.0026***	0.0025***	0.0029***
	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
β_2 : ln(GDP per capita)	-0.0162***	-0.0162***	-0.0163***	0.0024*	0.0016	0.0022*
	(0.0011)	(0.0012)	(0.0012)	(0.0012)	(0.0012)	(0.0012)
β_3 : ln(Distance)	0.0574***	0.0627***	0.0632***	-0.0102**	-0.0089*	-0.0093**
	(0.0046)	(0.0046)	(0.0046)	(0.0045)	(0.0046)	(0.0046)
β_4 : Common Language	-0.0244***	-0.0306***	-0.0305***	-0.0386***	-0.0315***	-0.0320***
	(0.0028)	(0.0029)	(0.0029)	(0.0032)	(0.0033)	(0.0033)
γ : Tariff	0.0041***	0.0031***	0.0041***	-0.0005***	0.0002*	-0.0005***
	(0.0005)	(0.0004)	(0.0005)	(0.0002)	(0.0001)	(0.0002)
θ_1 : Coef. of Variation	0.0017***	0.0029***	0.0026***	-0.0007*	-0.0006**	0.0003
	(0.0004)	(0.0004)	(0.0005)	(0.0004)	(0.0003)	(0.0004)
θ_{2t} : $\times$ tariff	0.0001		0.0001	-0.0001*		-0.0001***
	(0.0001)		(0.0001)	(0.0000)		(0.0000)
θ_{2d} : $\times$ ln(Distance)		0.0033***	0.0034***		-0.0009	-0.0010
		(0.0010)	(0.0010)		(0.0006)	(0.0006)
θ_{2l} : $\times$ Common Language		-0.0030***	-0.0030***		-0.0023***	-0.0025***
		(0.0007)	(0.0007)		(0.0005)	(0.0005)
θ_3 : Product Complexity	0.1220***	0.1450***	0.1341***	-0.0905***	-0.0914***	-0.0626***
	(0.0127)	(0.0128)	(0.0134)	(0.0182)	(0.0185)	(0.0190)
θ_{4t} : $\times$ tariff	0.0058***		0.0061***	-0.0034***		-0.0035***
	(0.0021)		(0.0021)	(0.0007)		(0.0007)
θ_{4d} : $\times$ ln(Distance)		0.0435**	0.0477**		0.0331	0.0256
		(0.0195)	(0.0195)		(0.0253)	(0.0253)
θ_{4l} : $\times$ Common Language		-0.0397***	-0.0390***		-0.0888***	-0.0909***
		(0.0134)	(0.0134)		(0.0189)	(0.0189)
θ_5 : Wholesale HHI	-0.1923***	-0.1938***	-0.1926***	-0.2148***	-0.2169***	-0.2151***
	(0.0111)	(0.0111)	(0.0111)	(0.0187)	(0.0187)	(0.0187)
θ_6 : ln(Smallness)	0.0176***	0.0177***	0.0174***	0.0622***	0.0623***	0.0617***
	(0.0027)	(0.0027)	(0.0027)	(0.0068)	(0.0068)	(0.0068)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
HS2 FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	420,530	420,530	420,530	272,945	272,945	272,945
R-squared	0.056	0.056	0.056	0.119	0.119	0.119

The denominator is the sum of imports of consumption goods by pure retailers and wholesalers. * p<0.10, ** p<0.05, *** p<0.01. Standard errors adjusted for clustering at the product (HS6) - source country level are reported in the parentheses.

our knowledge, new result: on average, wholesalers of intermediate/capital products import more differentiated and complex products than manufacturers, but wholesalers of consumption products import less differentiated and complex products than retailers. We showed that this result is robust to several specifications. It is difficult to compare our results with other results because, unlike the literature, we consider imports and specific product categories.[16] It may be that we have clear cut results because incentives are better aligned between domestic manufacturers and wholesalers for complex imported products than they are on the export side. Clearly, more studies are needed on this issue. However two important features of the Canadian data are worth pointing out to understand why product differentiation of consumption and intermediate capital products has such a sharp difference on indirect imports.

First, pure wholesalers importing intermediate/capital products are not the same firms as those importing consumption products. At the firm level, 43% of pure wholesalers completely specialize either in intermediate/capital goods or in consumption goods. Among wholesalers that import both types of goods, there is still strong specialization. Among wholesalers that import both types of goods and the share of consumption goods is above 25%, the average share of intermediate/capital goods is only 17%. Similarly, among wholesalers that import both types of goods and share of intermediate/consumption goods is above 25%, the average share of consumption goods is only 9%. Although there is less overlap across products among wholesalers of intermediate/capital products than among wholesalers of consumption products, the two groups of wholesalers are quite different.

Second, there is evidence of stronger specialization among importers of intermediate/capital products than among importers of consumption products. Table 7 supports this point by showing the relative frequency of indirect import shares at the product-country pair level (m_{ij}) across ten classes of indirect shares for the two groups of products. There is a greater relative mass with indirect import shares close to 0 and 1 than with intermediate values. The shares for intermediate/capital products however are more biased toward m_{ij} close to 1 (about 50%) as compared to the share for consumption

[16] As reviewed by Virtanen et al. (2022), the literature has conflicting results about the role of wholesalers with respect to differentiated products. Bernard et al (2015) finds that wholesale exports are less differentiated and less complex than manufacturing exports; Felbermayr and Jung (2011) finds that the share of indirect exports is negatively related to product complexity, but Tang and Zhang (2012) shows a positive relation between horizontal differentiation and share of indirect exports.

products (about 45%). We test the difference in the distribution of import shares using Kolmogorov-Smirnov (K-S) test and it rejects the null hypothesis that the distribution of the shares of indirect imports is the same for the two types of goods (the combined K-S is 0.073 (p-value = 0)). Further, we use Wilcoxon rank-sum test to test the null hypothesis that the distribution for both types of products are drawn from the same distribution and we also reject the null hypothesis (Z-statistic: 62.04 (p-value = 0)). This suggests that wholesalers of intermediate/capital products act more as manufacturer's agents than wholesalers of consumption products do with respect to retailers because wholesalers and manufacturers import less the same products from the same countries than wholesalers and retailers do.

What these features reveal is that retailers and wholesalers play more the same role than manufacturers and wholesalers do. In terms of our theoretical framework, the retailers often prefer to search themselves for the products they resell to consumers rather than letting the wholesalers do it and this is especially true for more differentiated products. This can only be because of quality control and reputation concerns, or because they hold exclusive rights on some consumption products. By contrast, the manufacturers are happy to delegate the task of finding products to wholesalers and this is particularly true for more differentiated and more complex products.

Table 7: Distribution of Import Share by Product Group

Share of Indirect Imports (%)	Intermediate/Capital Goods	Consumption Goods
0 - 10	24.03	26.65
10 - 20	3.44	3.62
20 - 30	2.92	3.18
30 - 40	2.73	2.96
40 - 50	2.72	3.15
50 - 60	2.72	3.08
60 - 70	2.97	3.49
70 - 80	3.44	3.82
80 - 90	4.49	5.10
90 - 100	50.55	44.94

The second issue is whether NAFTA matters for the role of wholesalers. If the role of wholesalers is mainly to overcome barriers to trade such as distance, then NAFTA vs non-NAFTA sourcing should matter for the share of indirect imports, but if the role of wholesalers goes beyond these direct costs and are mainly linked to providing immediacy and to search and matching, then NAFTA and non-NAFTA countries may not matter that much.

To investigate this point, we introduce a NAFTA dummy that we interact with variables of interest in one of our alternative specifications, specifically the one with country fixed effects (Col. 5 in Tables 4 and 5). The results are presented in Table 8. Col. 1 (respectively, Col. 2) reports the results for the sub-sample of intermediate and capital goods (respectively, consumption goods). For the sub-sample of intermediate and capital goods, the results suggest that the effects of product complexity and smallness are larger for imports from NAFTA countries, while the effects of tariff ($\gamma + \gamma_{na}$) become insignificant for NAFTA countries, and the effect of wholesale HHI is smaller but still significant.[17] For the sub-sample of consumption goods, the coefficient estimates for the terms interacting product characteristics and tariffs with the North America dummy are insignificant except for wholesale HHI. For wholesale HHI, the coefficient estimate for imports from NAFTA countries ($\theta_3 + \theta_{3na}$) is close to zero.[18] We conclude that NAFTA sourcing does not make a qualitative difference on the share of indirect imports; only, at best, a quantitative difference for some variables. This result is another confirmation that wholesalers cannot be confined to the traditional role of overcoming barriers to trade. Depending on the products, they also very much act as retailer's and manufacturer's agents, searching and matching the appropriate products irrespective of their sources. This also implies that the proximity and close integration with NAFTA countries does not affect the important role of import-intermediaries in the Canadian economy.

The third and last issue is about the impact of small retailers and manufacturers. An interesting feature of the results is that the share of indirect imports increases with the mass of small retailers and manufacturers.[19] We now evaluate whether this effect is relatively stronger for small retailers selling consumption products or with small manufacturers using capital/intermediate products.

Following Baggs, Beaulieu and Fung (2009), we use as benchmark the predicted share of indirect imports when every explanatory variable (including smallness) is held at the

[17] The t-statistic for the combined effect of tariffs is -1.24 and the t-statistic for the combined effect of wholesale HHI is -4.51.

[18] The t-statistic for the combined effect of HHI is 0.52.

[19] Abel-Koch (2013) also find that small firms rely more on indirect exports.

Table 8: Share of Indirect Imports: Imports from NAFTA countries and Non-NAFTA countries

	Wholesalers and Manufacturers Intermediate and Capital Goods	Wholesalers and Retailers Consumption Goods
	(1)	(2)
α : Constant	0.5616***	0.5871***
	(0.0159)	(0.0480)
γ : Tariff	0.0030***	0.0002
	(0.0008)	(0.0001)
γ_{na} : $\times$ NA	-0.0047***	-0.0008
	(0.0015)	(0.0006)
θ_1 : Coef of Variation	0.0021**	-0.0015***
	(0.0009)	(0.0005)
θ_{1na} : $\times$ NA	0.0005	0.0006
	(0.0014)	(0.0011)
θ_2 : Product Complexity	0.1251***	-0.1329***
	(0.0335)	(0.0491)
θ_{2na} : $\times$ NA	0.1692***	-0.0421
	(0.0202)	(0.0346)
θ_3 : Wholesale HHI	-0.1994***	-0.2129***
	(0.0217)	(0.0548)
θ_{3na} : $\times$ NA	0.0867***	0.2391***
	(0.0246)	(0.0490)
θ_4 : ln(Smallness)	0.0169***	0.0690***
	(0.0063)	(0.0209)
θ_{4na} : $\times$ NA	0.0153**	-0.0130
	(0.0063)	(0.0149)
Year FE	Yes	Yes
Country FE	Yes	Yes
Observations	469,380	293,205
R-squared	0.081	0.148
F test	20.32	5.747
Prob > F	0.000	3.05e-05

* p<0.10, ** p<0.05, *** p<0.01. Standard errors adjusted for clustering at the product (HS6) level are reported in parentheses.

mean. We then compare the benchmark share of indirect imports to the share where smallness is one standard deviation above the mean. Rows 1 and 2 of Table 9 use the sub-sample of pure wholesalers and manufacturers importing intermediate and capital goods. Row 1 reports that the predicted share is 62.7% when the logarithm of smallness index is at the sub-sample mean. Row 2 shows that if the smallness index is one standard deviation above, the sub-sample mean increases to 63.9%, an increase of 1.2 percentage points. Rows 5 and 6 report the similar exercise for the sub-sample of pure wholesalers and retailers importing consumption goods. The results suggest that when the smallness index increases by one standard deviation, the share of indirect imports increases by 1.9 percentage points. This effect is slightly larger as compared to the previous sub-sample; however one standard deviation represents a different magnitude in the two sub-samples.

To assess the impact of smallness on indirect imports when the two sub-samples face the same magnitude change in smallness, we use the overall mean of the logarithm of smallness and consider one standard deviation above that mean. Rows 3 and 4 present the predicted share for the intermediate and capital goods. As the smallness is more dispersed when retail and manufacturing industries are pooled together, the magnitude of change in the share of indirect imports is slightly larger as compared to Col. 1 and 2, around 1.9 percentage points. The small magnitude in the change of share is due to small coefficient estimates for the smallness index reported in Table 4. For the consumption goods sub-sample, when facing identical change in smallness measure, the share of indirect imports increases by 6.2 percentage points, which is more than one-tenth of the baseline predicted share of indirect imports. Thus, indirect imports of consumption goods are significantly more sensitive to changes in smallness than the indirect imports of intermediate and capital goods.

5 Policies, Imports and Intermediaries

Recent papers (Jiang, 2021; Delorme and Ouellet, 2022) argue that imports in Canada are often vulnerable to disruptions and to delays because of the high degree of trade concentration at the country- and at the US-Canada border-crossing level. The previous sections show that import-intermediaries contribute to the Canadian economy by helping manufacturers and retailers, often small ones, to source the goods they need from all

Table 9: Predicted Share of Indirect Imports

	Predicted Share of Indirect Imports
Subsample: Pure wholesalers and manufacturers, intermediate and capital goods	
(1) ln(smallness) at the **subsample** mean	0.627
ln(smallness) = -0.267	(0.001)
(2) one SD above the subsample mean	0.639
ln(smallness) = 0.346	(0.002)
(3) ln(smallness) at the **overall** mean	0.639
ln(smallness) = 0.337	(0.002)
(4) one SD above the overall mean	0.657
ln(smallness) = 1.287	(0.004)
Subsample: Pure wholesalers and retailers, consumption goods	
(5) ln(smallness) at the **subsample** mean	0.608
ln(smallness) = 1.457	(0.001)
(6) one SD above the subsample mean	0.627
ln(smallness) = 1.75	(0.002)
(7) ln(smallness) at the **overall** mean	0.534
ln(smallness) = 0.337	(0.007)
(8) one SD above the overall mean	0.597
ln(smallness) = 1.287	(0.002)

Delta method standard errors are reported in the parentheses.

countries, including the US and Mexico, although the share of indirect imports is larger for countries that are more distant and do not share common languages with Canada. Moreover, because of greater specialization at the product-country level, wholesalers and manufacturers are more complementary than wholesalers and retailers. This suggests that import diversification and a competitive Canadian economy would benefit from a larger and more competitive wholesale sector, especially for capital and intermediate products. What could public policy do to promote indirect imports?

Lowering barriers to trade is naturally the most direct policy to increase imports whether they are indirect or not. But Canadian tariffs are generally low limiting the impact of this policy. More significant are non-tariff barriers. For instance, the World Bank assessed (until 2021) the cost to clear custom through the time and the number of required documents. Although these barriers affect all imports, the cost involved with border compliance in Canada is high relative to other developed countries (see https://archive.doingbusiness.org/en/doingbusiness). More specific to wholesalers (and retailers), WTO (1998) notes that the internationalization of distribution is particularly sensitive to 'differences in product standards, burdensome practices for certification and testing of products'.[20] Hence, policies aimed at lowering barriers to trade do have scope

[20] As the EU's unique market demonstrates, 'technical harmonization and the removal of barriers caused

to facilitate indirect imports.

But wholesaling belongs to the service sector, a sector much less internationally integrated than the good markets. Canada's broad service sectors relevant to wholesaling are relatively protected.[21] Public policies aimed at liberalizing the service sector have a strong potential of raising indirect imports.

To be more specific, Canada is a signatory of GATS (General Agreement on Trade in Services), a WTO agreement that came into effect in 1995. Canada has committed to uphold WTO principles on cross-border services and be transparent about exclusions and limitations. Like most WTO members, Canada maintains restrictions on cross-border services. There are two classes of limitations relevant to wholesaling. One is 'to exclude the distribution of certain types of products from the scope of [a country's] commitments' (WTO, 1998, 51). Domestic policies, for instance linked to security concerns, justify this type of limitations.[22] But there are other limitations on market access and national treatment (also included in the recent USMCA) that are important when the provision of such services requires a commercial presence.[23] For instance, a licensed customs broker in Canada must be Canadian (or the corporation registered in Canada) and 'only a person of Canada using Canadian-registered and either Canadian-built or duty-paid trucks' supplying 'truck [..] services between points in the territory of Canada'.[24] These restrictions, by increasing costs, have the potential of restricting the number and the size of wholesalers.

Indirect imports are also sensitive to domestic policies such as competition policy and

by differences in national product regulations [...] can greatly encourage the internationalization of distribution' (WTO, 1998). In Canada, this is also the case at the inter-provincial level. Expediting the removal of non-tariff barriers plaguing the inter-provincial trade is one the main recommendations of the 2023 OECD economic survey of Canada.

[21]Estimates of tariff equivalents for Canada are 33.1% for business services and 38.1% for transport services in 2019 (Benz and Jaar, 2020). Ueno et al. (2014, Figure 2) places Canada as the most restrictive country among the OECD countries in terms of restrictiveness index for distribution services, especially for 'restrictions on foreign ownership and other market entry conditions'.

[22]In Canada, products with restrictions in the wholesale sector belong to agriculture and live animals, fisheries products, alcoholic beverages, musical scores, audio and video recordings, books, magazines, newspapers, pharmaceutical and medical goods (WTO, 1998, Table 8). See also the Consumer Packaging and Labelling Act (https://laws-lois.justice.gc.ca/eng/acts/C-38/).

[23]'[W]holesalers and retailers rely most heavily on the freedom to establish a commercial presence. Hence, barriers which limit the ability of firms to establish a commercial presence and to employ nationals from their home country affect these distribution services more significantly than franchising and commission agent services' (WTO, 1998).

[24]See USMCA, Appendix, Reservation I-C-20. Similar restrictions exist for air and water transportation.

intellectual property protection. Consider the vertical contracts between manufacturers and distributors such as vertical integration, exclusive dealing, exclusive territories, or retail price maintenance. They are often useful to improve market efficiency within a vertical structure, but they can also have anti-competitive consequences offsetting at least part of their benefits. A permissive policy regarding these practices limits indirect imports by placing contractual restrictions on who can import products (for instance in the automobile industry). This is further re-enforced by intellectual property protection that leads to a segmentation of international markets through parallel import prohibitions. In other words, several domestic policies are not neutral on the ability to engage in indirect imports.

The above discussion suggests two main emphases regarding public policies toward wholesaling and indirect imports. First, there is scope for lower non-tariff barriers in Canada, several of which having direct impacts on the ease by which wholesalers can operate at the international level. Second, policymakers should be mindful of the impact of several domestic policies on wholesalers and indirect imports. This does not mean a complete overhaul of these policies, but being aware of their collateral damages and that they involve trade offs. This is especially important in Canada, a country often characterized by a large mass of small firms since wholesalers, by helping manufacturers and retailers source their imports, also help them with their competitiveness. Given our results about the role of wholesalers, the economic impacts of such policy emphases are likely to be more important for intermediate and capital products than they are for consumption products.

6 Conclusion

The paper analyzes the role of import intermediaries in Canada over the period 2002-12 and discusses how public policies impact the wholesale sector.

We first discuss three hypotheses about the share of indirect imports at the product-country level. The empirical analysis then uses detailed data on Canadian firms in manufacturing, wholesale and retail sectors linked to their imports by product and country. As wholesalers importing for both retailers and manufacturers cover a very wide range of products, we divide the sample into two sub-samples: imports of intermediate and capital goods by wholesalers and manufacturers, and imports of consumption goods by retailers and wholesalers. We examine the role of country level determinants, including size, distance, and common language, as well as product characteristics such as product differentiation and product complexity. We also include tariff rates (which vary by both country and product), and market structure features such as wholesaler competitiveness and the mass of small potential buyers.

Some of our empirical results are similar to those found with respect to export intermediaries. It is the case when the share of imports by intermediaries, whether they serve retailers or manufacturers, increases with higher tariff or with non-common languages. Simply, wholesalers generally help overcoming barriers to trade irrespective of the direction of trade. But several results are new. We focus on three of them.

First, import-wholesalers do a lot more than just overcoming barriers to trade. In particular, their role is strongly influenced by product characteristics, such as product differentiation and complexity. A manifestation of this is the finding that sourcing from NAFTA or from non-NAFTA countries does not qualitatively alter the role of wholesalers.

Second, import-wholesalers have a stronger comparative advantage with respect to manufacturers than they do with respect to retailers. This is especially the case with respect to small manufacturers. Although small and large manufacturers need differentiated inputs, the intermediaries' expertise to find and to service these products is especially determinant for small manufacturers. This is because finding these products is not part of a manufacturer's core activities and specialization by wholesalers quickly gives them an advantage over manufacturers, especially small ones.

Of course, small retailers also need differentiated products. But they do not necessarily sell a large share of products requiring services, and when they do, the retailers have a strong incentive to provide such services themselves. This is also influenced by the fact that exclusive rights on products are more likely to be held by retailers than by manufacturers. Imports of consumption products, especially when they are more differentiated or more complex, are therefore more likely to be carried by direct importers than in the case of capital and intermediate products.

Third, the level of indirect imports depends on market structure both at the wholesaler level and at the manufacturer/retailer level. Not surprisingly, a more competitive wholesaling market is associated with higher indirect import shares. Importantly, there is also a significant positive link between the mass of small retailers/manufacturers and the share of indirect imports.

The Canadian economy exhibits several characteristics that make these results interesting. First, as compared to the US, it has a relatively large mass of small manufacturers (Baldwin et al., 2014). We expect import-wholesalers to be particularly useful to these firms, a result that is empirically robust. We also find that a change in the mass of small retailers has a stronger impact on indirect imports. Second, it is not because Canada is well integrated in the North American economy that wholesalers' roles are waning. On the contrary, their roles are found to be qualitatively the same for NAFTA and non-NAFTA sources. Our findings help understanding why the share of indirect imports is high in Canada even from NAFTA sources. For at least these two reasons, policy makers should care about the wholesale sector.

This is even more so today given the recent and growing concerns about the vulnerability of supply chains and, in Canada's case, about the high concentration of some imports at the country level (Jiang, 2021) and even at the border-crossing level (Delorme and Ouellet, 2022). Whether it is to improve import diversity or making small manufacturers more productive through imported intermediate inputs (Kasahara and Rodrigue, 2008; and Halpern et al., 2015), a larger and more competitive wholesale sector is part of the answer. For this to happen public policies can help. The best policies are those that further liberalize barriers to trade and relax policies that plague the internationalisation of the distribution and of the transport sectors in Canada.

Appendix

A.1 Variable Definitions

Direct Importers' smallness: The construction of this variable comprises four steps. First, we use product level (HS6) import data to identify the industry classification (at the 4-digit NAICS level) of the top five manufacturers/retailers that import directly this product. Top five industries are defined as the manufacturing/retail industries with the greatest shares in the value of imports during the sample period. These industries are identified using import data for the entire sample period. The list of top industries is constant over time to prevent endogeneity issue. Retail industries are excluded when identifying the top five direct importers of intermediate and capital products, and manufacturing industries are removed when finding the top five direct importers for consumption products. Second, we calculate the number of firms below the 25th percentile at the 4-digit NAICS level for these top industries. Third, we sum up the number of corresponding manufacturers and retailers. Finally, we normalize the number of firms below 25th percentile by the overall median. As firms that use import intermediaries tend to be non-importers, we also can construct an index of non-importers using the same approach. The first step is the same as described above. The second step is calculating the number of non-importers at the 4-digit NAICS level for the top five industries. The third step is summing up the number of non-importers and the final step is normalization by the median number of non-importers.

Indirect importers' concentration: The degree of concentration among indirect importers is measured by constructing a Herfindahl index at the 4-digit HS level. We first restrict the import data to the sub-sample of wholesalers. We then calculate the share of each wholesale importer in the imports of this product-country at the 4-digit HS level. Finally, we use the squares of share in imports to construct wholesale Herfindahl index.

Product differentiation: We use two measure of product differentiation. The first measure is Rauch (1999) classification. It classifies products into three categories: organized exchange, reference priced and differentiated. Rauch (1999) classification is obtained from the Forum for Research in Empirical International Trade website. It is at the 4-digit SITC (rev. 2) level and then concorded to HS 6 using concordance from the United Nation Statistics Division website. We use Rauch's liberal classification. We combine organized exchange and referenced price into one category: non-differentiated products. The main measure of product differentiation we use in this paper is the coefficient of variation of price at the HS 6 level as proposed by Bernard et al. (2015). This measure is developed in three steps. First, we use the value and quantity of imports at the firm-product (HS10) level from the Canadian Border Services Agency (CBSA) in 2003 to obtain unit value. Second, we calculate the coefficient of variation at the HS10 level. As more differentiated product is expected to have more price dispersion across firms, it has the advantage to be a continuous measure of the degree of product differentiation. Third, we construct average coefficient of variation weighted by the import share of HS10 in HS6. However, there are fewer products in the CBSA data than in the import data as some products have zero quantity or have too few importers to compute standard deviation of unit values. This causes some observations to be dropped when this measure of product differentiation is used.

Product Complexity: Product complexity is approximated by Nunn's (2007) measure of contract intensity, which is the fraction of differentiated inputs in the total value of inputs of a product. The variable was at the 1997 IO industries. They can be mapped to NAICS industries. As in Bernard et al (2015), we use Pierce and Schott's (2012) concordance to convert NAICS industries to HS6 products.

Product Category: Products can be divided into three categories: intermediate, capital and consumption goods based on Broad Economic Categories (BEC). BEC classification can be concorded to 2002 HS6 using concordance provided by the UN Statistics Division.

Tariff: Data on tariff rates are from World Integrated Trade Solution (WITS). Tariff rate is measured at the HS 8 digit level. We then constructed an average tariff rate at the HS 6-digit level weighted by the share of imports. Each product has several rates depending on the source of imports in Canada (free trade agreement, MFN rate, GSP rate). We obtain country-product specific tariff rates based on the import source country's tariff code with Canada.

Country Characteristics: Data on country distance from Canada and language is from the CEPII gravity website. We use distance weighted by population to measure the distance between an import source country and Canada (see Mayer and Zignago (2011) for a discussion of the construction of this variable). The proxy of language similarity is an indicator of common official language (English or French). It is also from the CEPII website. The GDP and GDP per capita of the import source countries in current US dollars are from the World Development Indicators.

A.2 Summary Statistics of Key Variables

As discussed above, key variables used in this paper are at the product-country level, product level or country level. We present summary statistics in separate tables. Table 10 reports summary statistics for measures of the share of indirect imports and tariff rates. Table 11 present summary statistics for product-level key variables at the HS6 level. On average, there are 3,729 intermediate and capital products and 1,194 consumption products (2002 HS6) imported in Canada during the sample period. Table 12 provides summary statistics for country level key variables.

Table 10: Summary Statistics: Product-Country Level

	Intermediate+Capital			Consumption			Overall		
	N	MEAN	SD	N	MEAN	SD	N	MEAN	SD
Tariff Rate	711785	1.97	3.69	371605	7.69	11.28	1083390	3.93	7.74
Share of Indirect Imports	642665	0.64	0.42	349685	0.60	0.42	992350	0.62	0.42
Share of Indirect Imports (Including Mixed)	670050	0.59	0.43	355095	0.59	0.42	1025145	0.59	0.43
Share of Indirect Imports (M+W+R)	677500	0.57	0.43	361700	0.54	0.43	1039200	0.56	0.43

Notes: 1. Tariff rates are in percentage. 2. Share of indirect imports is the share of imports by pure wholesalers in the imports by pure manufacturers and pure wholesalers if the product is a intermediate or capital product, and in the imports by pure retailers and pure wholesalers if the product is a consumption product. 3. "Including Mixed": imports by both mixed and pure firms. 4. (W+M+R): share of indirect imports with denominator including imports by pure retailers, wholesalers and manufacturers.

Table 11: Summary Statistics: Product Level

	Intermediate+Capital			Consumption			Overall		
	N	MEAN	SD	N	MEAN	SD	N	MEAN	SD
Number of Products (HS6)	40980	3729.01	115.30	13120	1194.02	37.92	54100 4923.02	153.14	
Smallness Index	40980	0.89	0.54	13120	4.37	1.36	54100	1.74	1.70
Non-importer Index	40980	0.90	0.71	13120	7.06	2.56	54100	2.40	2.99
Wholesale HHI	40845	0.15	0.19	13115	0.08	0.12	53960	0.13	0.18
Product Complexity	40220	0.44	0.21	13020	0.52	0.18	53240	0.46	0.20
CV of Unit Import Cost	34635	1.85	2.58	11345	3.89	4.87	45980	2.36	3.41
Differentiated Product Dummy	40980	0.54	0.50	13120	0.70	0.46	54100	0.57	0.49

Notes: Wholesale HHI measures firm-product concentration at the HS4 level and the maximum number is 1, Differentiated product dummy is based on Rauch (1999) classification (liberal).

Table 12: Summary Statistics: Country Level

	Intermediate+Capital			Consumption			Overall		
	N	MEAN	SD	N	MEAN	SD	N	MEAN	SD
GDP	2030	292.27	1203.73	2010	295.07	1209.37	2040	291.30	1201.78
GDP per Capita	2030	12200.00	17808.28	2010	12200.00	17868.60	2040	12100.00	17788.94
Number of Countries	2350	213.66	2.06	2295	208.78	3.27	2370	215.28	1.35
Distance	2350	9054.94	3390.24	2295	9037.85	3397.21	2370	9085.81	3405.91
Common Official Language Dummy	2350	0.48	0.50	2295	0.48	0.50	2370	0.48	0.50

Notes: GDP is in billions of current US dollars. GDP per capita is in current US dollars. Distance is in kilometres.

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7 Supplementary Appendix: Theoretical Framework

We summarize a simple partial equilibrium model with firm-heterogeneity (Melitz, 2003) where domestic manufacturers or retailers differ by their size due to productivity differences and decide which channel to source a product that they need among three possibilities: indirect foreign sourcing through intermediaries, direct foreign sourcing, or domestic sourcing.

A domestic manufacturer/retailer selling a product j faces demand $q_j(p_j) = Ap_j^{-\sigma}$, where p_j is the market price of product j, σ is the elasticity of substitution among products belonging to the relevant product group, and A collects the other terms.[1]

A firm l, with productivity γ_l and supply channel k, sets price $p_{j,k}$ maximizing profit $\pi_l = p_{j,k}q_{j,k}(p_{j,k}) - c_{j,k}\frac{q_{j,k}(p_{j,k})}{\gamma_l} - f_{j,k}$, where $c_{j,k}$ and $f_{j,k}$ are respectively the unit and fixed costs associated with supply channel k. The production technology is the simplest possible since each unit of output requires one unit of intermediate input. This corresponds to a retailer: input and output are identical which means that the size of the market, and the elasticity of substitution, are the same for inputs and for output. This equivalence holds for manufacturers provided there is a correspondence between the size of the market for output and the demand for input and that more differentiated products require more differentiated inputs.

The optimal price is $p_l = \left(\frac{\sigma}{\sigma-1}\right)\frac{c_{j,k}}{\gamma_l}$ exhibiting a decreasing (fixed) markup with higher elasticity of substitution since $\sigma > 1$. Given source k, the demand for input by a firm selling product j is

$$i_{j,k} = \frac{A}{c_{j,k}^{\sigma}}\left(\frac{\sigma-1}{\sigma}\right)^{\sigma}\gamma_l^{\sigma-1}. \tag{A.1}$$

A firm's demand for input is therefore increasing with its own productivity, and thus its size, as well as with the size A of the market in which product j belongs. It is also decreasing with a higher elasticity of substitution, and with a higher unit cost $c_{j,k}$.

The domestic manufacturer/retailer's optimal profit conditional on input-sourcing k is thus:

$$\pi_l(k) = A\frac{(\sigma-1)^{\sigma-1}}{\sigma^{\sigma}}\left(\frac{\gamma_l}{c_{j,k}}\right)^{\sigma-1} - f_{j,k}. \tag{A.2}$$

We make the following assumptions regarding costs. First, the unit-costs are:

$$c_{j,H} > c_{j,I} \geq c_{j,D}, \tag{A.3}$$

where $k = H, I, D$ is respectively domestic, foreign-indirect, and foreign-direct sourcing of product j.[2]

Eq. (A.3) makes the reasonable assumption that import occurs when the foreign unit cost (direct or indirect) is lower than the domestic one and, given intermediaries' markup, the indirect import unit cost is generally not lower than the corresponding direct unit cost unless bulk purchases reverse the second inequality.

Second, the inputs are perfect substitutes across the three sources. Thus, a re-

[1] It includes the share of expenditure devoted to the group of differentiated products and the price index among these products; it thus depends on the number of relevant products and the market size.

[2] The unit cost is country-specific only in the foreign-direct sourcing case. Keeping track of country sources is not needed for the arguments and is thus ignored.

tailer/manufacturer chooses a single source.[3] To get firm's sorting by buying source, fixed costs are needed. Specifically, we assume

$$f_{j,k} = \begin{cases} 0 & k = H; \\ F_{j,k} \geq 0 & k = I, D. \end{cases} \tag{A.4}$$

The interpretation of $F_{j,D}$ is that a domestic firm faces a country- and/or a product-specific fixed cost associated with direct imports, while, with indirect imports, it faces a fixed-fee paid to the intermediary. In this case, the intermediary charges a two-part tariff $(c_{j,I}, F_{j,I})$. We assume that the fixed cost faced by a firm that imports directly is higher that the fixed-fee charged by the import intermediary $(F_{j,D} > F_{j,I} \geq 0)$. Clearly, given (A.3), domestic sourcing is never selected when the intermediary does not charge a fixed fee $(F_{j,I} = 0)$. Thus the important assumption for the sorting of firms with respect to import channels is that direct imports involve a positive fixed cost (i.e., $F_{j,D} > 0$).

The difference $(F_{j,D} - F_{j,I})$ can be interpreted as reflecting the advantage associated with indirect over direct imports. Since $F_{j,D}$ is a cost faced by direct importers, it includes administrative and coordination costs of shipping and custom clearing, as well as searching and matching costs including those to control product quality and specification. By specializing with respect to products or countries, intermediaries can spread these costs across firms or lower them through knowledge accumulation. But this advantage also depends on market structure since a higher fixed fee reduces this advantage.

Using optimal profits given indirect and direct sourcing, a firm chooses indirect sourcing when

$$F_{j,D} - F_{j,I} > A\frac{(\sigma-1)^{\sigma-1}}{\sigma^{\sigma}}(\frac{\gamma_l}{c_{j,D}c_{j,I}})^{\sigma-1}\left[c_{j,I}^{\sigma-1} - c_{j,D}^{\sigma-1}\right]. \tag{A.5}$$

Figure 1 illustrates firm-sorting by buying sources when the parameters of the model are consistent with the three of them. Increasingly efficient manufacturers/retailers switch from domestic to indirect foreign sourcing (segment a-b) and then to direct importing. Not surprisingly, the greater $(F_{j,D} - F_{j,I})$, the more important is the relative importance of indirect imports.

Indirect import sourcing depends on the segment a-b in Figure 1. Point a is determined by $\pi_l(c_{j,H}, F_{j,H} = 0) = \pi_l(c_{j,I}, F_{j,I})$ and thus by

$$\tilde{\gamma}^{\sigma-1} = \frac{F_{j,I}}{A}\left(\frac{\sigma^{\sigma}}{(\sigma-1)^{\sigma-1}}\right)\left(\frac{1}{\frac{1}{c_{j,I}^{\sigma-1}} - \frac{1}{c_{j,H}^{\sigma-1}}}\right). \tag{A.6}$$

Point b is determined by $\pi_l(c_{j,I}, F_{j,I}) = \pi_l(c_{j,D}, F_{j,D})$ and thus by

$$\bar{\gamma}^{\sigma-1} = \left(\frac{F_{j,D} - F_{j,I}}{A}\right)\left(\frac{\sigma^{\sigma}}{(\sigma-1)^{\sigma-1}}\right)\left(\frac{1}{\frac{1}{c_{j,D}^{\sigma-1}} - \frac{1}{c_{j,I}^{\sigma-1}}}\right). \tag{A.7}$$

Because of (A.3), (A.6) and (A.7) are positive. Point a is to the left of point b whenever

[3]See Muris et al. (2022) (and the literature reviewed therein) for an analysis in which firms may choose two sources in the presence of perfect substitutes.

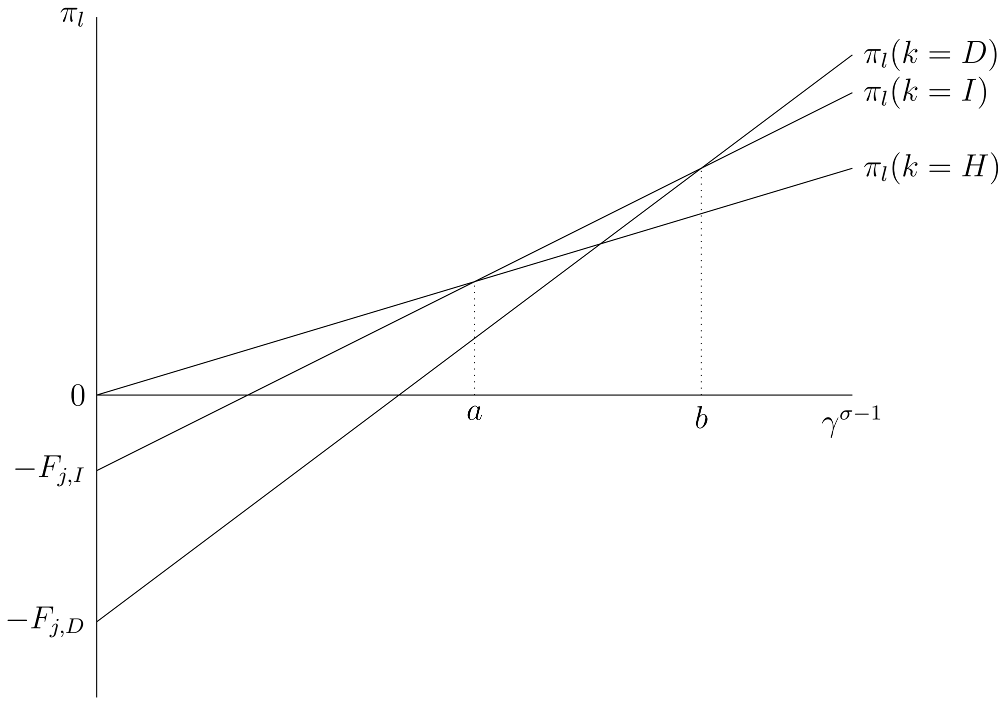

Figure 1: Firms' import channels

$\tilde{\gamma}^{\sigma-1} < \bar{\gamma}^{\sigma-1}$ and thus

$$\frac{(\frac{c_{j,H}}{c_{j,D}})^{\sigma-1} - 1}{(\frac{c_{j,H}}{c_{j,I}})^{\sigma-1} - 1} < \frac{F_{j,D}}{F_{j,I}}. \tag{A.8}$$

Both ratios are greater than one when (A.3) holds. Thus, the greater the ratio $\frac{F_{j,D}}{F_{j,I}}$, the greater the differences between $c_{j,H}$, $c_{j,I}$ and $c_{j,D}$ can be for indirect foreign sourcing to occur. Alternatively, given $c_{j,H}$, $F_{j,D}$ and $F_{j,I}$, $c_{j,D}$ cannot be too low with respect to $c_{j,I}$ for indirect sourcing to occur.

The following results hold:

Proposition: *Everything else being equal, more firms choose indirect import:*

1. *the smaller the market size of the final product;*
2. *the smaller the average size of the domestic manufacturers/retailers using/selling this product;*
3. *the greater the competition among intermediaries;*
4. *the larger the gains associated with the services provided by import-intermediaries for this product;*
5. *the higher the barriers to trade;*
6. *the less differentiated the final products provided γ is sufficiently low;*
7. *the more differentiated the final products when γ is not sufficiently low, or when it is but $F_{j,D} - F_{j,I}$ rises sufficiently with product differentiation.*

On Figure 1, propositions 1.1 to 1.3 hold because these forces make the slope of the indirect import schedule closer to that of the direct imports one, which increases a-b by shifting b to the right. With proposition 1.4, the slope of the two schedules remains the same but a higher difference $F_{j,D} - F_{j,I}$ increases a-b.

Consider now propositions 1.5-1.6. To establish that, every thing else being equal, points a and b associated with free-trade are positioned to the left of the corresponding a and b associated with positive barrier to trade and thus that direct imports fall with higher barriers to trade, we consider a marginal change in the barriers to trade. Consider first the variable trade barrier. Since $c_{j,I}$ appears only once in (A.6), a decrease in $c_{j,I}$ necessarily increases the denominator and thus lowers $\tilde{\gamma}$: point a moves to the left. To establish that b moves to the left as well, differentiate (A.7) and re-arrange such that:

$$\alpha d\bar{\gamma}^{\sigma-1} + \bar{\gamma}^{\sigma-1}(\sigma-1)\left[\frac{1}{c_{j,I}^{\sigma-1}}\frac{dc_{j,I}}{c_{j,I}} - \frac{1}{c_{j,D}^{\sigma-1}}\frac{dc_{j,D}}{c_{j,D}}\right] = 0,$$

where $\alpha = \frac{1}{c_{j,D}^{\sigma-1}} - \frac{1}{c_{j,I}^{\sigma-1}} > 0$. When $\frac{dc_{j,I}}{c_{j,I}}$ and $\frac{dc_{j,D}}{c_{j,D}}$ are negative, the expression in square bracket is unambiguously positive. Thus $\alpha d\bar{\gamma}^{\sigma-1} < 0$ which implies that b must move to the left with lower barriers to trade.

Consider now a fixed barrier to trade. From (A.6), it is immediate that $\frac{d\tilde{\gamma}^{\sigma-1}}{dF_{j,I}} > 0$: when $F_{j,I}$ decreases, so is $\tilde{\gamma}^{\sigma-1}$. Thus point a moves to the left with lower $F_{j,I}$. From (A.7), $d\bar{\gamma}^{\sigma-1} = \text{Sign}[\frac{dF_{j,D}}{F_{j,D}}F_{j,D} - \frac{dF_{j,I}}{F_{j,I}}F_{j,I}]$. Thus $d\bar{\gamma}^{\sigma-1} < 0$ (b moves left) when $\frac{dF_{j,D}}{F_{j,D}}F_{j,D} < \frac{dF_{j,I}}{F_{j,I}}F_{j,I}$. Since $F_{j,D} > F_{j,I}$, it suffices that $\frac{dF_{j,D}}{F_{j,D}}$ decreases more than $\frac{dF_{j,I}}{F_{j,I}}$.

Consider now a change in product differentiation through the elasticity of substitution. The direct effect through the term $\frac{(\sigma-1)^{\sigma-1}}{\sigma^\sigma}$ is unambiguous: higher σ has a negative effect on this term. However the effect becomes ambiguous when the other terms in $sigma$ are taken into account. To establish conditions, we first rewrite the RHS of (A.5) as $f.g$ where $f = A\frac{(\sigma-1)^{\sigma-1}}{\sigma^\sigma} > 0$ and $g = (\frac{\gamma}{c_{j,D}})^{\sigma-1} - (\frac{\gamma}{c_{j,I}})^{\sigma-1} > 0$ since $c_{j,d} < c_{j,I}$. A marginal increase in σ changes $f.g$ by $f'g + g'f$, where $f' = \frac{1}{\sigma^\sigma}(ln(\sigma-1) - ln\sigma)(\sigma-1)^{\sigma-1} < 0$ for $\sigma > 1$ and $g' = (\frac{\gamma}{c_{j,D}})^{\sigma-1}ln\frac{\gamma}{c_{j.D}} - (\frac{\gamma}{c_{j,I}})^{\sigma-1}ln\frac{\gamma}{c_{j,I}}$. A higher σ decreases $f.g$ whenever $\mid f'g \mid > \mid g'f \mid$. A sufficient condition for this to occur is when the firm's productivity γ is low enough. When this condition holds, lower σ could still imply more indirect imports provided the LHS of Eq. (A.5) also rises.

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