Why do firms import via merchants in entrepôt countries rather than directly from the source?

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Abstract

An increasing share of world trade happens indirectly via merchants in third countries, so-called *entrepôts*. This article uses an exhaustive and highly disaggregated dataset for Norwegian firms' import transactions to study the motives for importing through such merchants rather than directly from the source country. I first show that transactions via entrepôts are much smaller than transactions from the source. I then study which factors are associated with the probability of importing indirectly. Source country characteristics – especially high trade barriers and unfavourable geographical locations – are important when time-invariant unobserved heterogeneity is not controlled for. When controlling for this, however, firm- and product-level characteristics stand out as the main drivers. Smaller and less productive firms more often import via entrepôts, especially when importing product-source combinations that are relatively unimportant in their total imports and when importing products with low price dispersion and high value-to-weight ratios. The results are in line with theories suggesting that merchants facilitate trade by offering reduced fixed trade costs for firms that trade through them. As such, they may help smaller and less productive firms to import.

Keywords: International trade; importing; trade costs; merchants; entrepôts.

JEL codes: F12, F14

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1. Introduction

Trade intermediaries such as merchants are found to account for significant parts of international trade (e.g. Feenstra and Hanson, 2004; Bernard et al., 2010; Blum et al., 2018), and many firms trade indirectly through them rather than directly with producers or consumers (e.g. Grazzi and Tomasi, 2016; Maurseth and Medin, 2019).[1] The possibility of trading through merchants can be important for aggregated trade flows. For instance, Bernard et al. (2015) found that the elasticity of aggregated exports regarding the exchange rate was different for indirect and direct trade. Various hypotheses have been advanced about why firms choose to trade via merchants. Several scholars hold that merchants are facilitators that reduce transport costs, asymmetric information or other types of trade-related barriers. This boosts trade by making it profitable for smaller values to be traded, thereby allowing smaller firms to participate in trade or already-trading firms to expand their market portfolios. Others claim that merchants help firms evade tariffs or taxes.

With a few notable exceptions, the major part of the empirical literature studying merchant use in international trade has focused on merchants located in the country where the product is produced; thus, *the source country*, or the country where the product is consumed, will henceforth be called *the destination country* (Akerman, 2018; Ahn et al., 2011; Abel−Koch, 2013; Bai et al., 2017; Bernard et al., 2015; Crozet et al., 2013; Grazzi and Tomasi, 2016; Maurseth and Medin, 2019; McCann, 2013). However, merchants can also be in third countries – entrepôts – where they export products that have first been imported from other countries (re-exporting).[2] Such merchants, henceforth referred to as *entrepôt merchants*, are economically important. They have been found to add significant value to the products they trade even though they are not involved in significant processing (Feenstra and Hanson, 2004), and trade channelled through them can be very large in certain cases. Entrepôt trade has become increasingly important over recent decades.[3] Technical progress in transport and communication, which has spurred international trade and

[1] *Merchants* are companies such as wholesalers and retailers whose main activity is to purchase products from companies and resell them to other companies or consumers without significantly processing them. Medin (2020) contrasts merchant-intermediaries with customs broker-intermediaries. An important distinction between the two is that the former take title of the products they trade, whereas the latter do not. A general discussion of different types of trade intermediaries can be found in, for example, Gitman et al. (2018, ch. 12.2).

[2] Some authors use the concept of *entrepôt* exclusively for countries that are global hubs in international trade. Here, the concept is used for any country that is neither a source nor a destination but where internationally traded products nevertheless change hands. It does not, however, include mere transshipment countries (see also sections 2.2 and 3).

[3] This has been demonstrated in many studies examining the share of a country's total exports that is first imported from other countries and not further processed – the re-export share. For instance, Notten (2015) compared figures for 10 European countries from 2000 and 2010 and found that the re-export shares varied between 2.5% for Finland and 37.9% for the Netherlands and that the shares had increased in almost all the countries. Lankhuizen and Thissen (2019) studied the development in several countries (mostly European) during the same period and found that re-exporting was most pronounced in manufactured goods and had often grown more than total trade. However, the volume of re-exported goods was concentrated in a few countries, and these

the globalisation of value chains, is often mentioned as a possible reason. Not accounting for such indirect trade can lead to significant biases in trade-related analyses (Mellens et al., 2007; Lankhuizen and Thissen, 2019). Even so, official trade statistics often fail to report entrepôt trade accurately, and the definition of re-exports can vary from country to country (Notten, 2015).

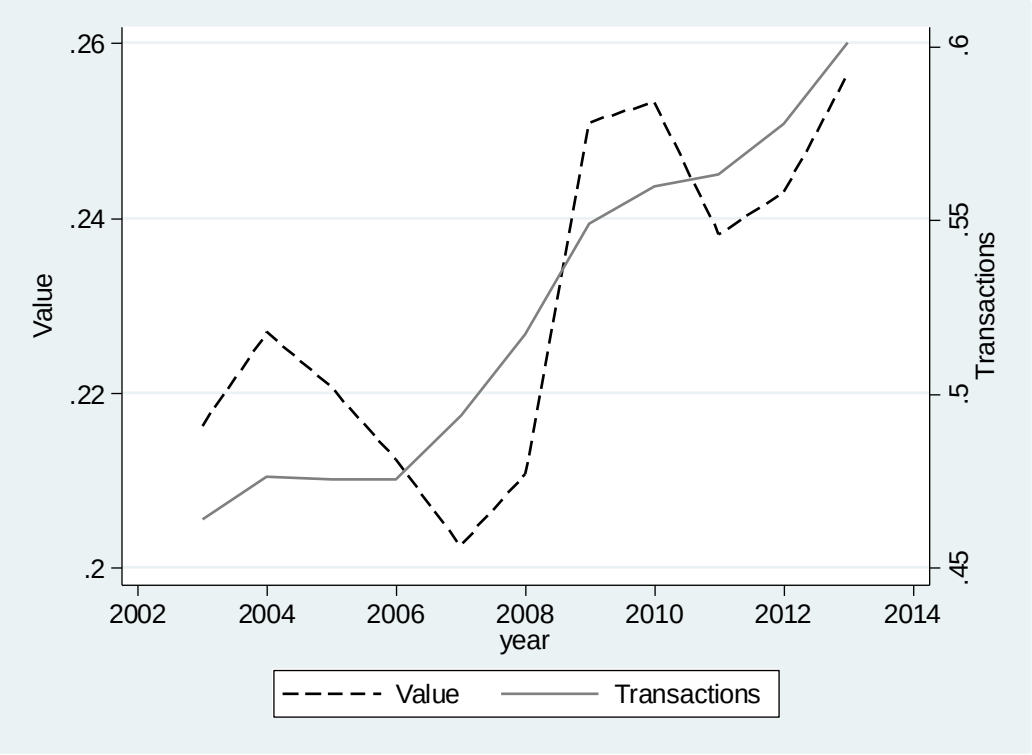
Being a small, open country remotely located on the outskirts of Europe, Norway frequently imports through entrepôts, and this article studies the factors influencing the use of entrepôt merchants. I utilise an almost exhaustive dataset of all import transactions, containing not only information about the source countries from which firms in Norway import but also the entrepôt countries when relevant. Figure 1 shows the share of imports that were indirect, through such entrepôts, in the most important importing sectors from 2003 to 2013. Consistent with the findings for other countries, the shares have been increasing. In the last year of the period, more than 25% of the value and 60% of the transactions were indirect.

Using data at the transaction level has several advantages. First, it is possible to study how import values and prices are associated with firms' choice of import mode (direct versus indirect) while controlling for unobserved heterogeneity at a much more disaggregated level than most other studies. Second, it allows a joint analysis of the features of firms and products as well as of the source countries that influence the importing mode. Therefore, it is possible to assess the relative importance of these features. This distinguishes the article from studies of the use of domestic merchants. To my knowledge, all such studies have been based on data that allow only analyses of how merchant use is associated with either firm-level features or country-/product-level features but not all three features simultaneously (see section 2 for more details). The approach taken here also diverges from the few other studies that investigate merchants in entrepôts. Except for Melchior et al. (2012) and Melchior (2013), these mainly deal with a single entrepôt country (Feenstra and Hanson, 2004; Fisman et al., 2008; Notten, 2015), while I study trade through *all* entrepôts relevant to one single importer. Moreover, other studies of entrepôt trade generally do not

were often highly open and had large seaports with well-developed infrastructure. The Netherlands was by far the most important re-exporter, followed by Germany and Belgium. The UK was also of some importance. Mellens et al. (2007), in turn, reported the annual growth in the re-export share of manufacturing goods between 1995 and 2000 to lie between 10% to 20% in seven European countries and a whole 39% in Finland (but growing from a low initial level). They also reported levels for Singapore and Hong Kong in 2005. In the former, the re-export share amounted to slightly more than one-half. In the latter, it constituted a whole 94%. In both countries, the share had grown over the last decade, but growth was much more pronounced in Hong Kong. For the USA, Andriamananjara et al. (2004) showed that the re-export share increased steadily from the 1970s and reached 10% at the beginning of the 2000s.

analyse the choice of importing mode at the firm level, as here.[4] I find that transactions through entrepôt merchants are smaller than those coming directly from the source and that most variables generally associated with the profitability of importing are negatively associated with importing indirectly. This indicates that entrepôt merchants act as trade facilitators. Characteristics of both importing firms and products matter, and to some extent, also those of source countries.

Figure 1. Development in the share of imports to Norway that were indirect



Note: Indirect imports are purchased in entrepôts rather than directly from the source. All import transactions in Norway above 1,000 NOK during 2003 to 2013 by firms in wholesale, retail and manufacturing are included. Such firms cover 76% of all imports during this period.

Unlike many other firm-level datasets on international trade, the Norwegian data contain information about all sectors, not just manufacturing. This is a great advantage as manufacturing firms account for less than 30% of all imports to Norway. The lion's share (about 50%) is accounted for by firms that are merchants themselves, namely wholesalers and retailers (henceforth, WR). By including WRs in addition to manufacturing firms, I can study

[4] Both Melchior et al. (2012) and Melchior (2013) analyse Norwegian imports through various entrepôts. However, the latter only studies this from one source (India), and none of them assess firm-level decisions. Notten (2015) uses firm-level data, but these only contain information about entrepôt merchants, not the firms that use them. Consequently, he also does not study firms' choices of importing modes.

whether there is an extra trade-facilitating effect of channelling trade through two types of merchants, namely entrepôt merchants and domestically located WRs. Indeed, import transactions going through both types of merchants are even smaller than those only going through only one of them, suggesting a double-trade facilitating effect.

The article is organised as follows. Section 2 describes the theoretical background by presenting the various motives for merchant use suggested in the literature and reviews previous empirical results. Section 3 describes the data and provides stylised facts, while section 4 presents the results from regression analyses. Section 5 offers concluding remarks.

2. Motives for merchant use

Various theories have been advanced regarding why firms trade through merchants rather than directly. Feenstra and Hanson (2004) provide a good overview, supplemented here with a review of more recent literature. Most of the literature has focused on how merchants reduce informational barriers or other trade costs taking the form of fixed or sunk costs, and this is also the focus in this article. Nevertheless, I also briefly describe two alternative motives for merchant use.

2.1 Fixed trade costs and informational barriers

Fixed trade costs can, for example, accrue because it is costly to acquire knowledge about foreign markets and to comply with trade procedures and regulations, organise freight and establish contact with buyers or suppliers. For various reasons, merchants can be particularly able at overcoming such barriers. They specialise in trade and are likely to have made investments in the past leading to lower current fixed costs. Furthermore, since they pool trade between many buyers and suppliers, they can spread the fixed costs out over more firms, products and countries, thereby obtaining lower per-unit trade costs. There is reason to believe that such costs have become relatively more important during recent decades due to significant reductions in variable trade costs, such as tariffs and transport costs.

Recent articles such as those by Ahn et al. (2011), Felbermayr and Jung (2011), Crozet et al. (2013) and Akerman (2018) all present varieties of a model called *the canonical model of export intermediation* in the survey paper by Blum et al. (2018, p. 20). The model builds on Melitz (2003), and, as in that model, a productivity-sorting pattern among firms arises in equilibrium, wherein only firms with productivity above a certain level export, and less-productive firms sell only in the domestic market. The new feature is that the sorting pattern is expanded to include a

third firm type. Firms engaged in international trade can obtain lower fixed trade costs by trading through merchants rather than directly. Doing this involves giving up some of their revenues to the merchants, however. As a consequence, firms with intermediate levels of productivity can earn enough profits from their trade to cover the fixed costs of indirect but not direct trade. Therefore, they choose to use merchants. Crozet et al. (2013) show that a similar pattern arises if firms differ in the quality of the products they produce rather than in productivity. Firms with high-quality products trade directly, and those with intermediate-quality products trade through merchants. Both in the productivity-sorting case and the quality-sorting case, large values are traded directly, and smaller values are traded through merchants.

The results from the export intermediation model should also be relevant in the context of this article even though it focuses of importing. The crucial feature is that a sorting pattern arises in the presence of fixed trade costs. Kasahara and Lapham (2013) show that fixed costs are important in importing as well and that Melitz (2003)-type productivity-sorting can arise among importers in the presence of such costs. Moreover, Defever et al. (2020) show that productivity-sorting can arise among indirect and direct importers of intermediate inputs when the fixed costs of importing indirectly, through wholesalers, are lower than those of importing directly from the producer. However, the focus in that model is not on selection into the different importing modes, and no canonical model yet exists for import intermediation (Blum et al., 2018). In the following, I therefore present the results from the export intermediation model.

In addition to predicting a relationship between trade mode and firm-level characteristics, the model predicts that the characteristics of countries and products matter. In some variants of the model, merchants are used when variable trade costs, such as transport costs and tariffs, are high or markets are small because this reduces the profitability of trade (Ahn et al., 2011; Crozet et al., 2013). In all variants, merchants are used when country- and/or product-specific fixed trade costs are large. This can, for example, be the case if shipping cargo involves a large unit cost per container, product standards differ largely between markets or informational barriers are large.

Nonetheless, large informational barriers are also likely to involve higher risk. The different aspects of risk are not well studied in the model of intermediation beyond the point that securing against risk can take the form of a fixed cost that can, in certain cases, be reduced by using merchants. For example, merchants may specialise in finding their way in markets where it is difficult to do business due to poor regulatory conditions or bad logistics systems or

in revealing the content and quality of complex products. However, trading through merchants may also increase risk. For example, product-specific asymmetric information between buyers and sellers is likely to be large for complex and high-tech products that contain significant service components. Contracts can then be more difficult to enforce, monitoring costs can be larger and essential information can get lost if it is passed through many actors. Authors such as Peng and Ilinitch (2001) hold that monitoring costs and the risk of contract breach can be reduced by trading directly rather than through merchants due to a then-closer relationship between producers and consumers. The variant of the intermediation model suggested by Felbermayr and Jung (2011) addresses some of these issues. They assume that enforceable sales contracts between exporting producers and merchants located in a destination country are impossible to write and that merchants ex post can deny purchasing an order upon which they had previously agreed. This results in producers using merchants if the contractual frictions are small or their products are easily sold in markets other than those initially intended for them (low market specificity).

Predictions about prices diverge in the different variants of the model of intermediation. All of them predict that merchant use pulls in the direction of higher consumer prices because merchants add a fee or mark-up to the producer price either because they face extra variable trade costs or because they have market power. Felbermayr and Jung (2011) also hold that the mark-up is higher when the market specificity of the product is larger because this increases the bargaining power of the merchants. If firms vary in their productivity, as in the standard case, an additional effect pulls in the direction of higher consumer prices for products traded through merchants. The producer price is inversely proportional to the firm's productivity level, implying that less-productive firms (which are the ones that use merchants) also charge higher producer prices. These, in turn, are passed on to consumers. However, if firms vary instead according to quality, as in Crozet et al. (2013), firms with high-quality products charge high producer prices, earn large profits and trade directly. In this case, the producer price of firms selling through merchants is lower than that charged by firms selling directly (because products sold through merchants are also lower quality). This pulls in the direction of lower consumer prices for indirectly traded products. The net effect is uncertain because the price-increasing effect of the fee/mark-up added by merchants pulls in the opposite direction.

Most studies testing the hypothesis of merchants reducing fixed trade costs study merchants located in the source or destination country, not an entrepôt. There are two types of such studies. Those of the first type compare firms that trade through domestic merchants to firms that trade directly (Ahn et al., 2011; Abel−Koch, 2013; McCann, 2013;

Grazzi and Tomasi, 2016; Bai et al., 2017; Maurseth and Medin, 2019). Generally, these studies are not based on customs declaration data because firms that trade through merchants at home are not registered in customs. Instead, such studies are typically based on survey data, where producers are asked whether they trade indirectly or directly. The general lesson from these studies is that various indicators of firm size and productivity are positively correlated with the inclination to trade directly, thereby yielding support to the hypothesis. A weakness, however, is that they can only analyse how the choice of trading mode is influenced by firm-level features, not features of partner countries and products, as such information is not available in the survey data used.[5]

Studies of the second type, in turn, analyse how merchant use is associated with the characteristics of products and countries but not firms. The reason is that they do not compare the producers that trade directly to those that trade indirectly but rather to the intermediaries themselves – the domestically located merchants. For example, Ahn et al. (2011), Crozet et al. (2013), Bernard et al. (2015) and Akerman (2018) used customs declaration data from, respectively, China, France, Italy and Sweden and found that trade by merchants relative to producers increased with distance. Furthermore, all these studies except Bernard et al. (2015) determined that it decreased with the size of the partner country, and all but Ahn et al. (2011) discerned that it increased with country-specific risk in the form of difficulty in doing business. Ahn et al. (2011) and Crozet et al. (2013) also demonstrated that trade by merchants increased with tariffs. All these results are in line with the hypothesis of merchants reducing fixed trade costs.

Regarding prices, the empirical results diverge. Whereas some papers find that merchants charge higher prices than direct traders for the same product (Ahn et al., 2011), others find the opposite (Bernard et al., 2010, on US importers and exporters). Some also find that this varies according to product features. In line with their proposed theory, Crozet et al. (2013) showed that merchants charged higher prices than direct traders for (presumably) productivity-sorted products but that the opposite was true for (presumably) quality-sorted products.

[5] Bai et al. (2017) combined customs declaration data with survey data and studied merchant use among Chinese producers of rubber and plastic. However, they did not study how country and product characteristics influenced merchant use as this information was not available for the merchant users. There are a couple of related articles studying the use of domestic trade intermediaries based on customs declaration data. Medin (2020) studied the use of customs brokers among exporters and importers in Norway, and Carballo et al. (2016) studied exporting through a simplified scheme using postal offices in Peru. However, the intermediaries studied in these papers were agents (customs brokers and post offices), who do not take hold of the traded products, as opposed to merchants, who do. Furthermore, only Medin (2020) analysed how intermediary use related to the features of firms, partner countries and products. Carballo et al. (2016), rather, focused on how intermediary use influenced the ability to export.

Results also diverge as to whether merchants mitigate risk related to asymmetric information on product quality and content. Bernard et al. (2015) studied how merchant use was related to two measures of product differentiation – price dispersion and so-called *relation specificity* – reflecting the commodity content of the product. In line with the hypothesis of complex products being traded directly, they found that both these measures were negatively associated with merchant use. Poncet and Xu (2018), conversely, found some indications of a quality-assuring role for merchants. They distinguished between different types of merchants and found that those specialising in few products often traded products where (inferred) quality dispersion was larger.

Only a few studies address the hypotheses of fixed trade costs and informational barriers by studying entrepôt merchants. One is Feenstra and Hansson (2004), who looked at the impact of product and destination country features by comparing Chinese exports via merchants in Hong Kong to those sold directly to the final destinations. They found that the price charged when a re-exported Chinese product left Hong Kong relative to that paid when it entered Hong Kong (the re-export mark-up) was positively correlated with destination features such as distance. So was the share of Chinese exports channelled through Hong Kong relative to that sold directly (the re-export share). The authors took these results as indications of merchants reducing asymmetric information. They also found that the re-export mark-up and share were positively correlated with a dummy for product differentiation, supporting theories of merchants as guarantors of product features.

2.2 Saving transport costs and evading tariffs

A frequently mentioned motive for using merchants, especially when they are located in entrepôts, is transport cost savings. Authors such as Andriamananjara et al. (2004), Wang and Wang (2011), Kojaku et al. (2019) and Ganapati et al. (2020) discuss how rapid change in transportation technology during recent decades has strengthened economies of scale in transportation (in addition to causing a vast reduction in shipment costs and contributing to a stark globalisation of value chains). This, in turn, has enhanced a hub-and-spoke system in international trade, where most products traded over long distances are first transported by large container ships to certain hub countries with favourable geographic locations, strong histories of maritime trade and large seaports with well-developed infrastructure. Thereafter, transport to final destinations is done by smaller ships or other means of transportation. Classic examples of global hubs are Hong Kong, Singapore and the Netherlands. However, many countries may act as hubs for certain countries or regions. Sweden, for example, is the most important hub for Norway (see section 3).

The hub-and-spoke system gives rise to an industry of merchants in the hub, and, as pointed out by Feenstra and Hanson (2004), firms may not only find it profitable to transship products through the hub but also to buy and sell from the merchants located there, who may specialise in coordinating trade in the whole region. In addition to the motives for merchant use described above, a reason for this could be that economies of scale in shipping enable merchants to obtain lower per-unit transport costs than other firms. A single producer or consumer may not have enough freight to fill a container in one shipment, but merchants that pool trade from many actors can more easily adjust their freight volumes to minimise per-unit trade costs (Blum et al., 2018). Similarly, advanced logistics services are often technology intensive and subject to economies of scale (WTO, 2016); thus, merchants pooling trade from many actors are also likely to obtain lower unit costs of storage and logistics. Such transport cost savings motives for merchant use are not at odds with the ideas from the model of intermediation. Also here, merchants offer an opportunity for reduced fixed trade costs for firms that trade through them.

Finally, some scholars mention tax or tariff evasion as a motive for merchant use. They hold that merchants are more frequently used when tariffs or taxes are higher and that multinational firms more often employ merchants because they are in a better position to use them to manipulate prices and shift income from high-tax to low-tax countries. Fisman et al. (2008), for instance, showed that for products with higher tariffs, more imports to China were indirect through Hong Kong rather than direct from the source. The authors took these results as indications of tariff evasion. Nevertheless, the findings should not be seen as unambiguous evidence of this. Again, they are compatible with the ideas from the model of intermediation, where higher tariffs are likely to yield lower profits from trade and, hence, make it more difficult to earn enough to cover the fixed costs of trading directly. Furthermore, more frequent merchant use among multinationals may not only reflect evasion. A large share of sales by foreign owned-companies, in Norway and elsewhere, happens through local affiliates (Melchior et al., 2016).[6] It may simply be that merchant use among such affiliates is less costly because they can utilise the distributional networks of their mother companies.

3. Data and stylised facts

The dataset used for the analysis is a confidential and almost complete record of all Norwegian import transactions of all products except raw oil and natural gas from 2003 to 2013, and it contains more than 100 million transactions.

[6] Table A2 in the appendix shows that about one-quarter of all import observations in the empirical analysis presented in section 4.2 regard foreign-owned companies.

It is based on customs declarations and provided by Statistics Norway (actual name of SSB). For each transaction, the Norwegian customs regulations oblige the importer to declare its organisational number and importing date in addition to the weight, value and source country of the imported product.[7] If the importer does not purchase the product directly from the source, it must also report the country where it is purchased. That country is here defined as the entrepôt.[8] This implies that mere transshipment is excluded from the definition of indirect trade and cannot be an explanation for the large and increasing shares of such trade found in Figure 1 in the introduction. Product processing in entrepôts is also ruled out because, according to the customs regulations, the product cannot have been significantly changed after leaving the country reported as the source. The data do not contain any information about the foreign exporter beyond the country of location.[9] However, from the definition of entrepôts, we know that an exporter located there didn't produce the exported product itself, but rather imported it from abroad, either directly or indirectly thorough another firm in the entrepôt. Therefore, it is reasonable to assume that it is a merchant. In the following, it is thus assumed that all imports reported to be indirect via entrepôts in the data are purchased from merchants.

I combine the customs declaration data with data on features of the importers, which include the importers' sectoral affiliation (also confidential and provided by SSB's *structural statistics*). This information is generally only available for companies in private, non-financial and non-primary sectors. Therefore, the analysis is limited to such firms. These firms cover a large part of total imports during the sample period – 88% of the value and 84% of the transactions. The focus on firms excludes imports by private consumers, and thus, smaller internet transactions are also not likely to be an explanation for the increase in indirect imports shown in Figure 1.[10] The analysis is further limited to firms from two main sectors, which together account for the major part of imports, namely manufacturing firms (accounting for 28% of the total import value) and WRs (accounting for 48%).[11]

[7] Products classified according to eight-digit categories in the harmonised system (HS).
[8] Note that a product may have changed hands several times in different countries on its way to Norway, and thus it may have passed through more than one entrepôt country. The data contain information only about the entrepôt where the product last changed hands before entering Norway.
[9] Consequently, it is not possible to distinguish between arm's-length and intra-firm trade.
[10] Adding to this is the fact that transactions below 1,000 NOK (=170 USD in 2013) are not included in the data and that small internet transactions are likely to be below 350 NOK due to a significant tax advantage (VAT exemption) for such transactions.
[11] The remaining firms belong to a variety of sectors, mainly service providers, which are highly heterogeneous and difficult to compare. I also disregard firms that switch sectoral affiliation from manufacturing to WR or the other way around during the sample period. Furthermore, I drop transactions regarding products temporarily exported from Norway only to be re-imported later and products temporarily imported and then re-exported. The trade value accounted for by such transactions is marginal.

Comparing these two types of firms is indeed interesting as their importing activities are quite different. As shown in Table A1 in the appendix, WRs mainly import consumer goods, while manufacturing firms mainly import goods intended for production. WRs have much smaller total import values, the annual average among all firms during the sample period being only half of that of manufacturing firms (which amounts to approximately 19 million constant 2014 NOK). Even so, there are only small differences in the number of countries imported from (the median being around three), and the number of imported products is actually larger for WRs (the median amounts to seven for them and five for manufacturing firms).[12] These figures also translate into WRs having much smaller transaction values than manufacturing firms; the mean and median are more than five times larger for the latter than the former (see summary statistics for $TrValue_{kivi,t}$ in Table A2 in the appendix). Concerning the importing mode, both types of firms engage in both modes, but WRs clearly import more indirectly than manufacturing firms. More than half of all transactions by WRs are indirect, but this is so for only 14% of those by manufacturing firms (see summary statistics for $dTrIndir_{kivj,t}$ in Table A2 in the appendix). From Figure 1 in the introduction, smaller transactions are more commonly imported indirectly, and it is worth mentioning that the average transaction value decreased during this period, from 43,000 to 37,000 NOK. This was due to a decrease in the size of indirect transactions, and thus, decreasing transaction values may explain the increasing share of indirect imports. Furthermore, the differences between WRs and manufacturing firms regarding importing mode indicate that mode choice depends on firm-level features such as sectoral affiliation and size.

Other features also are likely to matter. Certain products are more often imported directly, and this regards products imported mainly by one type of firm as well as products imported by both types. As shown in Table A1 in the appendix, it is common to directly import commodities used in nickel production (mainly imported by manufacturing firms); cars and mineral fuels (typically imported by WRs); and wood, iron/steel structures and machinery (often imported by both firm types). Common for such products is that they have low value-to-weight ratios. Thus, transport costs are likely to constitute a high share of their import value. This is somewhat consistent with the findings by Andriamananjara et al. (2004), who showed that re-exports by the USA often regarded luxury

[12] The considerably smaller import values for WRs are somewhat surprising since these firms pool trade from many producers. Nevertheless, this is consistent with the findings from some other studies on merchants located in the country of production or consumption (see Blum et al., 2018, and Bernard et al., 2010, for, respectively, Chile and the USA). However, not all studies agree on this point. Utar (2017) showed that among exporters in Denmark, WRs traded smaller values than manufacturing firms, whereas the opposite was true among importers. Concerning the number of products, both Utar (2017) and Blum et al. (2018) revealed that WRs imported and exported a much larger number of products than did manufacturing firms but that they did not trade with a larger number of partner countries. On the contrary, the number of countries traded with was often smaller.

consumer goods with high value-to-weight ratios. They also found that more homogeneous goods were generally shipped directly. However, unlike in this article, their definition of indirect trade includes transshipment, and the patterns for Norwegian imports are less clear cut. Many quite distinct products are imported both directly and indirectly. This is true for some heavyweight products such as vehicles used for goods transport, some highly complex products such as medical equipment and some homogeneous products such as fish residuals and microchips. It is also true for products imported mainly by one type of firm and for products imported by both. Only a couple of the listed product groups – both imported mostly by WRs – are heavily dominated by indirect imports, namely televisions and computers.

The characteristics of source countries may also play a role. Most firms – WRs as well as manufacturing firms – switch between importing directly and indirectly different products from different sources (see footnote 19 in section 4.2). During the sample period, the vast majority of imports to Norway from Northern Europe were bought directly from the source, whereas imports from more distant countries were more often indirect. For example, almost 60% of the total import value originating in China was bought indirectly through merchants in other countries. Consequently, features of countries well as products and firms are likely to matter for the choice of importing mode, and in section 4.2, I will study this more systematically.

Which countries act as entrepôts for Norway? The data reveal that several well-known global entrepôts are important. Hong Kong, for example, ranks ninth among the countries that channelled the largest trade values from other sources to Norway and first among non-European countries. Even so, most countries to some extent function as entrepôts for Norway, and certain geographically close but larger and more centrally located countries are quite important. Among these is the neighbouring country Sweden, which is actually the most important entrepôt (in addition to being the most important source).[13] The trade the country channels to Norway from other sources amounts to a whole 50% of Norwegian imports of Swedish-produced goods. Some countries are both geographically close to Norway and global entrepôts; the Netherlands, for example, is the second-most important entrepôt for Norway. [14]

[13] Sweden accounted for 34% of all Norwegian indirect imports over the sample period. The other Scandinavian country, Denmark, accounted for 15%.

[14] In the regression analysis in section 4.2, I will use a dummy variable for 22 countries defined as global hubs. These are defined on the following grounds: 19 of them (China, Hong Kong, South Korea, Malaysia, the USA, Russia, Canada, Saudi Arabia, Singapore, Egypt, the UK, Belgium, Germany, the Netherlands, France, Spain, Indonesia, Thailand and Japan) have at least one of the 25 largest ports in the world according to measures constructed by either Wang and Wang (2011, Table 2, p. 58) or Kojaku

4. Regression analyses

4.1 Trade values, volumes and prices

Figure 1 in the introduction clearly demonstrates that the average transaction value was lower for indirect transactions. This is consistent with merchants facilitating trade by offering lower fixed trade costs for firms that use them. To more systematically analyse how transaction values, volumes and prices relate to merchant use, I estimate the following regressions by OLS.

(1) $x_{kivj,t}=\alpha + \beta_1 dTrIndir_{kivj,t} + \beta_2 dWR_i + \beta_3 dTrIndir_{kivj,t} * dWR_i + FE + e_{kivj,t}$

$x_{kivj,t}$ is either the log of the import value, $TrValue_{kivj,t}$, the log of the import weight, $TrWeight_{kivj,t}$, or the log of the import price (value per weight), $TrPrice_{kivj,t}$, of transaction *k*, which concerns imports by firm *i* of product *v* from source country *j* in year *t*. $dTrIndir_{kivj,t}$ is a dummy equal to 1 if importing is indirect via an entrepôt merchant and 0 if its direct from the source. As mentioned, merchants may not only be located in entrepôts, and the Norwegian data also allow the study of domestically located importing merchants. This is done by including a dummy for firm *i* being a WR rather than a manufacturer (dWR_i). I also include an interaction term between $dTrIndir_{kivj,t}$ and dWR_i to control for any differences in the influence of $dTrIndir_{kivj,t}$ between manufacturing firms and WRs. *FE* are fixed effects (at different levels in different specifications), and $e_{kivj,t}$ is an error term. Table 1 presents the results.[15]

The upper panel of the table depicts the results for values, and column (1) shows the results when no fixed effects are included. Both types of indirect transactions – via entrepôts merchants or domestically located WRs – are clearly smaller in value than direct transactions. From columns (2) and (3), this also holds when including fixed effects at very disaggregated levels: combined product−year ($FE_{v,t}$) and combined product−source−year ($FE_{vj,t}$), respectively. The result for transactions via entrepôts even prevails when firms are added to the combined fixed effects ($FE_{ivj,t}$ column 4).[16] Doing this, we can still identify β_1 and β_3 thanks to the highly disaggregated data; some firms switch

et al. (2019, Table 1, p. 8). Furthermore, based on data for re-exports, Andriamananjara et al. (2004) define nine countries (including the EU) as being 'Principal transshipment countries of the world' (Table 1). Two of these are not among the 19 mentioned above (the United Arab Emirates and Australia), and these are also defined as global hubs. In addition, Italy – also not among the 19 – is considered a hub because Andriamananjara et al. (2004, Table 2) list it as the fourth major EU re-exporter (the four other countries constituting the five largest EU re-exporters are among the 19 mentioned above). These 22 hub countries accounted for 44% of all Norwegian indirect imports over the sample period.

[15] All the analyses with fixed effects were carried out using Correia's (2016) *reghdfe* routine in Stata 16.1, which allows for linear estimation with high-dimensional fixed effects. The number of observations and clusters varies across the estimations with different fixed effects because singletons are dropped in accordance with recommendations. Singletons are observations that, within fixed effects groups, appear only once during the sample period .

[16] In other words, $FE_{v,t}$ is equal to an interaction between a product fixed effect and a year fixed effect, $FE_{vj,t}$ is equal to an interaction between $FE_{v,t}$ and a source country fixed effect, and $FE_{ivj,t}$ is equal to an interaction between $FE_{vj,t}$ and a firm fixed effect.

between importing directly and through an entrepôt the same product from the same source during the same year, so there is still variation within $dTrIndir_{kivj,t}$. However, the main effect of dWR_i (β_2) is no longer possible to estimate, since it is completely soaked up by $FE_{ivj,t}$. It could be that the lower import values found for WRs relative to manufacturing firms in specifications (1)–(3) are driven by other differences between firms than sectoral affiliation. Differences in size, for instance. Indeed, from $NoEm_{i,t}$ in Table A2 in the appendix it can be seen that WRs are considerably smaller than manufacturing firms. Even though the main effect of dWR_i cannot be calculated in specification (4), the interaction effect can, and the estimated β_3 is significantly negative. This means that the negative association between importing through an entrepôt merchant and import value is stronger for WRs than for manufacturing firms. *Ceteris paribus* for manufacturing firms, transactions via entrepôts are 25% smaller than those coming directly from the source, whereas for WRs they are 45% smaller.

The mid-panel shows the results for import weight. As can be seen, the estimated effects are similar to those for value but somewhat larger in magnitude for manufacturing firms. The explanatory power of the model is also higher. Taken together, the results for value and weight strongly support the view that entrepôt merchants act as facilitators, allowing for smaller transactions to take place. To some extent, they also indicate that domestic merchants act as facilitators.

Table 1. Transaction values and prices when importing through merchants

	(1)		(2)		(3)		(4)	
	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.	Coef.	S.e.
Dependent variable: transaction value ($TrValue_{kivj,t}$)								
$dTrIndir_{kivj,t}$	-0.87 ***	0.10	-0.75 ***	0.06	-0.96 ***	0.05	-0.25 ***	0.04
dWR_i	-0.88 ***	0.06	-0.74 ***	0.04	-0.61 ***	0.03	n.a	
$dTrIndir_{kivj,t} * dWR_i$	-0.04	0.11	0.02	0.07	-0.05	0.06	-0.20 ***	0.06
# obs	89,836,603		89,834,547		89,588,584		83,792,028	
# clusters	77,170		77,164		76,803		55,039	
R^2	0.14		0.36		0.47		0.71	
Dependent variable: transaction weight ($TrWeight_{kiv,t}$)								
$dTrIndir_{kivj,t}$	-1.83 ***	0.14	-0.89 ***	0.05	-1.09 ***	0.05	-0.27 ***	0.05
dWR_i	-1.25 ***	0.11	-0.72 ***	0.05	-0.53 ***	0.04	n.a	
$dTrIndir_{ki} * dWR_i$	0.60 ***	0.16	0.30 ***	0.06	0.07	0.05	-0.20 **	0.08
# obs	89,836,603		89,834,547		89,588,584		83,792,028	
# clusters	77,170		77,164		76,803		55,039	
R^2	0.11		0.57		0.66		0.84	
Dependent variable: transaction price ($TrPrice_{kivj,t}$)								
$dTrIndir_{ki}$	1.00 ***	0.12	0.10 ***	0.04	0.05 ***	0.02	0.02	0.02
dWR_i	0.46 ***	0.09	0.03 *	0.02	-0.03 ***	0.01	n.a	0.00
$dTrIndir_{kivj,t} * dWR_i$	-0.68 ***	0.14	-0.25 ***	0.05	-0.07 ***	0.02	-0.01	0.02
# obs	70,670,974		70,669,141		70,577,736		66,186,564	
# clusters	72,549		72,544		72,417		51,036	
R^2	0.02		0.78		0.88		0.94	
Fixed effects	none		product-year combined ($FE_{v,t}$)		product-source-year combined ($FE_{vj,t}$)		firm-product-source-year combined ($FE_{ivj,t}$)	

Note. Norwegian imports during 2003–2013. OLS regressions with standard errors (s.e.) clustered at the firm level. In the price regression, the 10% highest and lowest price observations are deleted due to many extreme values. Estimated coefficients for constant terms and fixed effects are not included. *, **, *** indicate significance levels at, respectively, 10%, 5% and 1%.

The lower panel shows the results for prices. Specifications (1)–(3) indicate that indirect transactions, at least those via entrepôt merchants, have higher prices than direct ones. This lends some support to the hypothesis of merchants adding a fee or mark-up to the price, as in the canonical model of intermediation. An additional explanation can be that indirectly imported products are more market-specific, enhancing the merchants' bargaining power, as in Felbermayr and Jung (2012).

However, the prices for products via entrepôts only seem higher for manufacturing firms. WRs actually seem to pay lower prices for such products (since $\beta_2+\beta_3 <0$). A possible explanation is that WRs buy lower-quality products indirectly and higher-quality products directly, as in the quality-sorting case of Crozet et al. (2013). Another explanation can be that only manufacturing firms experience that the products they import through entrepôts have

higher market specificity than those they import directly. This is indeed plausible. As can be seen from Table A1 in the appendix, WRs typically import mass-produced goods for private consumption, such as mobile phones, televisions, apparel, toys and (also used in production) computers, vehicles and mineral fuels. Such products are non-perishable, demanded all over the world and easily sold in many markets. Manufacturing firms, in turn, mainly import goods to be used in production, such as aluminium oxide, fish residuals or specialised machinery. The use of such products is likely more concentrated in certain countries or even specific to single firms. Even though fixed effects for eight-digit product groups are included in (2) and (3), these may not capture all the variation in a product's market specificity.

When firms are added to the combined fixed effects (column 4), none of the results for prices is significant. Again, this may indicate that the observed differences between indirect and direct imports are driven by other differences between firms than sectoral affiliation. This could, for instance, be differences productivity or quality, as predicted in the canonical model of export intermediation.

4.2 Factors influencing merchant use

4.2.1 Data cleaning and econometric specification

The remaining analyses focus on the features of firms, products and source countries driving merchant use. I, therefore, aggregate the data up to a panel where one observation regards imports of firm *i* of product *v* from source *j* in year *t*, with products now categorised at the six- rather than eight-digit HS level.[17] From the aforementioned structural statistics of SSB, I retrieve additional information about the firms, and from various other sources I collect information about products and source countries. This information is added to the data, and observations where it is missing are dropped.[18] In addition, the data are trimmed in the following way: To rule out very atypical observations, all observations that appear only once during the sample period are dropped. Furthermore, to better compare indirect and direct imports across firms, I include only source−product−year combinations where there are at least two importing firms present and both indirect and direct imports. The result is a (highly unbalanced) panel of about 38,000 firms, 1.3 million firm−product−source groups and five million observations covering about 70 % of

[17] Products are aggregated up to six-digit categories for two reasons. First, this makes it possible for a one-to-one match with other data at the product level, such as tariffs and categories for product differentiation. Second, eight-digit categories in the raw data are not consistent over time but vary according to the HS version applied in the relevant year. For six-digit categories, existing concordance tables can be used to make the data consistent over time.

[18] This leads to a near 20% drop in the imports covered by the sample both in terms of import value and the number of transactions.

all transactions and 62% of the import value of WRs and manufacturing firms. All the variables used in the following analyses with definitions, sources and summary statistics are listed in Table A2 in the appendix.

As the dependent variable, I need a variable reflecting the importing mode within firm−product−source groups over time. Since one group can conduct more than one transaction during one year, importing mode is not automatically unique within observations. However, the data reveal that to a large extent it is. This can be seen from the first column (second row) of Table 2, which shows that almost 95% of all observations import everything either directly or indirectly (henceforth: observations of a unique importing mode). In the remaining columns, observations are categorised according to the number of transactions they consist of, and from the second column (first row) it is apparent that one reason for the large share of observations of a unique importing mode is that more than 40% of all observations consist of only one transaction. [19] This is not the only reason, however. Also observations consisting of more than one transaction mainly stick to the same importing mode. Unique-mode observations are dominating even in the category with the largest number of transactions – among the few observations consisting of more than 100 transactions, about three-quarters are of a unique importing mode. For this reason, I construct as the dependent variable a dummy, $dIndir_{ivj,t}$, which is equal to 1 if more than 50% of the import value of observation *ivj*,*t* is indirect and 0 otherwise. In the vast majority of the cases, $dIndir_{ivj,t} = 1$ means that all imports are indirect, and $dIndir_{ivj,t} = 0$ means that everything is direct.

Table 2. Import triplets (firm-product-country) characterized by a unique importing mode in a given year

	All obs.	Obs. categorised according to the number of transactions they consist of					
		1	2	3-5	6-10	10-100	>100
Number of obs.	4,943,834	1,985,804	820,106	928,198	478,893	638,039	92,794
% obs. of a unique mode	94.4	100.0	95.8	92.7	89.3	84.1	76.0

Note: Imports to Norway during 2003 to 2013. One observation regards an import triplet (imports by a given firm of a given product from a given source country) in a given year. An observation can consist of more than one transaction, and observations of a unique importing mode are observations where all transactions are either direct or indirect.

The following regression is then estimated:

(2) $dIndir_{ivj,t} = \alpha + \boldsymbol{\beta}\mathbf{x}_{\mathbf{ivj,t}} + dWR_i + \boldsymbol{\gamma}\mathbf{x}_{\mathbf{ivj,t}} * dWR_i + \mathbf{FE} + c_{ivj} + \varepsilon_{ivj,t}$

[19] In contrast, a whole 96.5% of the sample firms conduct more than one transaction during a year, and only 35% stick to one mode of importing. Consequently, importing mode is much more heterogeneous within firms.

In the equation above, dWR_i is the dummy for the firm being a WR, as defined in section 4.1, and $\mathbf{x_{ivj,t}}$ is a vector of the other independent variables. An interaction term between $\mathbf{x_{ivj,t}}$ and dWR_i is included to consider that different factors may drive the choice of importing mode for WRs and manufacturing firms. **FE** is a vector of various fixed effects, including for four-digit HS product categories and years (see the note to Table 3 for a full list). In addition, c_{ivj} is time-invariant unobserved heterogeneity at the group level (firm, product and source), which is accounted for in the main model by clustering at the firm level. This implies the assumption that c_{ivj} is uncorrelated with the other independent variables. Remaining noise is captured by $\varepsilon_{ijv,t}$.

In addition to the main model (PROBIT), I run three alternative estimations of eq. (2). In the first, I check for sensitivity to the data trimming by using the full sample rather than the trimmed one (PROBIT FULL). In the second (CRE−PROBIT) and third (LINEAR FE), the assumption of no correlation between c_{ivj} and $\mathbf{x_{ivj,t}}$ is relaxed. CRE−PROBIT is a Wooldridge (2019) heteroskedastic correlated random effects probit model for unbalanced panels, which involves specifying a certain correlation structure between c_{ivj} and $\mathbf{x_{ivj,t}}$. LINEAR FE is the linear counterpart to CRE−PROBIT – a fixed effects (within) OLS estimation, where the c_{ivj} and $\mathbf{x_{ivj,t}}$ are allowed to correlate freely. Both models focus on variation within firm−product−source groups over time.[20]

In CRE−PROBIT, the c_{ivj}s are assumed to be normally distributed with a conditional expectation depending on the following two factors: the time averages of each element of $\mathbf{x_{ivj,t}}$ ($\bar{\mathbf{x}}_{\mathbf{ivj}}$) and dummy variables –$g_{ivj,r}$– for the number of years (r) firm i imported product v from source j during the sample period. Specifically, $E\left[c_{ivj}|s_{ivj,t}, s_{ivj,t}\mathbf{x_{ivj,t}}\right] = \sum_{r=1}^{T}\left(\psi_r g_{ivj,r} + g_{ivj,r}\,\bar{\mathbf{x}}_{\boldsymbol{ivj}}\boldsymbol{\xi}_{\mathbf{r}}\right)$, for t=1,…,T, where $s_{ivj,t}$ is a dummy equal to 1 if group ivj imported in year t, T_{ivj} is the number of sample years the group imported and T is the total number of sample years.[21] In addition, it is assumed that the conditional variance of c_{ijv} depends on $s_{ivj,t}$ and $g_{ivj,r}$ in the following way: $Var\left[c_{ivj}|s_{ivj,t}, s_{ivj,t}\mathbf{x_{ivj,t}}\right] = exp\left(\tau + \sum_{r=1}^{T-1} g_{ivj,r}\omega_r\right)$. T is the base group, and its variance is τ. There is one variance for each r, and these are displayed as deviations – ω_rs– from τ (which is why the sum goes to T-1). We can now estimate eq. (2) by a heteroskedastic probit model where c_{ivj} is replaced by c_{ivj}=$\boldsymbol{\xi}$($\bar{\mathbf{x}}_{\mathbf{ivj}}$, …, $\bar{\mathbf{x}}_{\mathbf{ivj}}$) + ($g_{ivj,3}$, …, $g_{ivj,T}$), and $g_{ivj,3}$, …, $g_{ivj,T\text{-}1}$ are included as independent variables in the variance. This relies on $\mathbf{x_{ivj,t}}|c_{ivj}$ being strictly

[20] Including fixed effects in a probit model would yield biased coefficient estimates due to the *incidental parameters* problem. LINEAR FE was estimated using Correia's (2016) *reghdfe* routine in Stata 16.1.

[21] Hence, $T_{ivj} = \sum_{t=1}^{T} s_{ivj,t}$, and $g_{ivj,r}$ is equal to 1 if T_{ivj}=r (with r going from 1 to T).

exogenous and the $s_{ivj,t}$s being independent of the $\varepsilon_{ivj,t}$s. Note that since the panel is unbalanced, the means of the year dummies may differ for disparate observations, and thus, they are also included in $\bar{\mathbf{x}}_{\mathbf{ivj}}$. In this model, coefficients can only be identified for time-varying $x_{ivj,t}$s because a time-invariant x_{ivj} is perfectly collinear with its $\overline{x}_{ivj}$, and hence, its effect is not possible to distinguish from its correlation with c_{ivj}.[22]

4.2.2 Results

The results are presented in Table 3. Since the coefficients from a probit model do not reflect the derivatives, average partial effects (APE) are displayed instead. The APE of a given independent variable x is calculated by first calculating the change in the predicted probability of importing indirectly following a unit change in x for each observation in the sample and then averaging over all observations.[23] The APE thus indicates the change in the average predicted probability (APP) of importing indirectly following a unit change in x. For the main model (PROBIT), three types of APEs are calculated. In the first (displayed in column 3), all variables other than x are held at their observed levels. Since a large share of observations are for WRs, these APEs are dominated by the effects for such firms. Therefore, I also calculate separate effects for manufacturing firms (column 1) and WRs (column 2) where dWR_i is set at, respectively, 0 and 1 for all observations (holding all other variables at their observed levels). The APP of importing indirectly is 26% for manufacturing firms, 37% for WRs and 36% for all firms pooled together. For the three alternative models, displayed in columns 4 (PROBIT FULL), 5 (CRE-PROBIT) and 6 (LINEAR FE), only pooled APEs are reported.

The first thing to notice from the results from the main model is perhaps the large distinction in the probability of importing indirectly between WRs and manufacturing firms. The estimates suggest that, *ceteris paribus*, WRs are almost 12 percentage points more likely to import through entrepôt merchants. In other words, firms that are merchants themselves seem more likely to trade through other merchants. At first glance, this may seem surprising since merchants, whether located domestically or abroad, are likely to face lower fixed costs of importing directly than producers. However, we must remember that the main model relies on the c_{ivj}s being uncorrelated with the independent variables, which may be a strong assumption. We have already seen that manufacturing firms and WRs

[22] For the same reason, we must drop all groups that appear only once during the sample period (singletons). This is already handled in the trimming of the sample and is why $g_{ivj,1}$ is not included in the expression for c_{ivj} and in the variance. Furthermore, $g_{ivj,2}$ is not included because it is the base group.

[23] When x is a continuous and log-transformed variable, the APE indicates, approximately, the effect of a 1% change in it, and when x is dichotomous, the APE indicates the effect of a change in it from 0 to 1.

import products with quite distinct characteristics – characteristics that may not be fully captured by the product-level independent variables or the fixed effects for four-digit HS product categories. The mass-produced consumer goods typically imported by WRs are demanded all over the world and are, therefore, likely to be more attractive objects for re-exports by merchants in entrepôts than the more specialised production inputs typically imported by manufacturing firms. Furthermore, WRs and manufacturing firms may differ in their company structures beyond what is captured by the dummy for foreign ownership. WRs, and in particular retailers, are perhaps more often part of multinational chains that have a single distribution centre for the whole of Scandinavia located in a nearby hub. An example is H&M, a large retailer in clothing apparel. The company does not have its own production facilities and mainly imports from Europe and Asia. Imports are likely to go via Sweden because the owners as well as the logistics centre are located there. Manufacturing firms, in turn, are perhaps more likely to have subsidiaries abroad producing their inputs. An example is Hydro – a major aluminium producer in Norway – which owns bauxite mines in Brazil.[24]

Despite the large differences in the activities performed by manufacturing firms and WRs, they appear very similar in regard to the factors driving their importing mode. As demonstrated below, though some estimated effects are significant for only one type of firm, there are no variables where the APEs are of significantly opposite signs.

[24] Though foreign ownership is controlled for in the analysis, the source country of foreign owners is not. Having foreign subsidiaries is not controlled for. Note that we cannot verify the suggested import patterns for these companies in the data since the data are anonymised.

Table 3. Factors influencing importing mode, Average Partial Effects (APE). Dependent variable = probability of importing indirectly.

	(1) PROBIT (Manuf.)		(2) PROBIT (WRs)		(3) PROBIT (Both)		(4) PROBIT FULL (Both)		(5) CRE-PROBIT (Both)		(6) LINEAR FE (Both)	
Variable	APE	S.e.	APE	S.e.	APE	S.e.	APE	S.e.	APE	S.e.	APE	S.e.
dWR_i	0.118 ***	0.008	0.118 ***	0.008	0.118 ***	0.008	0.111 ***	0.006	na		na	
$ImpSh_{ivj,t}$	-0.022 ***	0.001	-0.029 ***	0.001	-0.028 ***	0.001	-0.023 ***	0.001	-0.010 ***	0.000	-0.010 ***	0.000
$NoEm_{i,t}$	-0.019 ***	0.003	-0.017 ***	0.004	-0.016 ***	0.003	-0.011 ***	0.003	-0.008 ***	0.001	-0.007 ***	0.001
$Prod_{i,t}$	-0.027 ***	0.005	-0.026 ***	0.005	-0.026 ***	0.004	-0.021 ***	0.003	-0.002 **	0.001	-0.003 **	0.001
$ForOw_{i,t}$	0.016	0.012	0.149 ***	0.011	0.131 ***	0.009	0.108 ***	0.008	0.002	0.003	0.002	0.004
$Dist_j$	0.046 ***	0.009	0.080 ***	0.009	0.074 ***	0.008	0.047 ***	0.006	na		na	
$Rem_{j,t}$	-0.024 ***	0.006	-0.004	0.004	-0.006	0.004	-0.015 ***	0.002	-0.017 *	0.009	-0.017	0.011
$NotScan_j$	0.107 ***	0.029	0.225 ***	0.021	0.210 ***	0.019	0.214 ***	0.014	na		na	
$Spoke_j$	0.012	0.038	0.088 ***	0.027	0.078 ***	0.024	0.073 ***	0.017	na		na	
$Tar_{jv,t}$	0.015	0.022	0.052 ***	0.013	0.047 ***	0.012	0.032 ***	0.008	0.015	0.012	0.016	0.014
$EEA_{j,t-1}$	-0.201 ***	0.025	-0.061 ***	0.016	-0.076 ***	0.015	-0.071 ***	0.009	0.003	0.004	0.008	0.005
$FTA_{j,t-1}$	-0.086 ***	0.012	0.008	0.012	-0.001	0.010	0.006	0.006	0.008 **	0.003	0.013 ***	0.004
$GSP_{j,t-1}$	-0.076 ***	0.013	-0.104 ***	0.012	-0.099 ***	0.011	-0.095 ***	0.006	-0.019	0.016	-0.020	0.017
$GSPL_{j,t-1}$	-0.033	0.039	-0.227 ***	0.019	-0.206 ***	0.018	-0.203 ***	0.013	-0.020	0.036	-0.025	0.020
$ExpFee_j$	0.092 ***	0.014	0.020 **	0.009	0.027 ***	0.008	0.039 ***	0.006	na		na	
$Logi_j$	-0.034	0.023	-0.183 ***	0.016	-0.164 ***	0.015	-0.159 ***	0.010	na		na	
$RegQua_j$	-0.068 ***	0.014	-0.034 ***	0.010	-0.037 ***	0.009	-0.053 ***	0.006	na		na	
$Exch_{j,t}$	0.003	0.016	0.053 ***	0.011	0.046 ***	0.010	0.024 ***	0.008	0.000	0.005	-0.002	0.005
$MinEE_v$	0.269 ***	0.040	0.315 ***	0.017	0.303 ***	0.016	0.356 ***	0.008	na		na	
$PrVar_{v-1,t}$	-0.015 ***	0.003	-0.020 ***	0.001	-0.019 ***	0.001	-0.013 ***	0.001	-0.002 ***	0.001	-0.002 ***	0.001
Ref_v	0.217 ***	0.061	0.239 ***	0.050	0.231 ***	0.050	0.097 ***	0.029	na		na	
$Diff_v$	0.151 ***	0.035	0.210 ***	0.038	0.201 ***	0.038	0.097 ***	0.027	na		na	
$GDP_{j,t}$	0.003	0.004	0.013 ***	0.003	0.012 ***	0.003	0.011 ***	0.002	-0.037 ***	0.012	-0.018	0.036
$GDPC_{j,t}$	-0.003	0.010	-0.017 **	0.007	-0.015 **	0.006	-0.014 ***	0.005	-0.011	0.007	-0.034	0.035
$Price_{v,t}$	-0.004 *	0.003	0.001	0.001	0.000	0.001	0.001	0.001	0.002 ***	0.001	0.002 **	0.001
$DistHub_j$	0.090 *	0.051	0.050	0.035	0.053 *	0.032	0.051 **	0.023	na		na	

Note. Norwegian imports during 2003–2013. *i*=firm, *v*=product, *j*=source country, *t*=year. Manuf. = Manufacturing firms, WR = wholesalers/retailers, both = manuf. and WR. PROBIT = ordinary probit. FULL = untrimmed sample. CRE-PROBIT = correlated random effects heteroskedastic probit, estimated according to Wooldridge (2019). LINEAR FE = fixed effects (within) OLS. All regressions include dummies for years, and all except LINEAR FE include dummies for seven geographic regions and product groups at four-digit HS level (version 2002). CRE-PROBIT also includes several auxiliary variables, which are not displayed since they are indistinguishable from the unobserved heterogeneity. These are: the time-invariant independent variables included in PROBIT, the time-constant means of all the time-varying independent variables (including the year dummies), dummies for the number of periods each observation appears in the sample (also included as independent variables in the variance). In all estimations except PROBIT FULL, the # of obs. is 4,943,834, the # of *ivj* groups is 1,322,611 and the # of firms is 37,892. In PROBIT FULL the corresponding numbers are 8,311,088; 4,213,063 and 62,656. The log pseudo-likelihood is -1,987,628 in PROBIT, -3,156,542 in PROBIT FULL and -1,970,470 in CRE-PROBIT. Standard errors (s.e.) are clustered at the firm level. *, ** and *** indicate a significance level at, respectively, 10%, 5% and 1%.

Merchants reducing fixed trade costs and informational barriers

The results from the main model are clearly consistent with the hypothesis that firms import indirectly to reduce fixed trade costs and informational barriers. The characteristics of firms as well as of products and source countries appear to have an impact.

I start by examining the firm-level variables that are relevant for this hypothesis. $ImpShare_{ivj,t}$ is the share of firm *i*'s product−source-specific imports in its total imports and accounts for the fact that firms may not find it worthwhile to eliminate fees paid to merchants by trading directly when such fees constitute a relatively small share of total importing costs. The APE is significantly negative, as expected, but moderately sized; a 1% increase in $ImpShare_{ivj,t}$ is associated with a decline in the probability of the importing indirectly of 0.028 percentage points, or 0.076% when evaluated relative to the APP. Firm size, in terms of number of employees ($NoEm_{i,t}$), and productivity, in terms of value-added per employee ($Prod_{i,t}$), are also negatively associated with the probability of using entrepôt merchants. Foreign ownership ($ForOw_{i,t}$), in turn, has a large positive influence; firms with foreign owners are almost 13 percentage points, or 36%, more likely to import indirectly. Although this is consistent with the tariff evasion motive, another plausible reason is that the costs of merchant use are lower for foreign-owned firms because they can use the distributional networks of their mother companies.

Turning to product and source country features, the estimated APEs generally have signs opposite of what is normally seen in gravity models (which are models that predict trade volumes between pairs of countries). For instance, the probability of trading through merchants increases with most trade cost variables, both when they reflect variable and when they reflect fixed costs. This is as expected. According to the hypothesis of merchants reducing fixed costs, most variables influencing the import value negatively should positively influence the probability of importing indirectly.

Among these features, I first focus on transport cost variables. Geographic distance ($Dist_j$) is a commonly used proxy for transport costs in trade analyses, and the by-far most-used measure is great circle distance – that is, distance 'as the crow flies'. Here, I use a somewhat more sophisticated measure. For source countries within Europe and Central Asia, I stick to great circle distance because shipments to Norway are likely to be done by train or truck; however, for countries outside these regions, I use the sea distance between major ports because a ship is the most

likely means of transportation. The estimated effect is positive, which is as expected.[25] $Rem_{j,t}$, in turn, reflects the remoteness of the source country and also has the expected effect – negative, though only for manufacturing firms. The following two dummy variables capture two different groups of source countries where transport costs are likely to be relatively large: $Spoke_j$ equals 1 if the source country is a spoke country – that is, not among 22 countries defined as hubs in global trade (see footnote 14), and $NotScan_j$ equals 1 if the source is a country other than Sweden or Denmark. Together with Norway, these two countries constitute Scandinavia – a region with strong geographic, historical, cultural and linguistic ties. Estimated APEs for both variables are significantly positive, as expected, and large. The probability of importing indirectly is 7.8 percentage points higher for spoke countries and a whole 21 percentage points higher for non-Scandinavian countries. Note, however, that the APE for $Spoke_j$ is not significant for manufacturing firms.

Second, we turn to trade policy variables, which also have expected effects. Higher tariffs of product *v* from source *j* ($Tar_{vj,t}$) are associated with a higher overall probability of importing indirectly, but the effect is not significant for manufacturing firms. Furthermore, importing from a country granted trade preferences with Norway, whether with reciprocity or not, has a negative effect (holding tariffs constant). The effects are sizeable; the overall APEs for three out of four dummy variables for trade preferences are significantly negative and range from 7.6 percentage points for two-way preferences with countries in the European Economic Area ($EEA_{j,t-1}$) to a whole 20.6 percentage points for unilateral preferences for least-developed countries ($GSPL_{j.t-1}$). There are some distinctions between manufacturing firms and WRs. For the former, the APE for $GSPL_{j.t-1}$ is not significant. However, that for having a reciprocal free trade agreement other than EEA ($FTA_{j,t-1}$) is. For WRs, the opposite is true. These results may indicate that country-specific fixed importing costs in the form of non-tariff barriers are lower when importing from countries granted preferences.

Third, we look at business conditions, which generally also have expected effects. $ExpFee_j$ –fees of exporting a container from the source– forms part of source-specific fixed trade costs, and the effect on importing indirectly is positive. In turn, good regulatory quality ($RegQual_j$) and good logistics performance ($Logistics_j$) in the source have negative effects though the latter variable is not significant for manufacturing firms separately.[26] $Exch_{j,t}$ reflects the depreciation of the real exchange rate between NOK and the local currency, and the positive effect is as expected

[25] This measure is also used in the variables $Rem_{j,t}$ and $DistHub_j$, which are based on $Dist_j$ and described below.
[26] The size of these is difficult to interpret due to the construction of the variables (see the appendix).

because depreciation means that foreign products and, hence, importing become relatively more expensive. However, the effect is not significant for manufacturing firms. Finally, $MinEEv_v$ –a variable that proxies for unobserved product-specific sunk costs of starting to import (not captured by the other independent variables)– has a positive APE.

Fourth, the three variables capturing product-level informational barriers have somewhat ambiguous effects. The first is the standard deviation of the price of product *v* when imported directly (excluding the observation in question) – $PrVar_{v\text{-}1,t}$. A large value is supposed to reflect large quality differences within the product group. The two other variables are dummies for products referenced priced (Ref_v) and differentiated ($Diff_v$) based on the classification in Rauch (1999). Homogeneous products (the base category) are traded on organised exchanges, and thus, information about quality and content should be easy to uncover. Such information is also accessible for referenced priced products, whose prices are published in international trade journals. Differentiated products, in contrast, can be much more difficult to find information about. Whereas the probability of importing indirectly is estimated to decrease with $PrVar_{v\text{-}1,t}$, it is estimated to increase with Ref_v and $Diff_v$. The two latter variables also have large effects, with APEs above 0.2. These somewhat conflicting results may indicate that different strategies for reducing product-level informational barriers are used in disparate situations.

Fifth, we examine two variables reflecting market size. Somewhat surprisingly, the estimated effects of these are of opposite signs. However, none is significant for manufacturing firms separately. Larger GDP per capita ($GDPC_{j,t}$) is associated with a lower probability of importing indirectly. This can be explained by possibly higher profitability of importing from such countries, i.a. because they export products of higher quality or because their export procedures (beyond those captured by the other controls) are less demanding. The estimated APE for GDP ($GDP_{j,t}$) is positive. A reason can be that fixed importing costs are larger for large countries, as argued by Akerman and Forslid (2009).

Other motives

As mentioned in section 2, reducing fixed trade costs and informational barriers are not the only possible motives for merchant use. The significantly positive effects for $Tar_{vj,t}$ and $ForOw_{i,t}$ for WRs can be seen as lending some support to the tariff evasion motive. However, as explained above, these results may very well indicate that merchants simply reduce fixed trade costs. Transport cost savings is yet another motive which is particularly relevant for entrepôt trade. The results for $Dist_j$ and $Spoke_j$ support such a motive, but again, the effect is difficult to separate

from the fixed cost savings motive. However, I also include two control variables that should be unrelated to that motive but related to transport costs. The first is the average unit value for product *v* in year *t* when imported directly ($Price_{v,t}$), which accounts for the fact that products with high value-to-weight ratios could be more likely sent over large distances, including via hubs, because transport costs are likely to constitute a lower share of the total importing costs for such products (see e.g. Hummels and Skiba, 2004). Second, I include a measure specifically constructed for this purpose, $DistHub_j$, which equals a variable D_j interacted with $Spoke_j$. The measure is based on the idea that spoke source countries geographically close to hubs are more likely to sell their products to merchants in such hubs, which re-export them later.[27] D_j denotes the direct distance from source *j* to Norway relative to the distance via the closest hub. For spoke countries, $0 < D_j < 1$. When D_j is large, the additional distance of the detour is relatively small, and any additional transport costs of sending products via the hub should be relatively small. Consequently, for source countries that are spokes, we expect a positive effect of D_j on the probability of importing indirectly.[28] In contrast, for source countries that are hubs there should be no such effect, which is why D_j is interacted with $Spoke_j$ (which is also included as a separate variable, as described above). The estimated APEs for $Price_{ivj}$ is generally insignificant, whereas that for $DistHub_j$ is weakly positive for all firms pooled together, but insignificant for WRs separately. Together with the results for $Dist_j$ and $Spoke_j$, these results yield some support for the transport costs savings motive, especially for manufacturing firms.

Alternative estimations

In column 4, the results from the estimation using the non-trimmed sample are displayed. By comparing them with column 3, it is easily seen that the results are very similar to those from the main model. Consequently, the trimming of the sample does not seem to influence the results much.

The results from the main analysis do not necessarily reflect causal relationships as there may be unobserved confounding factors at the level of the firm as well as product and source country not controlled for. To the extent that such factors are time invariant, this is remedied in the two models focusing on variation within firm−product−source groups over time, CRE−PROBIT and LINEAR FE. This advantage comes at a cost, however.

[27] The China–Hong Kong trade is a good example of this. Feenstra and Hanson (2004) showed that about half of China's exports was first exported to Hong Kong and thereafter re-exported to the final destinations during the period 1988–1998.
[28] Note that products may be transshipped through a hub without being considered as imported directly as long as there is no change of ownership of the products in the hub. Consequently, $DistHub_j$ does not reflect mere transport costs savings from shipping products via the hub but rather additional transport cost saving from buying from merchants located there.

The main model concluded that several time-invariant factors were important, but such factors can no longer be assessed. The results are displayed in columns 5 and 6.

Firstly, it is worth noting that the two analyses, with a few exceptions, yield quite similar APEs, both in terms of significance and size. This indicates that misspecification of the correlation structure between the independent variables and c_{ivj} is not severe in the CRE−PROBIT model.

Turning to comparison with the main model, we notice that the results are quite similar regarding firm-level features with one exception. Foreign ownership no longer has a significant impact. The APEs for $ImpShare_{ivj,t}$ are of the same sign but smaller than in the main model, and so are those for $NoEm_{i,t}$ and $Prod_{i,t}$. Regarding product-level characteristics, the results for $PrVar_{v\text{-}1,t}$ are also similar to those from the main model, but unlike in that model, $Price_{v,t}$ now has a significantly positive effect. This adds some further support to the transport costs saving motive.

In contrast to the main model, country-level features no longer seem to have an impact, at least not consistently across the two models focusing on variation within groups. The APEs for tariffs are not significant and neither are those for trade preferences. There is one exception to this, however. The dummy for FTAs other than the EEA has a positive impact on the probability of importing directly. This contradicts the findings in the main model, and one possible explanation can be that the rules of origin differ in such agreements. Firms that import from a country that enters into an FTA must thus familiarise themselves with new rules, and this may involve increased fixed importing costs. Taken together, however, the two models give few indications of trade policy affecting the probability of importing indirectly and no support for the tariff evasion hypothesis. Together with the results from the main analysis, this suggests that distinctions in Norwegian trade policy towards different countries and products may influence the choice of importing mode between firms, but that changes in policy towards a given country for a given product over time do not have much impact on a given firm's inclination to import indirectly.

The APEs for GDP is not significant in LINEAR FE but is significantly negative in CRE−PROBIT. This result contrasts that from the main analysis, where the APE was positive for WRs but not significant for manufacturing firms. A possible explanation for the negative effect can be that a firm's profitability of importing from a growing market also grows. This can make the firm capable of earning enough to cover the fixed costs of importing directly (even though fixed importing costs may be higher in larger markets, as argued above).

Taken together, the results suggest that a firm's choice of importing indirectly is primarily caused by characteristics of firms and products rather than of source countries. Specifically, small firm size and low productivity together with relatively low importance of the product−source combination in the firm's total imports seem to induce an indirect importing mode and so does importing products with little price dispersion and high value-to-weight ratios. However, these causal interpretations may not hold if there are time-variant confounding factors not controlled for. Furthermore, they may not hold if reverse causality is at play. This is mostly a concern for firm-level characteristics, and in particular for $ImpSh_{ivj,t}$;[29] a firm that decides to import a given product–source combination indirectly may face a higher price and thus import less of that combination than if it had imported it directly.

5. Conclusion

This article has shown that a significant and growing share of Norwegian imports is purchased from merchants in entrepôt countries rather than directly from the source. Firms often buy from such merchants when they import small values, and firms that are merchants themselves –WRs– import even smaller values than manufacturing firms.

Furthermore, this work has shown how the features of firms, products and source countries are associated with the choice of importing mode. Variables reflecting trade costs in the source had the largest impact. Higher costs were associated with a higher probability of importing indirectly, and importing from spoke countries outside Scandinavia without trade preferences to Norway had a particularly large impact. Some product features also had a strong influence; in particular, products where sunk importing costs were large were more likely to be imported indirectly. The results for variables reflecting quality differences within product groups were discordant, however, with the probability of importing indirectly being negatively associated with price dispersion and positively associated with dummies for differentiated products. Regarding firm-level features, sectoral affiliation and ownership nationality had particularly large influences. Compared to manufacturing firms, WRs were significantly more likely to import indirectly, and so were firms with foreign rather than domestic owners. In addition, smaller and less productive firms were more likely to import indirectly, especially when importing from product−source combinations that were relatively unimportant in their total imports.

These factors should not necessarily be interpreted as causes for choosing an indirect importing mode as we may not have been able to control for all confounding factors in the main analysis. This was, to some extent, remedied in two

[29] Recall that the product-level variables are constructed based on prices for direct imports only.

sensitivity analyses focusing on variations within firm−product−source groups over time. The drawback of these analyses was that time-invariant factors, of which several were found to be important in the main analysis, were no longer possible to assess. Among the factors possible to analyse, however, most features at the firm-level and some at the product level were still found to significantly affect importing mode. There were fewer indications of source countries' features having an impact. The results suggested that an indirect importing mode was mainly caused by small firm size, low productivity, small share of the product–source combination in the firm's total imports, large value-to-weight ratios and low price dispersion within product groups. Trade policy changes, in contrast, did not seem to cause changes in importing mode.

These results found here for importers, from the main analysis as well as from the sensitivity analyses, are consistent with what the canonical model of export intermediation (reviewed in section 2) predicts about merchant use for exporters. That model focuses on how merchants facilitate trade by offering lower fixed trade costs for firms that trade through them rather than directly in foreign markets. As such, merchants help firms, especially smaller ones, to participate in trade or to expand their portfolio to markets where profitability is lower or costs are larger. The data used here are for importing firms, and a full model of import intermediation corresponding to that for export intermediation has yet to be built. However, similar mechanisms are likely to apply, and the results support the view that merchants in entrepôts facilitate trade by reducing firms' fixed importing costs. To some extent, they also indicate that such merchants reduce transport costs. There is less support for entrepôt trade being motivated by tariff and tax evasion. These results underscore the need for developing more comprehensive models of import intermediation in future research. They also demonstrate that the existence of well-functioning intermediary sectors can facilitate trade and be important for small firms' ability to import foreign products.

Appendix

Table A1. The most important products imported to Norway

Description	HS-6 categories	Total imports Direct and indirect		Share of total imports							
				Direct WR		Indirect WR		Direct manuf.		Indirect manuf.	
		Value	# trans	Value	# trans	Value	# trans	Value	# trans	Value	# trans
Vehicles, cars	870332, 870323	198,965	1,203,494	0.89	0.88	0.11	0.12	-	-	-	-
Commodities for nickel prod.	750110	148,342	1,250	-	0.01	-	-	0.99	0.93	0.01	0.06
Commodities for alu. prod.	281820, 760110	116,166	11,813	-	0.05	-	0.03	0.82	0.38	0.18	0.55
Pharmaceuticals	300490	71,458	187,667	0.57	0.51	0.36	0.43	0.04	0.04	0.03	0.02
Mineral fuels and oils	270900, 271019	57,805	327,707	0.92	0.72	0.07	0.26	0.01	0.02	-	-
Computers	847130, 847160	52,830	1,264,952	0.18	0.08	0.80	0.91	0.02	0.01	-	-
Computer parts	847330	45,440	1,251,723	0.33	0.26	0.60	0.69	0.06	0.04	0.01	0.01
Vehicles, goods transport	870421	42,369	256,593	0.61	0.58	0.39	0.41	-	-	-	-
Iron/steel structures	730890	35,344	239,165	0.33	0.58	0.01	0.08	0.65	0.33	0.01	0.01
Fish flours, oils etc.	150420, 230120	34,007	7,729	0.01	0.26	-	0.06	0.66	0.49	0.33	0.19
Food preparations	190590, 210690	33,625	909,620	0.49	0.64	0.07	0.14	0.19	0.22	0.25	0.01
Mobile phones	852520	31,310	554,374	0.42	0.21	0.57	0.78	0.01	0.01	-	-
Furniture and parts	940161, 940360	26,885	1,566,254	0.74	0.55	0.19	0.42	0.06	0.02	0.02	0.01
Televisions	852812	25,052	675,028	0.17	0.03	0.82	0.96	0.01	-	-	-
Wood	440710	21,236	238,779	0.25	0.30	-	-	0.75	0.69	-	-
Vehicle parts	870899	20,119	850,871	0.59	0.43	0.23	0.52	0.18	0.05	0.01	-
Iron/steel articles	732690	19,762	625,452	0.45	0.47	0.07	0.36	0.47	0.17	0.01	0.01
Plastic articles	392690	16,360	996,504	0.53	0.44	0.21	0.45	0.24	0.10	0.01	0.01
Machinery and parts	847990	13,565	334,897	0.37	0.58	0.03	0.09	0.58	0.31	0.02	0.02
Clothing	610910, 620343	11,117	623,855	0.49	0.23	0.47	0.73	0.03	0.01	0.01	0.03
Household appliances	851660, 843311	10,189	535,378	0.31	0.14	0.53	0.81	0.08	0.01	0.09	0.04
Organic chemicals	293499	8,804	14,592	-	0.50	-	0.28	0.29	0.08	0.70	0.14
Toys	950390	8,187	609,852	0.46	0.22	0.53	0.78	0.01	0.01	-	-
Medical equipment	382200	8,086	277,600	0.37	0.33	0.53	0.53	0.06	0.06	0.04	0.09
Microchips	854221	5,767	153,137	0.16	0.19	0.58	0.66	0.17	0.06	0.08	0.08

Note: The table includes the 15 most important product groups (classified at six-digit HS level) imported to Norway by manufacturing firms (manuf.) and wholesalers/retailers (WR) regarding either import value (in constant 2014 NOK) or number of import transactions during 2003 to 2013. In addition, some product groups are included on the grounds that they are important within the subcategories of direct and indirect imports of each of the two firm types.

Table A2. Definition of variables and summary statistics

Variable	WR		Manuf.		Description
	Mean	Median	Mean	Median	
Transaction-level data					
$dTrIndir_{kivj,t}$	0.578	1	0.141	0	Dummy = 1 if transaction *k* (which concerns imports by firm *i* of product *v* from source country *j* in year *t*) is from a merchant in an entrepot rather than directly from the source.
$TrValue_{kivj,t}$	30.8	4.75	166	24.0	Value of transaction *k* (which concerns imports by firm *i* of product *v* from source country *j* in year *t*), 1,000 NOK. Source: SSB.
$TrWeight_{kivj,t}$	1.11	0.030	23.1	0.204	Weight of transaction *k* (which concerns imports by firm *i* of product *v* from source country *j* in year *t*), 1,000 kg. Source: SSB.
$TrPrice_{kivj,t}$	530	169	858	103	Price (value/weight) of a transaction *k* (which concerns imports by firm *i* of product *v* from source country *j* in year *t*), NOK/kg. Source: SSB.
# obs	81,134,025		8,702,578		Number of observations.
Firm−product−source country−year-level data					
$dIndir_{ivj,t}$	0.400	0	0.137	0	Dummy = 1 if more than 50 % of the import value of product *v* from source country *j* by firm *i* was from a merchant in an entrepot rather than directly from the source in year *t*. Source: SSB.
dWR_i	1.000	1	0.000	0	Dummy = 1 if firm i is a wholesaler or retailer, and 0 if it's a manufacturing firm. Source: SSB.
$ImpSh_{ivj,t}$	0.028	0.003	0.039	0.002	Share of product *v* from source country *j* in firm *i's* total import value in year *t*. Source: SSB.
$NoEm_{i,t}$	69	10	266	64	# of employees in firm *i* in year *t*. Source: SSB.
$Prod_{i,t}$	837	634	859	725	Value-added per employee of firm *i* in year *t*, 1,000 NOK. Source: SSB.
$ForOw_{i,t}$	0.259	0	0.270	0	Dummy = 1 if firm *i*'s ultimate owner was foreign in year *t*. Source SSB.
$Dist_j$	6,663	1,157	3,670	838	Distance from source country *j* to Norway.[a]
$Rem_{j,t}$	5,177	3,486	4,414	3,308	Remoteness of source country *j* in year *t*.[b]
$NotScan_j$	0.790	1	0.682	1	Dummy = 1 if source country *j* is Sweden or Denmark.
$Spoke_j$	0.370	0	0.434	0	Dummy = 1 if source country *j* is not a global hub (see footnote 14 for the definition of global hubs).
$Tar_{jv,t}$	1.014	1.000	1.014	1.000	Norwegian tariffs on product v from source country *j* in year *t*, weighted average; 1.x indicates ad-valorem tariffs at x%. Source: UNCTAD's World Integrated Trade Solution (WITS) (https://wits.worldbank.org/ (accessed 14.07.2019).
$EEA_{j,t-1}$	0.674	1	0.828	1	Dummy = 1 if source country *j* was a member of the EEA or EFTA in year *t*-1.[c]
$FTA_{j,t-1}$	0.034	0	0.016	0	Dummy = 1 if source country *j* had a preferential trade agreement with Norway apart from EEA or EFTA in year *t*-1.[c]
$GSP_{j,t-1}$	0.216	0	0.069	0	Dummy = 1 if source country *j* was granted Geneal System of Preferences (GSP) to Norway in year *t*-1.[c]
$GSPL_{j,,t-1}$	0.003	0	0.001	0	Dummy = 1 if source country *j* was granted GSP preferences for Least Developed Countries to Norway in year *t*-1.[c]
$ExpFee_j$	0.296	0.305	0.305	0.305	Fees for exporting a container from source country *j*. Source: Doing Business [d, e]
$Logi_j$	3.745	3.910	3.880	3.947	Indicator of overall logistics performance of source country *j*. High score = good performance. Source: Logistic Performance Index (LPI) [d, e]
$Exch_{j,t}$	1.087	1.483	1.433	1.543	Exchange rate growth. = $1+(E_{j,t} - E_{j,t-1})/ E_{j,t-1}$, where $E_{j,t}$ is the real exchange rate between NOK and the local currency of source country *j* in year *t*. 1.x% indicate a growth of x %. Source: World Development Indicators (WDI) (nominal exchange rates and consumer price indices).[d]

Table A2 cont.

Variable	WR		Manuf.		Description
Variable	Mean	Median	Mean	Median	
Firm−product−source, country−year-level data					
$MinEE_v$	1.497	1.501	1.488	1.491	A proxy for unobserved sunk costs of starting to import product *v*, first suggested by of Bernard and Jensen (2007) for industry-level sunk costs and used for product-level sunk exporting costs in Bernard et al. (2015). $MinEE_v$ = 2-{min[$entry_{v,t}$, $exit_{v,t}$]} and varies between 1 and 2, where a higher value indicates higher sunk costs. {min[$entry_{v,t}$, $exit_{v,t}$]} is the minimum of entry and exit rates of imports of product *v* by Norwegian firms over all sample years. $entry_{v,t}$ ($exit_{v,t}$) equals the number of firms starting (stopping) to import product *v* in year *t* divided by the average number of firms importing product *v* in year *t* and *t*-1.
$PrVar_{v\text{-}1,t}$	786	488	1,101	553	The variance within product *v* and year *t* of all firm-product-source specific (weighted) average prices of direct imports, where the observation in question is excluded. Source: SSB.
Ref_v	0.044	0	0.096	0	Dummy = 1 if good *v* is reference priced.[f]
$Diff_v$	0.953	1	0.895	1	Dummy = 1 if good *v* is differentiated.[f]
$GDP_{j,t}$	18,144	13,469	16,789	7,890	GDP of source country *j* in year *t*, 1,000 million NOK. Source: World Development Indicators (WDI).[d]
$GDPC_{j,t}$	0.219	0.255	0.271	0.280	GDP per capita of source country *j* in year *t*. Source: World Development Indicators (WDI).[d]
$Price_{v,t}$	835	320	1,240	327	Average price of direct imports of product *v* in year *t* (the weighted average of $TrPrice_{kivj,t}$ for all direct import transactions of product *v* in year *t*, where weights = transaction values, and the 10% upper and lower values of $TrPrice_{kivj,t}$ are deleted due to many extreme values). Source: SSB.
$DistHub_j$	0.114	0	0.077	0	= D_j*$Spoke_j$ where D_j=$Dist_j$/($Dist_{jh}$+$Dist_h$). $Dist_{jh}$ is distance from source country *j* to the closest hub (*h*), and $Dist_h$ is distance from that hub to Norway (source and calculation, same as $Dist_j$).
# obs	4,215,405		728,429		Number of observations

Note: Manuf.=manufacturing firms, WR=wholesalers/retailers. All continuous variables are given in logs except $RegQua_j$ and $Logi_j$ (which are standardised indices). All products are classified at the six-digit HS level. All values are given in constant (2014) NOK, with units of 1 million unless otherwise stated. [a] For Europe and Central Asia, the great circle distance in kilometres between capitals is used; the *distcap* variable from the CEPII database *dist_cepii* (Mayer and Zignago, 2011). For other regions, the sea distance between the largest ports from Bertoli, Goujon and Santoni (2016) is used. [b] $Rem_{j,t} = \log\left[\sum_{j=1}^{n} \frac{x_{j,t}}{Dist_{j'j}}\right]^{-1}$; $x_{j,t}$=$GDP_{j,t}$/$GDP_{w,t}$, where $GDP_{w,t}$ is world GDP in year *t* (source: same as $GDP_{j,t}$); $Dist_{j'i}$ is great circle distance from country *j'* to country *j*; and *n* is the number of countries (source: same as $Dist_j$). The formula has the advantage of not putting too much weight on very small and distant countries and is taken from Head's 'Gravity for beginners', available at https://vi.unctad.org/tda/background/Introduction%20to%20Gravity%20Models/gravity.pdf (accessed 09.09.2019). Internal distance $Dist_{j'j'}$ = the square root of the country's area multiplied by about 0.4 (Head and Mayer, 2000). [c] The variables are lagged one year because the preferences did not necessarily enter into force at the beginning of the year. Moreover, it often takes time for the full effect of preferences to manifest. Sources: the European Union (EU countries) https://europa.eu/european-union/about-eu/countries_en#tab-0-1; the Norwegian Ministry of Trade, Industry and Fisheries (EFTA countries and FTAs) https://www.regjeringen.no/no/tema/naringsliv/handel/nfd---innsiktsartikler/frihandelsavtaler/id2344484/; the Directorate of Norwegian Customs (GSP and GSPL), personal correspondence and https://www.toll.no/en/corporate/import/free-trade/gsp---generalized-system-of-preference/countries-that-are-a-part-of-the-norwegian-gsp-system/ (all sources accessed 14.07.2019). [d] Access to the data and more information is available at the World Bank's data bank https://databank.worldbank.org/home. [e] Due to lacking observations for certain years and small changes in the variables from year to year, the time average over the sample period for each variable is used. [f] From the Rauch (1999) classification of degree of product heterogeneity (homogeneous goods are the base value). Conservative version is used. Available at https://www.macalester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/TradeData.html#Rauch

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