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Do What You Know and Leave the Rest to the Experts: Quantifying the Gains from Efficient Trade*

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Abstract

We develop and test a theory of efficient international trade. Efficiency gains arise through lower trade costs faced by 'trade specialists', whose superiority over 'common traders' manifests itself through lower trade costs. To test our theory, we construct and deploy a novel dataset based on firm-level merchanting data. Our estimates reveal that, on average, the trade costs for the 'trade specialists' are about four times lower than for non-specialists. The corresponding welfare effects from globally efficient trade amount to a remarkable gain of 80%, on average, which sends an encouraging message for the potential gains from trade that are missing in the existing literature.

Keywords: Efficiency, International Trade, Trade Costs, Gains from Trade.

JEL classification: D60, D61, F14, F12, F10.

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The greatest improvement in the productive powers of labour... seem to have been the effects of the division of labour.

Smith (1776)

The political problem of mankind is to combine three things: economic efficiency, social justice, and individual liberty.

Keynes (1926)

1 Introduction

The question of economic efficiency is probably one of the most important and long-standing questions in economics. As evident from the opening quotes, efficiency was an important matter for the fathers of microeconomics (Smith (1776)) and macroeconomics (Keynes (1936)) alike, and the interest in this topic has remained consistently strong over many decades and until today, e.g., Debreu (1951), Bergsman (1974), Charnes et al. (1978), Coelli et al. (2005), and Sickles and Zelenyuk (2019). Most recently, a vibrant literature, e.g., Bertrand and Schoar (2003), Bloom et al. (2013), Bloom et al. (2022a) and Bloom et al. (2022b) has approached the question of improvements in firm-level productivity and efficiency from the perspective of managers and how their characteristics may impact firm performance across various economic outcomes.[1] We complement existing work and contribute to the broader literature on economic efficiency by focusing on 'trade specialists', defined here as firms specializing in international trading, and by quantifying the gains from their ability to conduct efficient international trade.

We make four contributions to the existing literature. First, we develop a theoretical model, which belongs to the large family of 'new quantitative trade models,' and which distinguishes between the trading abilities of 'trade specialists' versus 'common traders'. Second, we are the first to employ a unique firm-level dataset on the universe of German merchanting transactions provided by the German Central Bank (Deutsche Bundesbank), which enables us to identify the trade transactions that are conducted by 'trade specialists'

[1] See Bloom and Reenen (2010), Bloom and Van Reenen (2011), Lazear and Oyer (2012), and Bloom et al. (2013) for excellent surveys of this literature.

and to construct a dataset that distinguishes between the bilateral trade transactions of trade specialists versus common traders. Third, based on our theory, we specify an econometric model that decomposes the efficiency gains for trade specialists across three types of trade costs: transportation costs, non-tariff trade barriers, and tariffs. Then, we deploy our new dataset to find strong evidence for significant efficiency gains from trading for trade specialists. Finally, we rely on the theoretical, general equilibrium model to translate our partial equilibrium estimates into welfare effects.

To develop our theory, we rely on and extend two main strands from the trade literature. Our departing point is the Krugman (1979, 1980) 'new trade theory' model and the result is a structural framework that belongs to the family of new quantitative trade models, e.g., Eaton and Kortum (2002), Anderson and van Wincoop (2003), and Arkolakis et al. (2012). Our framework simultaneously delivers our estimating equation and enables us to perform general equilibrium simulations. Our modeling innovations are the introduction of two types of firms, i.e., 'trade specialists' versus 'common traders', and adding more structure to the modeling of bilateral trade costs, which are allowed to vary for trade specialists versus common traders.

Specifically, guided by the existing literature,[2] we distinguish between three types of trade costs. The first, and most important, category of bilateral frictions in our model is *'transportation trade costs'* (Anderson and van Wincoop (2004) and Lendle et al. (2016)), and the case for lower trade costs for trade specialists versus common traders is motivated by several recent theories, e.g., the theory of rising trade costs due to increasing difficulty of reaching new customers of Arkolakis (2010), the 'external economies of scale' theory of Urbina and Bradshe (2013), the theory of 'reduction in search costs' in Lendle et al. (2016), or the 'distribution capital' theory of Crucini and Davis (2016). The other two categories of bilateral trade costs include traditional trade policies, e.g., *'tariffs'* and *'non-tariff trade measures'*.

To test the predictions of our theory, we construct a novel dataset that includes mer-

[2]See Anderson and van Wincoop (2004) for an early survey on bilateral trade costs and Lendle et al. (2016) and Egger et al. (2021) for more recent discussions.

chanting trade flows in 92 HS2 categories between 96 export countries and 158 import countries during the period 2001 to 2010. To this end, we are the first to employ a unique firm-level dataset on the universe of German merchanting transactions provided by the Deutsche Bundesbank.[3] Transactions are classified as merchanting when residents purchase goods located abroad from foreign sellers and then sell these goods to foreign buyers without the goods having entered Germany.[4] This enables us to characterize this novel and little-researched trade activity at the micro level by providing a range of salient stylized facts. These may serve to discipline and inform theoretical models on the topic in the future. More importantly for our purposes, the transaction data allow us to infer physical merchanting trade flows that can be directly compared to trade flows of common traders. Overall, the descriptive comparison of the two types of traders is consistent with the view that trade specialists select particularly difficult trade relations and products, for which they appear to have a comparative advantage relative to common traders.

The empirical analysis offers strong support for our main prediction of lower trade costs for trade specialists. It also confirms our hypotheses for the variation of bilateral trade frictions between trade specialists versus common traders across the three types of trade costs in our model. In particular, trade specialists exhibit a lower sensitivity to transportation costs, especially concerning distance. Moreover, the differential effect of distance between specialists and common traders increases with greater distances. This implies that the advantage of trade specialists is more pronounced for destinations that are generally more challenging to serve. Further results indicate that, unlike common

[3]The microdata is confidential and only accessible in anonymized form at the headquarters of the Deutsche Bundesbank in Frankfurt, Germany. While our dataset is novel, unique, and can be merged with the multinational activity and services trade of German merchanting firms (Section 3.2), we also face some constraints, which are worth pointing out. In particular, we do neither have access to price/quantity data nor detailed balance-sheet data for most firms. This precludes us from developing and estimating a fully-fledged micro-founded theoretical model as found in, e.g., Arkolakis (2010), Chaney (2014), and Ganapati (2024) for common traders. Guided by these data limitations, we do not take a fully structural approach in Section 2.1.

[4]In this paper, we focus on so-called direct merchanting transactions, in which the resale of goods occurs immediately after the purchase. In this case, the goods are directly transported from the country of the seller to the country of the buyer such that the geographical distance to Germany is irrelevant. By definition, the goods do not enter Germany, do not clear German customs, and are not stored in German warehouses; i.e., there is no value added in Germany. See Section 3.1 for details.

traders, contiguous borders, free trade agreements, and currency unions have no significant effect on trade specialists, suggesting they may have already internalized these traditional advantages.

As anticipated, tariffs impact both trade specialists and common traders similarly, reflecting the standardized influence of these trade barriers. Regarding further trade cost controls, we find that a shared language benefits both groups and colonial ties – much like economic integration agreements – pose challenges for trade specialists, potentially due to heightened competition with common traders in these cases. Overall, our findings consistently affirm that despite certain trade cost determinants favoring non-specialists, trade specialists maintain lower trade costs overall. These results collectively reinforce the notion that trade specialists navigate international trade with superior efficiency and challenge conventional trade cost structures.

Armed with the partial equilibrium estimates of lower trade costs for trade specialists, we use our model to translate the efficiency gains into general equilibrium welfare effects. With efficient trading, i.e., when trade costs in all countries decrease to the level of trade costs for trade specialists, real GDP increases in all countries with an average increase of about 80%. The gains vary between 10% and 130% and are qualitatively and quantitatively quite robust to utilizing different trade cost estimates and changes in the elasticity of substitution.

Our obtained welfare gains are in contrast to the relatively small welfare effects of integration and trade liberalization in most of the existing literature. Therefore, to highlight their credibility and importance from a policy perspective, we subject them to several sensitivity checks and compare them to prominent strands of the related literature on the gains from trade, e.g., to studies that estimate the effects of trade liberalization in the form of tariff reductions, trade agreements, and globalization effects (Anderson et al. (2018)), and studies that compare the current state of globalization and trade integration to a state of autarky (Arkolakis et al. (2012); Costinot and Rodríguez-Clare (2014)).

The sensitivity analysis reveals that our findings for positive and large efficiency gains from efficient trading are robust across different specifications, samples, and parameter values. In addition, the comparisons with the welfare gains from the existing literature send an encouraging message from a policy perspective, i.e., that there are substantial opportunities for further gains from trade, which are in the hands of individual economic agents and which go beyond the scope and abilities for trade liberalization due to traditional trade policies, e.g., regional trade agreements and the removal of tariffs.

The remainder of the paper is organized as follows. In Section 2, we derive our theoretical model, develop specific hypotheses about the potential efficiency gains for trade specialists, and specify our estimating equation. Section 3 describes the sources and procedures that we use to construct our dataset, and provides descriptive statistics. Section 4 presents our main findings and summarizes the results of a series of robustness experiments. Section 5 translates our partial trade cost estimates into welfare effects. Section 6 offers concluding remarks and directions for future work. A Supplementary Appendix, which is not intended for publication, includes details about the theoretical model and an extended theory allowing for firm heterogeneity, further details on the data, and additional empirical analyses.

2 Methodological Foundations

In Section 2.1 we build a multi-country and multi-sector theoretical model that distinguishes between trade specialists versus common traders and allows for differences between the two types of firms across three types of trade costs. In Section 2.2, we develop specific hypotheses about the potential differences in the effects of each type of cost on trade specialists versus common traders. Finally, based on the analysis in the previous subsections, in Section 2.3, we specify our econometric model.

2.1 A Theory of Trade Specialists vs. Common Traders

Our objective is to develop a simple theoretical framework with two key features. First, the model should allow for two types of firms, trade specialists versus common traders. In turn, this will enable us to test for and estimate such differences in the direct/partial bilateral trade costs in our econometric analysis. Second, the model should also enable us to perform a counterfactual analysis that translates the lower partial equilibrium trade costs faced by trade specialists into general equilibrium gains from efficient trading.

To pursue these goals, we model a world where economic agents produce and consume in J countries, indexed by $\{i, j\}$, K sectors, indexed by $\{k\}$, and T periods, indexed by $\{t\}$. Consumer preferences are proxied by CES demand for differentiated varieties, which are nested within Cobb-Douglas preferences across sectors, with α_j^k denoting the spending share of country j in sector k, with $\sum_k \alpha_j^k = 1$. There are two types of firms: trade specialists, denoted by superscript S, and common traders, denoted by superscript C. We use V (for *Vendor*) to denote the set of the two types of firms $\{S, C\}$, and we assume a fixed number of firms of each type in each country and sector, $N_i^{k,V}$.[5] The two types of firms are different in their ability to trade, and hence they are subject to different incidences of trade costs.[6]

Each variety is uniquely supplied by a single firm. We assume that there is no heterogeneity within the types of firms. As firms are unique sellers of their variety, they have some market power, as in Krugman (1979, 1980). To reflect that, we assume that firms are monopolistically competitive. The degree of competitiveness in a sector is governed by the sector-specific elasticity of substitution among the varieties, σ^k. At time t,

[5] In our data, trade specialists, also called merchants, are located in a given country and trade goods between two other countries, which are different than their home country, i.e., trade specialists are organizing trade between two foreign countries.

[6] Our main focus is on modeling the different types of trade costs for common traders and trade specialists. In addition, we could reallocate profits from arranging trade between two countries to the country of origin of the trade specialists. To do this, however, we would need data on the shares of profits earned by merchants from different origins for organizing trade between two specific countries. Such data is not available. Alternatively, we would need to make strong assumptions about how to allocate profits from merchanting trade (such as distributing profits according to output size). The overall results showing large gains from efficient trading will remain and are expected to increase the gains for smaller countries due to profits from organizing trade between large countries.

goods in country i and sector k are produced using factors for production at variable costs per efficiency unit given by $c_{i,t}^k$. These assumptions imply the following solution to the factory-gate price in each country, sector, and point in time:

$$p_{i,t}^k = \frac{\sigma^k}{\sigma^k - 1} c_{i,t}^k, \tag{1}$$

where, $\sigma^k/(\sigma^k - 1)$ is the markup over marginal costs.

Trade is subject to trade costs, which we model following the customary iceberg assumption. However, the elasticities of the different components of trade costs are different for the two types of firms. The intuition and motivation for this modeling choice are that, even though the trade costs between two countries are *ex ante* the same for trade specialists and common traders (e.g., consider the distance between the two countries), the trade specialists are better at handling these trade costs, i.e., they have knowledge/abilities that allow them to handle the same obstacles to trade more efficiently than the common traders.[7] This enables us to define the delivered price of goods in sector k from origin i to destination j at time t for firm V as follows:

$$p_{ij,t}^{k,V} = p_{i,t}^k \left(\tau_{ij,t}^k\right)^{\alpha^V} \left(n_{ij,t}^k\right)^{\beta^V} \left(b_{ij,t}^k\right)^{\gamma^V}, \tag{2}$$

where, motivated by our data and expectations about the different channels that may lead to different effects of trade costs for trade specialists, we decompose the iceberg trade costs in our model into three categories: $\tau_{ij,t}^k \geq 1$ denotes the vector of bilateral transportation costs; $n_{ij,t}^k \geq 1$ denotes the vector of other non-tariff trade barriers (e.g., trade policies that target protection or liberalization beyond tariffs); and $b_{ij,t}^k \geq 1$ denotes *ad-valorem* (wasteful) tariffs. The corresponding elasticities, that are trade-type specific, are denoted by α^V, β^V, and γ^V, respectively.

Armed with these assumptions and notation, we can derive the revenues (at delivered

[7] In the next section, we discuss in detail the alternative motivations for this modeling choice and also our decision not to micro-model the differences for each type of trade costs.

prices, i.e., inclusive of trade costs) from the sales of firm V, which produces in sector k in country i and sells to country j at time t as:

$$X_{ij,t}^{k,V} = N_i^{k,V} \left(\frac{\sigma^k}{\sigma^k - 1} \frac{c_{i,t}^k \left(\tau_{ij,t}^k\right)^{\alpha^V} \left(n_{ij,t}^k\right)^{\beta^V} \left(b_{ij,t}^k\right)^{\gamma^V}}{P_{j,t}^k} \right)^{1-\sigma^k} E_{j,t}^k, \tag{3}$$

where $E_{j,t}^k$ denotes the aggregate expenditures on products from sector k in destination j at time t, and $P_{j,t}^k$ is the corresponding sectoral CES price aggregator given by:

$$\begin{aligned}(P_{j,t}^k)^{1-\sigma^k} \quad = \quad & \sum_i \Bigg(N_i^{k,S} \left[\frac{\sigma^k}{\sigma^k - 1} c_{i,t}^k \left(\tau_{ij,t}^k\right)^{\alpha^S} \left(n_{ij,t}^k\right)^{\beta^S} \left(b_{ij,t}^k\right)^{\gamma^S} \right]^{1-\sigma^k} \\ & + N_i^{k,C} \left[\frac{\sigma^k}{\sigma^k - 1} c_{i,t}^k \left(\tau_{ij,t}^k\right)^{\alpha^C} \left(n_{ij,t}^k\right)^{\beta^C} \left(b_{ij,t}^k\right)^{\gamma^C} \right]^{1-\sigma^k} \Bigg). \end{aligned} \tag{4}$$

Note that the trade cost elasticities for the bilateral transportation costs, the non-tariff barriers, and the tariffs are all firm-type-specific, i.e., they are different for the trade specialists and the common traders. These trade cost differences between trade specialists versus common traders are the key novelty of our model relative to the existing literature. We devote the next section to motivating such trade cost differences and to formulating hypotheses for the empirical analysis in Section 2.3. We will develop the model further into a full general equilibrium framework in Section 5, where we perform our counterfactual analysis.

2.2 Modeling Trade Costs: Specialists vs. Common Traders

Guided by theory and intuition, and subject to the features and limitations of our data, in this section, we motivate and form hypotheses about the differences between the trade costs for trade specialists versus common traders across the three types of bilateral trade frictions in our model. While nested in the structural model, our approach to modeling bilateral trade costs is a reduced-form one. It may be possible to develop formal theories for some of the differences that we expect to capture empirically. Moreover, some existing theories may be suitable for our purposes. However, we prefer to adopt a significantly simpler approach for several related reasons, which we describe next.

First, as discussed below, even if we attempted to offer more formal theoretical foundations, the key resulting estimates of the parameters in our model would still be 'black boxes' for identification purposes. Thus, we believe that a fully structural approach would not add new insights relative to the reduced-form modeling choices and hypotheses that we develop below. Second, as will become clear shortly, several alternative channels/theories could be driving the differences between the trade costs for trade specialists versus common traders within each type of bilateral trade friction. Third, while our data would enable us to estimate the differences between trade costs for trade specialists versus common traders, it is not rich enough to enable us to disentangle the possible competing theories for those differences within each type of trade costs.[8] Finally, if we decided to pursue a fully structural approach, then each of the three types of bilateral trade frictions in our model would require individual theoretical treatment. This, combined with our inability to unpack the 'black box' trade-cost parameters, would result in an unnecessarily complicated structural model.

Against this backdrop, and following most of the trade cost gravity literature,[9] we decided to rely on a simple and flexible reduced-form approach that is guided by intuition and is feasible to implement with our data. Nevertheless, while setting up our trade costs hypotheses, we will discuss several more structural approaches that have been developed for different purposes but could also be used to motivate and capture the differences between the two types of traders in our model more formally. In addition, in the empirical analysis, we offer a series of robustness checks and alternative specifications that shed more light on the possible drivers of the trade cost differences between common traders and

[8] As described in the data section below, our unique dataset would enable us to construct and match bilateral trade flows for trade specialists versus common traders. However, the data that we have on trade specialists does not include information on the various channels, e.g., investment in shipping routes, language specialists, etc., which could be used to dig deeper into the drivers of their trade costs competitive advantage.

[9] See Anderson and van Wincoop (2003) for an early survey on bilateral trade costs and Lendle et al. (2016) and Egger et al. (2021) for more recent discussions.

trade specialists. Finally, we extend our simple model to allow for firm heterogeneity and fixed costs (in Appendix C.2), and we demonstrate that the more general theory leads to the exact same estimating equation.[10]

We start the analysis of the bilateral trade cost frictions in our model by focusing on the category *'transportation trade costs'*, $\tau_{ij,t}^{k}$. Consistent with the existing literature, e.g., Anderson and van Wincoop (2004) and Lendle et al. (2016), we believe that this type of friction accounts for the largest fraction of the total bilateral trade cost bill, e.g., because they would reflect the impact of geography. More importantly for our purposes, we also expect that this is the area where the potential competitive advantage of trade specialists would be very pronounced. To proxy for transportation costs in our empirical specification, we will rely on distance ($DIST_{ij}$), as the most widely used gravity variable in the related literature (Disdier and Head, 2008).[11] We also will employ contiguity ($CNTG_{ij}$) as another commonly used variable to proxy for the effects of geography in the gravity literature. In addition, we will use two other standard indicator variables – for common official language ($LANG_{ij}$) and for the presence of colonial ties ($CLNY_{ij}$) – as further trade cost proxies in additional specifications.

Our hypothesis for the estimates of the coefficients on the proxies for transportation trade costs is that the estimate of the negative impact of distance and the positive impact of contiguity, a common language, and colonial relationships should be smaller (in absolute value) for trade specialists compared to common traders. The reason for our prediction of a weaker impact of distance, contiguity, common language, and colonial relationships with trade specialists is that they may face more intense competition to break into markets where bilateral relationships at the country level have long been established and are strong due to geographic proximity, presence of a common language or colonial ties, consistent with the theory of rising trade costs due to the increasing difficulty of reaching new customers of Arkolakis (2010).

[10]Due to a lack of necessary data, we were not able to use the alternative framework for our general equilibrium analysis. Hence, we adhere to the simpler framework in the main part of the paper.

[11]Specifically, $DIST_{ij}$ denotes the log of population-weighted bilateral distance between two countries.

Given the relative importance of geography for international trade, we believe that this is the key channel for efficiency gains for the trade specialists. Hence, we expect that our estimates of the effects of distance, contiguity, common language, and colonial ties would capture some of the biggest differences between the two types of traders in our model.

Several theories are consistent with and can be used to motivate our prediction for lower transportation trade costs for trade specialists.[12] However, as mentioned earlier, without fully developing the alternative theories within the same framework and without having access to data that are rich enough to enable us to decompose the competing causes of the efficiency gains for trade specialists, the difference in the trade costs that we aim to identify between the two types of traders would remain a black box.

The next category of trade costs in our model is *'non-tariff trade barriers'*, $n^k_{ij,t}$, and to proxy for them, we use a vector of time-varying bilateral trade policies, which are designed to eliminate non-tariff trade barriers. Specifically, we will use a series of dummy variables for trade agreements, including an indicator for the presence of free trade agreements ($FTA_{ij,t}$), an indicator for the presence of customs unions ($CU_{ij,t}$), and an indicator for the presence of economic integration agreements ($EIA_{ij,t}$). Our prediction about the direction/sign of the difference between the estimates of the effects of trade liberalization on trade specialists versus common traders is that the effects of trade agreements should be smaller for the trade specialists. The intuition for this prediction is that trade specialists have already taken advantage of some of the opportunities to circumvent certain trade barriers, thus some of the efficiency improvements due to trade agreements would not apply to them.

The last category of trade costs in our specification is *'tariffs'*, $b^k_{ij,t}$, and to measure

[12] Some examples include the theory of rising trade costs due to increasing difficulty of reaching new customers of Arkolakis (2010), the 'marketing capital' notion of Head et al. (2010), the 'external economies of scale' story of Urbina and Bradshe (2013), the model of 'network link dynamics' of Chaney (2014), the story of 'managers' experience' by Mion and Opromolla (2014), the 'increasing returns scale in trade volume effects' theory of Anderson et al. (2016), the theory of 'reduction in search costs' in Lendle et al. (2016), the 'distribution capital' theory of Crucini and Davis (2016), or the 'investment bilateral capacity' story of Anderson and Yotov (2020).

this variable, we use $TARIFF_{ij,t} = ln(1+tariff)$, where *tariff* is the applied *ad-valorem* bilateral tariff imposed on exports from source i to destination j at time t. Our main hypothesis regarding the effects of tariffs is that their negative impact should be the same for trade specialists and common traders. The motivation for our prediction about a similar impact of tariffs on the two types of traders is that, regardless of whether a given product is exported by a trade specialist or by a common trader, it has to cross the border, and the same *ad-valorem* tariff rate should be levied on it.[13]

2.3 Econometric Specification

We capitalize on the analysis from the previous section and on established developments in the gravity literature (Larch et al., 2025) to translate our theoretical model from Section 2.1 into an econometric specification, which will enable us to test each of our main hypotheses. To this end, we proceed in two steps. First, we translate Equation (3) into an estimating equation by exponentiating its right-hand side,[14] using fixed effects ($\pi_{i,t}^{k,V}$ and $\chi_{j,t}^{k,V}$, respectively) to capture $N_i^{k,V}$, $[\sigma^k/(\sigma^k-1)]^{(1-\sigma^k)}$, $(c_{i,t}^k)^{1-\sigma^k}$, $(P_{j,t}^k)^{1-\sigma^k}$ and $E_{j,t}^k$, and adding a multiplicative error term $\epsilon_{ij,t}^{k,V}$:

$$X_{ij,t}^{k,V} = \exp\left[\tilde{\beta}_1^V \ln\left(\tau_{ij,t}^k\right) + \tilde{\beta}_2^V \ln\left(n_{ij,t}^k\right) + \tilde{\beta}_3^V \ln\left(b_{ij,t}^k\right) + \pi_{i,t}^{k,V} + \chi_{j,t}^{k,V}\right] \times \epsilon_{ij,t}^{k,V}, \quad (5)$$

where $\tilde{\beta}_1^V = (1-\sigma^k)\alpha^V$, $\tilde{\beta}_2^V = (1-\sigma^k)\beta^V$, and $\tilde{\beta}_3^V = (1-\sigma^k)\gamma^V$. We estimate our model jointly for both types of traders. To explicitly allow for differential trade cost effects for the trade specialists versus the common traders, we reintroduce the superscripts S and

[13] In good faith, we assume away the possibility for illicit exports by the trade specialists. However, we do believe that the trade specialists know, understand, and take advantage of the details of complex tariff schedules much better than common traders.

[14] The exponential functional form is used because, following Santos Silva and Tenreyro (2006), we will employ the Poisson Pseudo Maximum Likelihood (PPML) estimator. Santos Silva and Tenreyro (2022) and Larch et al. (2025) offer recent discussions of the advantages of using PPML for structural gravity regressions. While we are convinced of the superiority of PPML relative to other estimators, in the sensitivity analysis in Section 4.2, we also confirm the robustness of our main findings with the OLS estimator. Following the convention in the related empirical gravity literature, we cluster the standard errors in our econometric model by pair and product. In addition, in the sensitivity analysis, we show that our main findings remain robust to clustering the standard errors by exporter, importer, product, and time.

C, respectively, in Equation (5), which becomes:

$$
\begin{aligned}
X_{ij,t}^{k,V} = & \exp\left[\beta_1^C \ln\left(\tau_{ij,t}^k\right) + \beta_1^S\left(\ln\left(\tau_{ij,t}^k\right)\times S_i\right) + \beta_2^C \ln\left(n_{ij,t}^k\right) + \beta_2^S\left(\ln\left(n_{ij,t}^k\right)\times S_i\right)\right] \times \\
& \exp\left[\beta_3^C \ln\left(b_{ij,t}^k\right) + \beta_3^S\left(\ln\left(b_{ij,t}^k\right)\times S_i\right) + \pi_{i,t}^{k,S} + \chi_{j,t}^{k,S} + \pi_{i,t}^{k,C} + \chi_{j,t}^{k,C}\right] \times \epsilon_{ij,t}^{k,V}. \qquad (6)
\end{aligned}
$$

The dependent variable in (6) is nominal trade in sector k from source i to destination j at time t, and it includes different observations for trade flows of trade specialists and common traders. In addition, to capture the potentially differential impact of trade costs on trade specialists versus common traders, we interact each type of trade costs in (6) with an indicator variable, S_i, which is equal to one if the corresponding observation in the dependent variable is for exports of trade specialists, and it is zero otherwise. Thus, consistent with our goals to identify the difference in the effects of trade costs between the two types of traders, the estimates in the vectors of coefficients β^S should be interpreted as deviations/differences of the estimates of the trade costs faced by trade specialists relative to the corresponding estimates for common traders. Note that the estimating equation (6) is also consistent with our more general theory described in Appendix C.2.[15]

We already defined the three main types/vectors of trade costs and the specific variables that we will use to proxy for them in Equation (6).[16] Based on our hypothesis, we expect (i) the estimate on $DIST_{ij}$ in the vector $\hat{\beta}_1^S$ to be positive and the estimate on $CNTG_{ij}$ in the vector $\hat{\beta}_1^S$ to be negative, (ii) the estimate on all trade agreement variables

[15]Using the more general theory, we obtain another type of trade costs – fixed costs, and the structural interpretation of the coefficients changes for some components. While, to our best knowledge, there are no well-established proxies for fixed/entry costs that are consistently constructed and available for a wide sample of countries such as ours, entry costs may be related to common official language ($LANG_{ij}$) and the presence of colonial ties ($CLNY_{ij}$). The academic community and trade practitioners have recognized the importance of language as an entry barrier. Deltas and Evenett (2020) is an example of a recent academic article that points to language as an entry barrier, while White (2020) offers a recent discussion from a practitioner's perspective. For evidence on the differential impact of colonial ties on the intensive versus the extensive margin of trade, we refer the reader to Santos Silva and Tenreyro (2006) and Santos Silva et al. (2014), respectively. In our analysis, we also provide specifications including a common official language and the presence of colonial ties as trade cost components.

[16]As a reminder, we will use distance ($DIST_{ij}$) and contiguity ($CNTG_{ij}$) to proxy for transportation costs ($\tau_{ij,t}^k$), indicators for free trade agreements ($FTA_{ij,t}$), customs unions ($CU_{ij,t}$), and economic integration agreements ($EIA_{ij,t}$) to proxy for non-tariff trade liberalization ($n_{ij,t}^k$), and *ad-valorem* tariffs ($TARIFF_{ij,t}$) for tariff barriers ($b_{ij,t}^k$). Furthermore, we provide results using common official language ($LANG_{ij}$) and colonial ties ($CLNY_{ij}$) as additional trade cost proxies.

in the vector $\hat{\beta}_2^S$ to be negative, (iii) the estimate on tariffs, $\hat{\beta}_3^S$, to be not statistically significant, and, finally, (iv) the estimates on $LANG_{ij}$ and $CLNY_{ij}$ as further controls for transportation costs in the vector $\hat{\beta}_1^S$ to be negative. To obtain our main results, we constrain the estimates of the coefficients on all covariates in Equation (6) to be common across sectors. However, in the sensitivity analysis, we also obtain sectoral estimates that confirm our main findings and conclusions.

Finally, $\pi_{i,t}^{k,S}$ and $\chi_{j,t}^{k,S}$ and $\pi_{i,t}^{k,C}$ and $\chi_{j,t}^{k,C}$ are exporter-sector-type-time fixed effects and importer-sector-type-time fixed effects for the trade specialists and the common traders, respectively. In addition to varying across exporter-sector-time and importer-sector-time, as is standard in estimating sectoral gravity models, the fixed effects in our econometric specification also vary by firm type to reflect the additional dimensions of our theory, and they are designed to capture all potentially non-observable factors varying by exporter-sector-type-time or importer-sector-type-time.

3 Data: Sources and Descriptives

Section 3.1 describes the sources for our data, and Section 3.2 offers a series of descriptive statistics.

3.1 Data sources

We utilize a novel dataset representing the universe of German merchanting transactions between 1999 and 2012, as collected by the Deutsche Bundesbank for the balance of payment statistics following the Foreign Trade and Payments Regulation (Aussenwirtschaftsordnung).[17] Transactions are classified as merchanting when residents purchase goods located abroad from foreign sellers and then sell these goods to foreign buyers without the goods having entered Germany. In principle, three types of merchanting transactions can

[17] To the best of our knowledge, the only other paper focusing on merchanting trade uses country-level data to study the importance of merchanting activity as a medium-term determinant of the current account (Beusch et al., 2017).

be distinguished: i) direct merchanting, in which the resale of goods occurs immediately after the purchase; ii) warehouse transactions, in which goods are temporarily stored in warehouses outside Germany before resale to non-residents; and iii) indirect merchanting, which involves another domestic party before goods are resold on to a foreign party.[18] Direct merchanting accounts for the majority of transactions (62%), followed by warehouse transactions (36%), and indirect merchanting (2%).

Individual entries in the raw dataset record, among others, a firm identifier, the month and year of the transaction, a two-digit HS product code, the country of purchase or the country of the buyer, and a code indicating the type of merchanting transaction. Therefore, the raw dataset does not include a correspondence between purchase transactions and sales transactions that belong to the same good and which coincide with the actual physical trade flow between the exporting country (seller) and the importing country (buyer).

To match the corresponding purchases and sales, we focus on direct merchanting transactions. In particular, we only consider month-firm-product triplets for which there is a single purchase transaction (but possibly multiple sales transactions). This is a very conservative approach, which is assumption-free and ensures a high-quality match at the cost of a loss of observations (12% of transactions representing 10% of the total value of direct merchanting transactions covering 89% of export and 80% of import countries from 86% of merchanting firms). As a robustness check, we also consider an alternative match, in which we link purchase transactions and sales transactions in month-firm-product triplets, which are closest to each other in transaction values.

The resulting dataset is more representative of the raw data (55% of transactions representing 43% of the total value of direct merchanting transactions covering 96% of

[18] After 2012, the transaction codes in the dataset no longer distinguish between direct merchanting and warehouse transactions due to changes in the methodology implemented in line with the sixth edition of the Balance of Payments and International Investment Position Manual (BPM6) of the International Monetary Fund. We exclude HS2 chapter 71 "Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation, jewellery; coin." from the analysis, since – before 2012 – the corresponding transactions were mostly related to gold trading, which according to BPM6 is no longer considered to be merchanting trade.

export and 95% of import countries from 89% of merchanting firms) but possibly contains some wrong assignments (hereafter referred to as "less conservative sample"). Moreover, for robustness, we consider an additional match based on month-firm-product triplets containing only single purchase and sales transactions. This constitutes the most conservative matching approach (hereafter referred to as "more conservative sample"). All of our main results are robust to these alternative approaches. In general, we use the transaction value of sales transactions in the analysis since these are inclusive of firm profits similar to export values of common trade flows.

Annual bilateral trade flows between countries at the 6-digit Harmonized System (HS) level are taken from the BACI Database of the Centre d'Études Prospectives et d'Informations Internationales (CEPII). For harmonization with the merchanting data, we aggregate the trade flows to the 2-digit HS product level, convert them from US dollars to euros using the annual average of the European Central Bank's reference rate, and subtract the corresponding merchanting flows to avoid double counting. The remaining flows likely still include some merchanting trade resulting from residual unmatched flows of the German dataset, and, more importantly, merchanting trade conducted by other countries. However, if anything, this is expected to work against our results by attenuating the estimated differences between trade specialists and common traders. For comparability, we exclude products and countries that are not covered in the merchanting dataset.

Bilateral distances, and indicator variables for common borders, common languages, and past colonial relationships are from the Gravity Database of CEPII. The tariff data are from CEPII providing information on bilateral applied tariff rates by 6-digit HS products for the years 2001, 2004, 2007, and 2010, which we aggregate to the 2-digit level by taking the simple mean.[19] Time-varying information on free trade agreements, customs unions, and economic integration agreements is from Mario Larch's Regional Trade Agreements Database (Egger and Larch, 2008). For a comprehensive list of definitions and data sources, see Table A1 in the Appendix.

[19] We would like to thank Houssein Guimbard for kindly providing the data to us. For robustness, we also use the trade-weighted mean.

3.2 Descriptive Statistics

The final merchanting dataset in the estimation sample covers trade flows in 92 HS2 categories between 96 exporting countries and 158 importing countries over the period 2001 to 2010 (Figure 1). The average value of merchanting trade in the sample only represents a small fraction of global trade flows (0.02%) given that we focus on a particular kind of firm in a single country. However, the correlation between the log of export values of the trade specialists and the common traders is around 0.56 suggesting that the geographic pattern of trade flows is broadly similar. Accordingly, the most important exporter and importer countries are also relatively similar for the two kinds of traders.

At the same time, given that trade specialists operate from Germany, one would also expect the trade partner's connection with Germany to play a role. Indeed, there is also a considerable correlation between Germany's trade shares with exporter and importer countries and those of trade specialists.[20] In a similar vein, Germany's trade structure is also to a certain extent reflected in the product composition of trade specialists (Table 1).

Table 1: Trade shares by HS2 chapters

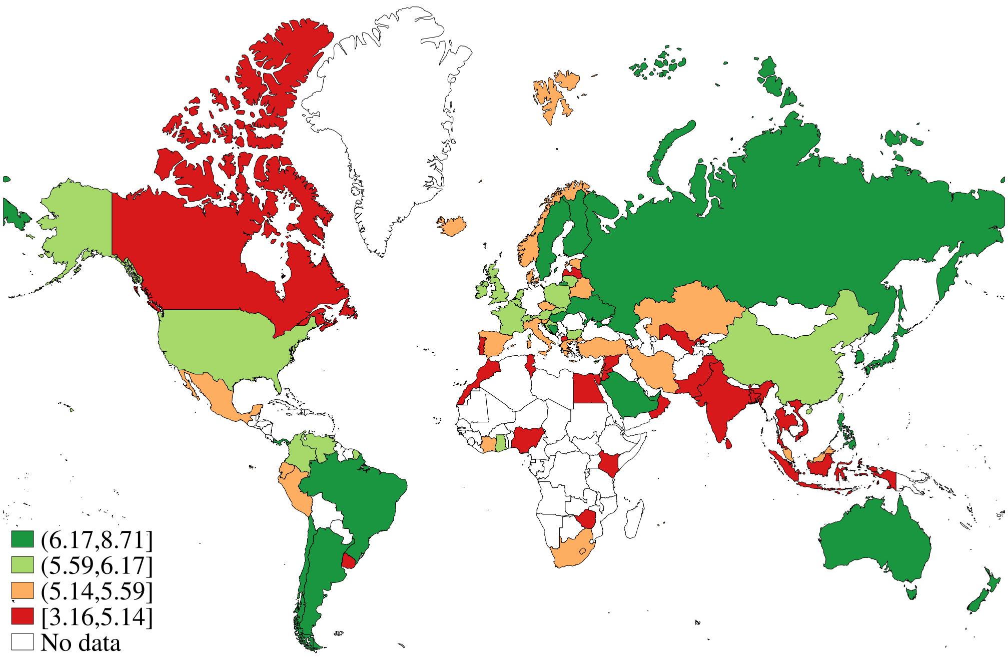
	Trade specialists	Common traders	Exp. DEU	Imp. DEU
Electrical machinery and equipment and parts thereof etc.	31.36	13.62	10.59	12.44
Nuclear reactors, boilers, machinery and mechanical appliances etc.	10.33	13.01	18.71	14.31
Iron and steel.	6.10	2.88	2.50	2.95
Plastics and articles thereof.	5.33	3.18	4.88	3.51
Mineral fuels, mineral oils and products of their distillation etc.	5.25	14.74	1.84	8.44
Vehicles other than railway or tramway rolling-stock etc.	4.91	7.52	18.53	9.45
Optical, photographic, cinematographic, measuring instruments etc.	3.56	2.96	4.21	3.16
Inorganic chemicals; organic or inorganic compounds of precious metals etc.	3.09	0.80	0.73	0.71
Organic chemicals.	3.09	2.82	2.54	3.06
Copper and articles thereof.	2.02	0.99	0.97	1.03

Notes: The table presents the top ten export products of trade specialists by HS2 chapter computed across the whole estimation sample. The values reported are shares in % of the total. Column (2) reports the corresponding values for common traders. Columns (3) and (4) report the corresponding values for common traders limited to German exports and German imports, respectively.

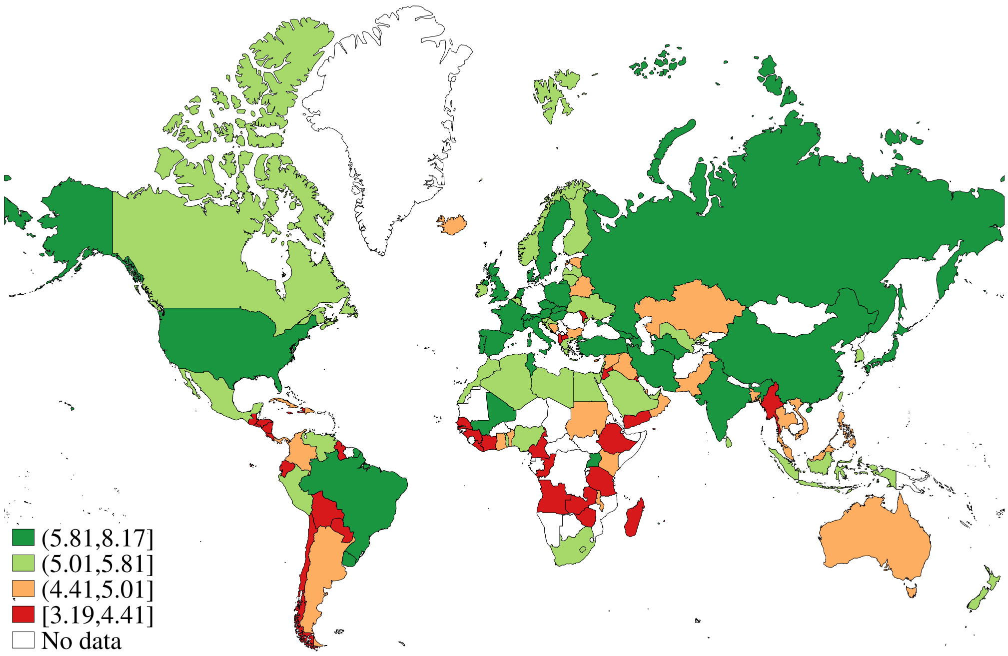
Table 2 provides summary statistics for all gravity variables used as bilateral trade cost proxies for the common traders and the trade specialists, respectively. In general, country pairs served by trade specialists are associated with higher bilateral trade costs than those by common traders, irrespective of the particular type of trade cost under consideration. For example, country pairs of trade specialists are on average 400 kilometers farther away

[20]The correlation between the export (import) shares of trade specialists with common trade of Germany is 0.53 (0.84), while it is 0.58 (0.62) for all common traders.

Figure 1: Trade values for trade specialists



(a) Exports



(b) Imports

Notes: The figure shows trade values of trade specialists aggregated at the country level, for which the mean over time was computed for the estimation sample. Panel (a) reports the natural logarithm of export values. Panel (b) reports the natural logarithm of import values. For confidentiality reasons, only values including at least five firms are shown.

from each other than those of common traders. Furthermore, they are roughly a third as likely to share a common border, a common language, or a colonial relationship.

Free trade agreements and currency unions are also more prevalent in trade relations of common traders, while the opposite appears to be true for economic integration agreements. Finally, the average ad-valorem tariff of the products traded between those country pairs is around 7% higher for trade specialists relative to common traders. Overall, the descriptive evidence is consistent with the view that trade specialists select particularly difficult trade relations and products, for which they appear to have a comparative advantage relative to common traders.

Table 2: Summary statistics of gravity variables

Variable	Common traders	Trade specialists
Distance	5169.06	5562.25
Common border	20.51	7.10
FTA	9.00	6.76
CU	1.79	0.99
EIA	16.96	20.53
Tariff	3.28	3.53
Common language	21.44	6.54
Colony	7.47	2.29

Notes: The table reports trade-weighted means across the estimation sample for a range of bilateral (i.e., country-pair) variables. Distance is the population-weighted distance between countries' most populated cities in kilometers. Common border is a dummy variable equal to one if countries share a common border and zero otherwise. FTA, CU, and EIA are dummy variables equal to one if countries are in a free trade agreement, customs union, or economic integration agreement, respectively. Tariff is the mean applied tariff rate. Common language is a dummy variable equal to one if countries have a common official or primary language and zero otherwise. Colony is a dummy variable equal to one if countries were ever in a colonial relationship and zero otherwise. Distance is in kilometers and all other variables are in %. See Table A1 in the Appendix for details.

Given that little is known about merchanting trade, in the following, we provide some details on the characteristics of the merchanting firms and their transactions underlying the aggregate merchanting data.[21] Table A2 in the Appendix shows that the bulk of merchanting trade is associated with wholesalers (45% of trade value; 60% of firms) followed by manufacturing firms in sectors such as the manufacture of motor vehicles (23% of trade value; 1% of firms) and the manufacture of chemicals and chemical products

[21] To ensure comparability with other data sources, the firm-level statistics are computed based on all merchanting transactions. Nevertheless, the results are qualitatively similar when using only the merchanting transactions in the estimation sample.

(12% of trade value; 4% of firms). The share of wholesalers is conspicuously larger than in common international trade, where Bernard et al. (2015) have shown that wholesalers are more prevalent in markets with higher destination-specific fixed costs and larger sunk entry costs.

Our dataset contains between 2,415 (in 2001) and 2,098 (in 2010) merchanting firms (Table A3 in the Appendix). In 2010, the average (median) merchanting firm had annual exports of 46.7 million EUR (1.2 million EUR) and traded two (one) HS2 products. Merchanting firms are therefore fewer, but larger than firms commonly involved in the international trade of goods in Germany.[22] Interestingly, the average (median) merchanting firm purchased goods from 4 (2) countries and sold them to customers in 7 (3) different countries in 2010.

As is typically observed for firm-level data of common traders (e.g., Bernard et al., 2012), aggregate merchanting trade is also extremely dominated by a few large firms (Figure A1 in the Appendix), which are predominantly multi-product and multi-destination exporters and importers (Table A4&A5 in the Appendix).[23] Finally, Table A6 in the Appendix shows that merchanting firms are also often services traders (57% in 2010) with service trade transactions with countries for which merchanting trade relations also exist (around 35% on both export and import side in 2010). To a lesser extent, the same observation applies to the multinational status of the firm (15% in 2010) and its affiliate presence in exporting and importing countries (both 7% in 2010).

[22] In 2009, there were 75,493 exporters (88,798 importers) in Germany according to Wagner (2012), translating into annual exports (imports) of 10.6 million EUR (7.5 EUR) per firm given aggregate trade figures. Note, however, that the reporting thresholds are not directly comparable. For merchanting trade, the threshold is 12,500 EUR. In 2009, intra-EU trade firms only had to report trade values exceeding 400,000 EUR, while for non-EU countries the threshold was at 1,000 EUR Wagner (2012).

[23] For example, the largest 134 firms accounted for 90% of the aggregate merchanting trade volume in 2010 (Figure A1 in the Appendix). Approximately 28% (35%) of merchanting firms exported (imported) a single product to (from) a single destination, which, however, accounted for less than 1% (3%) of the total export (import) value (Table A4&A5 in the Appendix). In contrast, firms exporting (importing) more than five products to (from) more than five destinations accounted for 6% (6%) of firms, but 29% (26.4%) of total export (import) value.

4 Empirical Analysis

Section 4.1 presents our main findings and establishes the superiority of the trade specialists. In Section 4.2, we obtain and discuss the results from a battery of robustness experiments, implement additional specifications, and explore alternative dimensions of the data to shed more light on the reasons and channels for the dominant performance of the trade specialists.

4.1 Main Findings

Our main findings are presented in Table 3. Consistent with the exposition from the theory section, and to highlight and decompose the alternative drivers of the efficiency gains for trade specialists, we introduce the proxies for the three types of trade costs sequentially. We start with the proxies for geography and transportation costs, in column (1), and then gradually build on the trade cost vector to reach our most preferred specification, in column (4), which includes the full set of trade cost variables. The specifications in columns (1) through (4) distinguish between the trade costs for the specialists versus non-specialists, and we remind the reader that, by definition, the estimates of the effects for the specialists should be interpreted as deviations from the corresponding estimates for non-specialists.[24] In the last column of Table 3, we also report results based on a sample that only covers trade specialists, thus allowing a direct interpretation of the trade cost estimates for trade specialists.

The results in column (1) of Table 3 are obtained from a specification that only includes the proxies distance ($DIST_{ij}$) and contiguity ($CNTG_{ij}$) for *transportation trade costs*. As expected, the negative and statistically significant estimate on $DIST_{ij}$ reveals that

[24]We could have easily obtained estimates for the specialists versus non-specialists that allow direct interpretation (as opposed to as deviations). Moreover, after a simple transformation, the estimates that are obtained with one approach can be used to obtain exactly the estimates from the other approach. We capitalize on this relationship in the discussion below. Our decision to report the estimates for trade specialists as deviations from those for the non-specialists was motivated by the main purpose of the paper, i.e., to demonstrate that the trade costs for the two groups are (statistically) different from each other and to quantify these differences.

Table 3: Main results

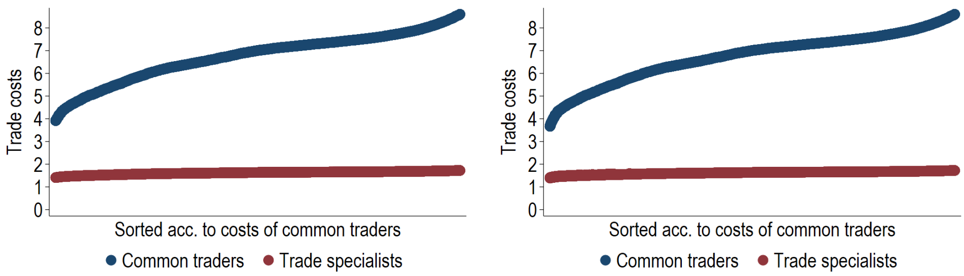
	(1)	(2)	(3)	(4)	(5)
$DIST_{ij}$	-0.964***	-0.868***	-0.841***	-0.828***	-0.359***
	(0.080)	(0.091)	(0.095)	(0.095)	(0.114)
$DIST_{ij} \times S_i$	0.720***	0.501***	0.496***	0.468***	
	(0.082)	(0.100)	(0.096)	(0.093)	
$CNTG_{ij}$	0.585***	0.586***	0.563***	0.505***	-0.021
	(0.075)	(0.074)	(0.071)	(0.072)	(0.240)
$CNTG_{ij} \times S_i$	-0.518**	-0.573**	-0.547**	-0.526**	
	(0.222)	(0.225)	(0.221)	(0.254)	
$FTA_{ij,t}$		0.340***	0.305***	0.297***	-0.253
		(0.066)	(0.064)	(0.063)	(0.196)
$FTA_{ij,t} \times S_i$		-0.535**	-0.515**	-0.550***	
		(0.215)	(0.215)	(0.209)	
$CU_{ij,t}$		0.952***	0.781***	0.754***	-0.562
		(0.184)	(0.161)	(0.160)	(0.501)
$CU_{ij,t} \times S_i$		-1.421***	-1.332**	-1.316**	
		(0.539)	(0.525)	(0.522)	
$EIA_{ij,t}$		0.445***	0.333***	0.419***	-0.657***
		(0.147)	(0.128)	(0.118)	(0.243)
$EIA_{ij,t} \times S_i$		-0.973***	-0.936***	-1.076***	
		(0.248)	(0.253)	(0.253)	
$TARIFF_{ij,t}$			-5.283***	-5.393***	-3.879
			(1.010)	(0.999)	(2.564)
$TARIFF_{ij,t} \times S_i$			0.818	1.514	
			(2.695)	(2.551)	
$LANG_{ij}$				0.151***	0.246
				(0.045)	(0.151)
$LANG_{ij} \times S_i$				0.095	
				(0.156)	
$CLNY_{ij}$				0.204*	-0.575***
				(0.106)	(0.197)
$CLNY_{ij} \times S_i$				-0.778***	
				(0.233)	
Observations	7,051,254	7,051,254	7,051,254	7,051,254	160,699
Exporters	131	131	131	131	93
Importers	158	158	158	158	150
Products	92	92	92	92	92
Years	4	4	4	4	4
R^2	0.93	0.93	0.93	0.93	0.79
Exporter × product × year FE					Yes
Importer × product × year FE					Yes
Trader × exporter × product × year FE	Yes	Yes	Yes	Yes	
Trader × importer × product × year FE	Yes	Yes	Yes	Yes	

Notes: The table presents Poisson pseudo-maximum-likelihood (PPML) regression results, using exports as the dependent variable that vary over the trader-exporter-importer-product-year dimension. Robust standard errors in parentheses are clustered by country-pair and product. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

distance is an important impediment to trade (for non-specialists). More important, and consistent with our main hypothesis, the key result from column (1) is that the negative impact of distance is significantly smaller (in absolute value) for the trade specialists.

In combination, the estimates on the two distance variables imply that the estimates of the distance elasticity for trade specialists is -0.244 (std.err. 0.101), i.e., negative and statistically significant, but almost four times smaller than the corresponding estimate for non-specialists. To get a first impression about the implied trade cost gap between specialists and non-specialists, we construct and plot them in panel (a) of Figure 2.[25] In each case, we use our estimate of the trade elasticity $\sigma = -5.393$ from our most preferred specification in column (4) of Table 3.[26] For expositional simplicity, we report estimates for the year 2001. However, the same conclusions hold for the other years in our sample. Using the average distance between two trading partners in the estimation sample (i.e., 5,870 kilometers), our estimates imply that trade costs for the specialists are more than 4 times smaller than for non-specialists.

Figure 2: Trade cost differences based on geography only



(a) $DIST_{ij}$. (b) $DIST_{ij}$ and $CNTG_{ij}$.

Notes: The figure is based on the results from column (1) of Table 3 and data for the 2001. Each plot presents the trade costs for trade specialists and common traders for individual country-pair-product duplets, sorted along the x-axis according to the costs of common traders. The first and last percentiles of the trade cost vectors were removed for expositional purposes. Panel (a) reports trade cost differences based on distance only. Panel (b) reports trade cost differences based on distance and contiguous borders.

The estimates of the effects of contiguous borders are also quite interesting and reveal-

[25]The estimates in Figure 2 are constructed as $(\exp(-0.964 \times DIST_{ij}))^{1/(1-\sigma)}$ for common traders and $(\exp(-0.244 \times DIST_{ij}))^{1/(1-\sigma)}$ for trade specialists.

[26]The coefficient on tariffs is often interpreted directly as an estimate for $-\sigma$. In our case, this implies $\alpha^C = \sigma/(\sigma - 1)$.

ing. The estimate on $CNTG_{ij}$ (i.e., for non-specialists) is positive, statistically significant, and comparable to corresponding estimates from the literature (e.g., Head and Mayer (2014)). Moreover, the negative and statistically significant estimate on $CNTG_{ij} \times S_i$ implies that the effects of contiguous borders are significantly smaller for the trade specialists. Transforming our estimate into a direct effect reveals that it is very small in terms of economic magnitude and not statistically significant (0.067, std.err. 0.213). This result supports our hypothesis that the trade specialists are the more efficient traders, and we interpret it as reflecting the ability of trade specialists to eliminate/internalize the advantages of 'contiguity'. Furthermore, it also supports our interpretation that trade specialists have a specific advantage for harder-to-serve destinations and may face more intense competition in markets with long-established trade relationships. However, the trade specialists' transactions with all partners are still subject to (smaller) transportation costs. Panel (b) of Figure 2 demonstrates that, despite the insignificant impact of contiguous borders, the trade costs for the trade specialists with their neighbors are still significantly smaller than those for the non-specialists.

The estimates in column (2) of Table 3 are obtained after introducing the proxies for *'non-tariff trade barriers'*, i.e., the dummy variables for the presence of free trade agreements ($FTA_{ij,t}$), customs unions ($CU_{ij,t}$), and economic integration agreements ($EIA_{ij,t}$). As expected, our estimates reveal that trade agreements promote international trade between non-specialists of member countries. This is captured by the positive and significant estimates on all three trade policy variables in column (2). Another intuitive result is that deeper agreements have a stronger positive impact on trade. This is captured by the larger estimates that we obtain on $CU_{ij,t}$ and $EIA_{ij,t}$ relative to $FTA_{ij,t}$. Most important for our purposes, and as predicted by our hypotheses, the effects of trade agreements are significantly smaller for the trade specialists. This is captured by the negative and statistically significant estimates on all three trade agreement interaction variables.

Interestingly, all three estimates on trade agreement interaction terms for the specialists are larger in absolute value than the corresponding estimate for the non-specialists.

The net effects of FTAs (-0.195, std.err. 0.198) and customs unions (-0.469, std.err. 0.506) for trade specialists are not statistically significant. This means that FTAs and CUs did not lead to any additional trade cost reductions for the merchants. This result implies that the trade specialists have not only taken advantage of some of the opportunities to circumvent certain trade barriers but they have been able to preemptively exhaust all trade cost reductions that FTAs and CUs have brought to the common traders. The effect of EIAs on the trade specialists is negative, large, and statistically significant (-0.528, std.err. 0.232), implying that the entry into force of EIAs hurts their exports. A possible explanation for this unexpected finding is that by offering better (publicly available) bilateral access to the common traders, deeper liberalization efforts lead to more competition for the trade specialists and, therefore, hurt their exports to EIA partners.

In column (3) of Table 3, we introduce *'tariffs'* ($TARIFF_{ij,t}$) to our specification.[27] Three results stand out. First, as expected, we find that explicitly controlling for tariffs leads to smaller (but still sizable and significant) estimates of the effects of each type of trade agreements. The implications are (i) that the estimates on the agreements variables from the previous specifications have also accounted for the effects of tariffs, and (ii) that, in addition to eliminating tariffs, trade agreements lead to significant additional reductions in trade costs. Second, the negative and statistically significant estimate on $TARIFF_{ij,t}$ implies that tariffs are an important impediment to international trade. Third, the magnitude of our estimate is also plausible and comparable to corresponding estimates from the related literature. Specifically, our estimate implies a trade elasticity of 5.4, which is readily comparable to estimates from a series of papers, e.g., Broda and Weinstein (2006), Simonovska and Waugh (2014), Soderbery (2015), and Fontagné et al. (2022).

Last, but most important for our purposes, we find that the estimates of the effects of tariffs for trade specialists is not statistically significantly different from the corresponding estimate for the non-specialists. This result supports our hypothesis that, regardless of whether a given product is exported by a trade specialist or by a common trader, it has

[27]Specifically, $TARIFF_{ij,t}$ is defined as the log of 1 plus the *ad-valorem* tariff.

to cross the border and the same *ad-valorem* tariff rate should be levied on it.

While we consider this an encouraging result, we also note that the estimate of the impact of tariffs on the trade specialists is positive, which implies that the impact of tariffs is still negative but smaller for the trade specialists. A possible explanation for this result is that consistent with the 'marketing capital' notion of Arkolakis (2010) and Head et al. (2010) it may reflect the ability of the trade specialists to affect the consumers' perception of their products, e.g., how different/substitutable they are to other available varieties within the same product category. Thus, and pushing the econometric inference to the limit, the positive estimate on $TARIFF_{ij,t} \times S_i$ implies that, on average, trade specialists have been successful in differentiating their products.

Finally, column (4) of Table 3 presents the results from our preferred specification, which also introduces two additional trade cost proxies – a dummy variable for common official language ($LANG_{ij}$) and a dummy variable for the presence of any type of colonial relationship ($CLNY_{ij}$) between two trading partners. Column (5) complements the estimates from column (4) based on a sample that only consists of observations for trade specialists. Note that, due to the structure of the fixed effects that we use, the estimates in column (5) are exactly equal to the sum of the corresponding estimates from column (4).

Several findings stand out from this specification.[28] According to our estimates, common language and the presence of colonial relationships between countries lead to more international trade. This is consistent with the existing literature. More interesting for us, the estimates of the interactions of these variables have opposing signs. Specifically, the estimate on $LANG_{ij} \times S_i$ is positive but insignificant. This is captured more clearly in column (5), where common language does not have any significant effect. A possible explanation for this result is that language is an area where the trade specialists may be more able and willing to invest, e.g., Deltas and Evenett (2020) and White (2020), mitigating or even annihilating the advantage of a common language.

[28]Note that the significantly reduced number of observations in column (5) is related to the fact that the PPML estimator does not consider exporter-product-year or importer-product-year combinations for which there are no positive trade flows for trade specialists.

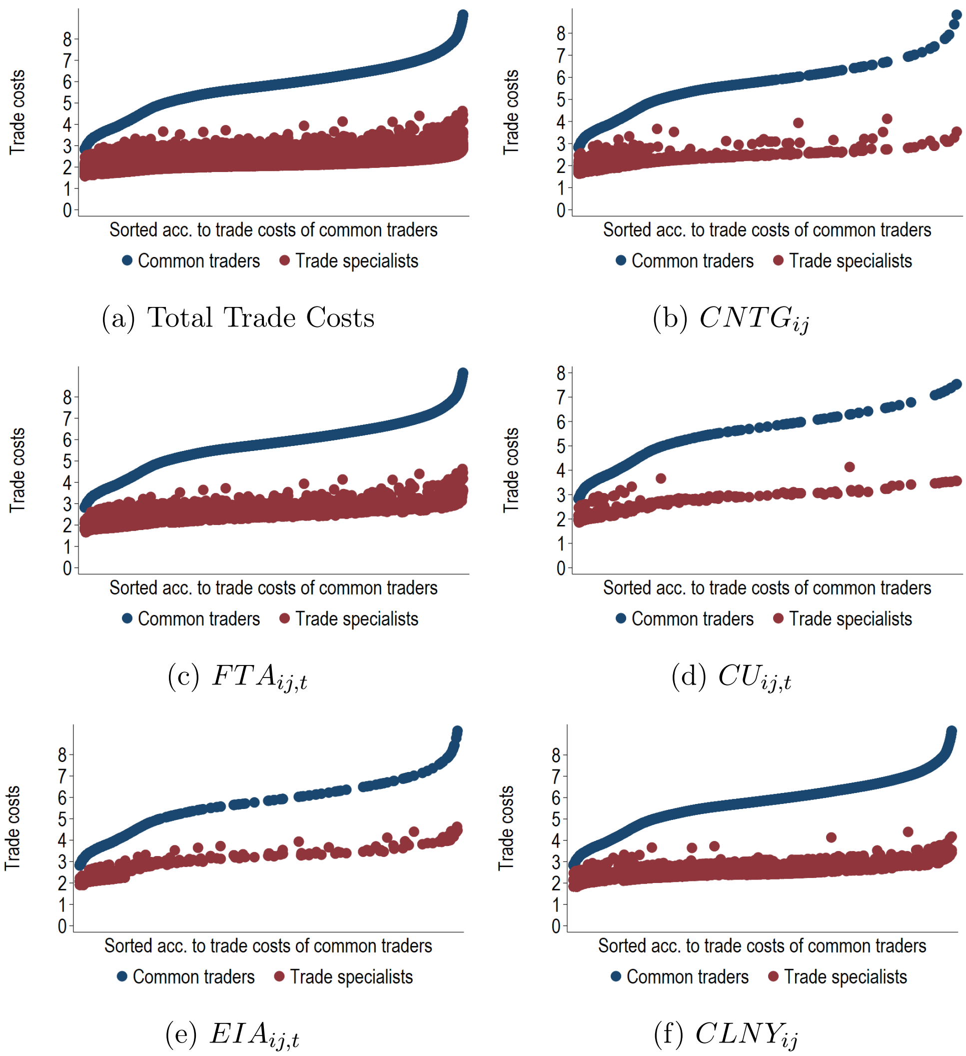
Turning to the effect of colonial ties on the trade specialists, our estimate on $CLNY_{ij} \times S_i$ is negative, large, and statistically significant. In combination with the corresponding estimate on $CLNY_{ij}$, and as captured explicitly in column (5), our results imply that the impact of colonial ties on the trade specialists is negative and statistically significant. This result confirms our hypothesis that trade specialists may be facing more intense competition to break into markets where the bilateral relationships at the country level have long been established and are strong due to the presence of colonial ties. Thus, the intuition behind this finding is similar to our explanation for the pro-competitive effects of the removal of non-tariff trade barriers, which we discussed earlier, and it is also consistent with the theory of rising trade costs due to increasing difficulty of reaching new customers of Arkolakis (2010).

We conclude the analysis in this section with a discussion of the results in Figure 3, which visualizes our main findings and demonstrates that the trade specialists retain their trade cost advantage despite the asymmetric effects of contiguity, trade agreements, and colonial ties that are in favor of the common traders. To this end, in panel (a) of Figure 3 we plot the trade costs for the trade specialists versus common traders based on the full set of estimates from our preferred specification from column (4) of Table 3.[29] In the rest of the panels of Figure 3, we limit the sample of trade cost estimates to the countries that share a common border (panel (b)), that share a free trade agreement (panel (c)), that are members of the same currency union (panel (d)), that are members of the same economic integration agreement (panel (e)), and that share colonial ties (panel (f)).

The figures confirm that the trade specialists consistently have lower trade costs than the non-specialists. This also holds when considering trade cost determinants for which the advantage of the specialists is reversed; such as in the cases of economic integration agreements or common colonial ties. Hence, our results support the view that, in general,

[29]The estimates in Figure 3 are obtained following the same procedure that we used to construct Figure 2. However, instead of just using distance and contiguity, this time we use all trade cost variables and their corresponding estimates from column (4) of Table 3. Once again, for expositional simplicity, we report estimates for the year 2001. However, the same conclusions hold for the other years in our sample.

Figure 3: Trade cost differences for dichotomous determinants



(a) Total Trade Costs

(b) $CNTG_{ij}$

(c) $FTA_{ij,t}$

(d) $CU_{ij,t}$

(e) $EIA_{ij,t}$

(f) $CLNY_{ij}$

Notes: The figure is based on the results from column (4) of Table 3 and data for the 2001. Each plot presents the trade costs for trade specialists and common traders for individual country-pair-product duplets, sorted along the x-axis according to the costs of common traders. The first and last percentiles of the trade cost vectors were removed for expositional purposes. Panel (a) reports trade cost differences based on all trade cost variables included in the regression. Panel (b)–(f) report trade cost differences for the following sub-samples: countries that share a common border (panel (b)), countries that share a free trade agreement (panel (c)), countries that are members of the same currency union (panel (d)), countries that are members of the same economic integration agreement (panel (e)), and countries that share colonial ties (panel (f)).

the trade specialists face significantly lower trade costs than the common traders.

4.2 Robustness Analysis and Additional Results

In this section, we present and discuss the results from several sensitivity experiments that confirm the robustness of our main findings. In addition, we implement some new specifications and explore alternative dimensions of the data to shed more light on the channels for the dominant performance of trade specialists. To ease exposition and add structure to the analysis, we split the robustness checks into five groups covering (i) alternative estimator, clustering, and samples, (ii) alternative covariates, (iii) wholesalers, intra-firm trade, and aggregation, (iv) product-specific results, and (v) heterogeneity of the distance effect.

4.2.1 Alternative Estimator, Clustering, and Samples

Table 4 offers results from several sensitivity experiments, which are split into two panels. The estimates in the first panel are obtained with alternative econometric specifications. First, in column (1), we experiment with four-way clustering. Specifically, instead of clustering the standard errors by country-pair and product as in our main analysis, we now cluster them by exporter, importer, product, and year. While a bit larger, the standard errors of the estimates in column (1) are similar to those from our main specification in column (4) of Table 3. Hence, there are no notable changes in the significance of our results.

The results in column (2) of Table 4 are obtained with the OLS estimator, which tests the sensitivity of our results with regard to heteroskedasticity in the trade data and the exclusion of zero trade flows. We draw the following conclusions based on these estimates. First, we note that some of the estimates on the coefficients for the non-specialists, e.g., on $DIST_{ij}$, are different between PPML and OLS. This is consistent with the findings of Santos Silva and Tenreyro (2006) and with many other papers that obtain and compare the results of both estimators.

More important for our purposes, we note that the direction and, approximately, the differences between the estimates on our covariates for the specialists versus the non-specialists remain robust to the use of OLS. The two more pronounced differences are the significant estimate on tariffs for the trade specialists and also the negative and significant estimate on language for the trade specialists. Note, however, that the OLS estimator also delivers a larger positive estimate of the impact of language for the non-specialists, leading to an overall insignificant effect of a common language for the trade specialists, as in the case of the PPML estimates. Overall, we conclude that our main conclusions remain robust to the use of the OLS estimator.

The results in the next panel of Table 4 are obtained with alternative estimation samples. In column (3), we estimate the baseline specification on a sample derived from a more conservative approach used to match merchanting export and import flows, while in column (4) we use a sample derived from a less conservative matching approach. In particular, the less conservative sample includes a higher share of transactions of larger firms, whose transactions could not be disentangled in the baseline sample. These firms tend to be large manufacturing firms. By design, the estimates for the non-specialists in columns (3) and (4) should be identical to our main results, and any potential differences could only appear in the estimates for trade specialists.

The results in column (3), i.e., obtained with the more conservative sample, are very similar to our main estimates. The only notable difference is the positive estimate of the impact of language on the trade specialists. We also see that the estimates on the geography variables in column (4), i.e., obtained with the less conservative sample, are similar to our main results. However, the estimates of the effects of all types of trade agreements on trade specialists are insignificant and the estimate on tariffs is large, positive, and significant. In combination, these estimates suggest that trade liberalization has benefited the trade specialists in the less conservative sample, while, at the same time they have been able to avoid tariff protection. These results are different from our main findings. However, we also cannot exclude the possibility that these differences, at least partially, stem from the imprecise matching of merchanting trade flows in this sample, which introduces noise in the estimation.

The estimates in column (5) of Table 4 are based on our main specification applied to a sample that contains only countries that are available in the WIOD. In addition to demonstrating the robustness of our results with an alternative database, the reason for employing WIOD is that, in the next section, we will rely on this balanced database to perform some counterfactual analyses to translate the efficiency gains for trade specialists into welfare effects.

The main message from column (5) is reassuring – despite the significantly smaller number of countries and observations, the WIOD estimates are readily comparable to our main results. The three main differences are the loss of significance of the $FTA_{ij,t}$ estimate for the trade specialists, and the loss of significance of the estimates on $CLNY_{ij}$ and $LANG_{ij}$ for the non-specialists. A possible explanation for these findings is the composition of the WIOD sample, which includes a smaller number of mainly developed countries. Overall, we conclude that the results in column (5) are comparable to our main findings, which gives us confidence to rely on the former for the counterfactual experiments in Section 5.

In the last column of Table 4, we restrict the estimation sample to include only those exporter-importer-product-year combinations that are part of the estimation sample in column (5) of Table 3. The idea behind this experiment is to ensure an as close as possible matching between the observations that we use for trade specialists versus non-specialists, i.e., to minimize the impact of composition effects.[30] Comparisons between the estimates from column (6) and our main results reveal that, despite the large drop in the number of observations, the two sets of results are very similar to each other. Therefore, we conclude

[30] In principle, if the empirical specification does not properly account for differences in the composition of trade flows between traders, the resulting gravity coefficients would then reflect high-cost transactions for trade specialists and low-cost transactions for common traders, since trade specialists select into high-trade-cost transactions as documented in Section 3.2. Therefore, we probably quantify an upper bound in the counterfactual analysis since the trade cost differences between traders would be even higher if compared for the same transactions. In any case, our empirical specifications are designed to minimize the effect of compositional differences by including fixed effects at the trader × product × exporter × year and trader × product × importer × year level.

Table 4: Robustness: Alternative estimator, clustering, and samples

	Change in specification		Change in sample			
	Altern. clustering	OLS estimator	More cons. sample	Less cons. sample	WIOD sample	Common sample
	(1)	(2)	(3)	(4)	(5)	(6)
$DIST_{ij}$	-0.828***	-1.259***	-0.828***	-0.828***	-0.769***	-0.677***
	(0.109)	(0.031)	(0.095)	(0.095)	(0.093)	(0.057)
$DIST_{ij} \times S_i$	0.468***	1.136***	0.366***	0.527***	0.678***	0.318***
	(0.101)	(0.073)	(0.097)	(0.095)	(0.069)	(0.085)
$CNTG_{ij}$	0.505***	0.630***	0.505***	0.505***	0.611***	0.492***
	(0.099)	(0.066)	(0.072)	(0.072)	(0.077)	(0.071)
$CNTG_{ij} \times S_i$	-0.526*	-0.690***	-0.399*	-0.269*	-0.580**	-0.512**
	(0.315)	(0.117)	(0.234)	(0.142)	(0.234)	(0.222)
$FTA_{ij,t}$	0.297***	0.103***	0.297***	0.297***	0.149	0.256***
	(0.096)	(0.039)	(0.063)	(0.063)	(0.147)	(0.087)
$FTA_{ij,t} \times S_i$	-0.550**	-0.184**	-0.598***	-0.168	-0.142	-0.509**
	(0.262)	(0.074)	(0.209)	(0.124)	(0.222)	(0.234)
$CU_{ij,t}$	0.754***	0.457***	0.754***	0.754***	0.593***	0.828***
	(0.276)	(0.068)	(0.160)	(0.160)	(0.229)	(0.199)
$CU_{ij,t} \times S_i$	-1.316***	-0.494**	-1.038***	-0.108	-1.132	-1.390***
	(0.428)	(0.242)	(0.345)	(0.620)	(0.718)	(0.512)
$EIA_{ij,t}$	0.419***	0.546***	0.419***	0.419***	0.490***	0.617***
	(0.143)	(0.055)	(0.118)	(0.118)	(0.177)	(0.131)
$EIA_{ij,t} \times S_i$	-1.076***	-0.882***	-1.275***	-0.079	-0.921***	-1.274***
	(0.256)	(0.136)	(0.223)	(0.478)	(0.308)	(0.255)
$TARIFF_{ij,t}$	-5.393***	-2.886***	-5.393***	-5.393***	-4.670***	-4.413***
	(1.168)	(0.283)	(0.999)	(0.999)	(1.289)	(1.565)
$TARIFF_{ij,t} \times S_i$	1.514	3.564**	2.416	4.895***	4.947	0.534
	(3.057)	(1.703)	(2.754)	(1.853)	(3.408)	(2.837)
$LANG_{ij}$	0.151**	0.485***	0.151***	0.151***	0.150**	0.125***
	(0.060)	(0.040)	(0.045)	(0.045)	(0.065)	(0.047)
$LANG_{ij} \times S_i$	0.095	-0.530***	0.277*	0.002	-0.079	0.120
	(0.280)	(0.110)	(0.155)	(0.115)	(0.210)	(0.158)
$CLNY_{ij}$	0.204	0.772***	0.204*	0.204*	-0.008	0.087
	(0.154)	(0.060)	(0.106)	(0.106)	(0.113)	(0.109)
$CLNY_{ij} \times S_i$	-0.778***	-0.934***	-0.831***	-0.312	-0.414	-0.662***
	(0.247)	(0.138)	(0.255)	(0.250)	(0.281)	(0.225)
Observations	7,051,254	1,904,709	7,018,456	7,201,594	596,376	321,398
Exporters	131	131	131	131	39	93
Importers	158	158	158	158	39	150
Products	92	92	92	92	92	92
Years	4	4	4	4	4	4
R^2	0.93	0.65	0.93	0.93	0.94	0.94
Trader × Exporter × product × year FE	Yes	Yes	Yes	Yes	Yes	Yes
Trader × Importer × product × year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents Poisson pseudo-maximum-likelihood (PPML) regression results (columns (1) and (3) to (6)), using exports as a dependent variable that vary over the trader-exporter-importer-product-year dimension. Robust standard errors in parentheses are clustered by country-pair and product except for column (1), in which they are clustered by exporter, importer, product, and year. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. Results in column (2) are obtained by OLS with the dependent variable in logs (i.e., $\ln(X_{ij,t}^{k,V})$). In column (3), we estimate the baseline specification on a sample derived from a more conservative approach used to match merchanting export and import flows, while in column (4) we use a sample derived from a less conservative matching approach. Column (5) is based on our main specification applied to a sample that contains only countries that are available in the World Input Output Database (WIOD). In column (6), we restrict the sample to include only those exporter-importer-product-year combinations that are part of the estimation sample in column (5) of Table 3.

that composition effects are unlikely to play a role in our context. Together with the rest of the estimates from Table 4, this result suggests that our main findings and conclusions about the dominance of trade specialists are robust to the use of alternative econometric specifications and several alternative estimation samples.

4.2.2 Alternative Covariates

In Table 5, we test the robustness of our results to alternative definitions of some of the main covariates in our baseline specification. Specifically, in column (1), we consider CEPII's simple average distance between countries i and j ($DIST_{ij}^{sm}$) as an alternative to our baseline distance variable, which measures the weighted average distance between i and j. In column (2), we use CEPII's distance between capitals as an additional alternative ($DIST_{ij}^{cap}$). In column (3), we combine our three measures of regional trade agreements into one overall variable – $RTA_{ij,t}^{cmbd}$. This variable equals one whenever one of the three variables ($FTA_{ij,t}$, $CU_{ij,t}$, or $EIA_{ij,t}$) is equal to one. Column (4) uses the dummy variable for regional trade agreements available from CEPII's gravity dataset ($RTA_{ij,t}^{cepii}$). Lastly, in column (5), we consider the weighted average of tariffs ($TARIFF_{ij,t}^{wm}$) instead of the simple average of tariffs. Based on comparisons between each set of results from Table 5 and our main estimates, we conclude that our key findings and conclusions are also robust to the use of alternative measures of our main covariates.

4.2.3 Wholesalers, Intra-Firm Trade, and Aggregation

Table 6 presents several robustness checks with regard to the importance of wholesalers, intra-firm trade, and the level of aggregation.

First, we consider potential differences between pure wholesalers and other firms in the merchanting dataset given that previous work has documented the special role they play in facilitating international trade (e.g., Bernard et al., 2010a; Ahn et al., 2011; Crozet et al., 2013). This is also relevant in the context of our baseline sample, which consists of a large share of wholesalers (Table A2). To check for differences between firms, we

Table 5: Robustness: Alternative covariates

	(1)	(2)	(3)	(4)	(5)
$DIST_{ij}^{sm}$	-0.703***				
	(0.088)				
$DIST_{ij}^{sm} \times S_i$	0.406***				
	(0.088)				
$DIST_{ij}^{cap}$		-0.726***			
		(0.091)			
$DIST_{ij}^{cap} \times S_i$		0.422***			
		(0.089)			
$DIST_{ij}$			-0.835***	-0.837***	-0.840***
			(0.097)	(0.088)	(0.092)
$DIST_{ij} \times S_i$			0.462***	0.489***	0.467***
			(0.094)	(0.095)	(0.096)
$CNTG_{ij}$	0.555***	0.542***	0.509***	0.466***	0.514***
	(0.079)	(0.078)	(0.072)	(0.069)	(0.074)
$CNTG_{ij} \times S_i$	-0.549**	-0.541**	-0.534**	-0.478*	-0.538**
	(0.259)	(0.260)	(0.250)	(0.247)	(0.257)
$FTA_{ij,t}$	0.368***	0.337***			0.315***
	(0.057)	(0.058)			(0.064)
$FTA_{ij,t} \times S_i$	-0.537**	-0.512**			-0.559***
	(0.226)	(0.225)			(0.212)
$CU_{ij,t}$	0.717***	0.787***			0.815***
	(0.173)	(0.161)			(0.169)
$CU_{ij,t} \times S_i$	-1.252**	-1.274**			-1.331**
	(0.543)	(0.534)			(0.536)
$EIA_{ij,t}$	0.620***	0.573***			0.454***
	(0.113)	(0.115)			(0.124)
$EIA_{ij,t} \times S_i$	-1.172***	-1.136***			-1.068***
	(0.254)	(0.253)			(0.252)
$RTA_{ij,t}^{cmbd}$			0.365***		
			(0.089)		
$RTA_{ij,t}^{cmbd} \times S_i$			-1.004***		
			(0.264)		
$RTA_{ij,t}^{cepii}$				0.334***	
				(0.067)	
$RTA_{ij,t}^{cepii} \times S_i$				-0.829***	
				(0.278)	
$TARIFF_{ij,t}$	-6.072***	-5.974***	-5.791***	-5.051***	
	(0.921)	(0.953)	(1.038)	(0.977)	
$TARIFF_{ij,t} \times S_i$	1.945	1.906	2.276	0.759	
	(2.602)	(2.596)	(2.497)	(2.642)	
$TARIFF_{ij,t}^{wm}$					-3.229***
					(0.831)
$TARIFF_{ij,t}^{wm} \times S_i$					1.739
					(1.506)
$LANG_{ij}$	0.092*	0.105**	0.159***	0.113**	0.154***
	(0.048)	(0.046)	(0.046)	(0.046)	(0.046)
$LANG_{ij} \times S_i$	0.168	0.153	0.133	0.190	0.099
	(0.156)	(0.155)	(0.153)	(0.154)	(0.159)
$CLNY_{ij}$	0.326***	0.318***	0.203*	0.235**	0.194*
	(0.103)	(0.103)	(0.107)	(0.110)	(0.106)
$CLNY_{ij} \times S_i$	-0.880***	-0.870***	-0.781***	-0.797***	-0.781***
	(0.232)	(0.231)	(0.234)	(0.234)	(0.233)
Observations	7,127,127	7,127,127	7,051,254	7,051,254	7,051,254
Exporters	132	132	131	131	131
Importers	159	159	158	158	158
Products	92	92	92	92	92
Years	4	4	4	4	4
R^2	0.93	0.93	0.93	0.93	0.93
Trader × Exporter × product × year FE	Yes	Yes	Yes	Yes	Yes
Trader × Importer × product × year FE	Yes	Yes	Yes	Yes	Yes

Notes: The table presents Poisson pseudo-maximum-likelihood (PPML) regression results, using exports as the dependent variable that vary over the trader-exporter-importer-product-year dimension. Robust standard errors in parentheses are clustered by country pair and product. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. In column (1), we consider CEPII's simple average distance between countries i and j ($DIST_{ij}^{sm}$) as an alternative to our baseline distance variable, which measures the weighted average distance between i and j. In column (2), we instead consider CEPII's distance between capitals ($DIST_{ij}^{cap}$) as an additional alternative. In column (3), we combine our three measures of regional trade agreements into one overall variable (RTA^{cmbd}). This variable equals one whenever one of the three variables ($FTA_{ij,t}$, $CU_{ij,t}$, or $EIA_{ij,t}$) is equal to one. Column (4) instead uses the dummy variable for regional trade agreements available from CEPII's gravity dataset. In column (5), we consider the weighted average of tariffs ($TARIFF_{ij,t}^{wm}$) instead of the simple average of tariffs.

generate two alternative merchanting datasets, one consisting only of wholesalers (column (1)) and one consisting of all other types of firms (column (2)). The results suggest that the negative impact of distance is smaller (in absolute value) for the wholesalers than for other merchanting firms. While non-wholesalers also have a trade cost advantage for distance vis-à-vis common traders, their coefficient on distance is not statistically significant. However, note that the non-wholesaler sample in column (2) contains substantially fewer merchanting observations potentially leading to imprecise estimates. Given that, by construction, our baseline sample excludes the largest firms, which tend to be manufacturing firms, we replicate the same analysis for the less conservative sample. Recall that this sample matches all direct merchanting trade flows with additional assumptions and includes a larger fraction of trade flows from non-wholesalers (columns (3) and (4)). Again, we obtain a smaller (in absolute value) coefficient on distance for the wholesalers, but now also a positive and significant distance coefficient (vis-à-vis common traders) for the sample excluding wholesalers. Therefore, we conclude that the trade cost advantages we find for merchants are particularly pronounced for wholesalers, while they also exist – albeit to a smaller extent – for other firms. Considering that wholesalers primarily engage in buying and selling goods in bulk quantities, these results appear both intuitive and reassuring.

Next, we consider the importance of intra-firm trade for our results. In principle, intra-firm trade likely differs from trade between unrelated parties. Notably, product contractability has emerged as a pivotal factor influencing integration decisions (Bernard et al., 2010b; Alfaro et al., 2019). In addition, transfer pricing considerations may play an important role in intra-firm trade by multinational corporations (Cristea and Nguyen, 2016; Davies et al., 2018).

To exclude the idiosyncrasies of intra-firm trade from our results, we draw on comprehensive annual data of German foreign direct investment positions (Friederich et al., 2023), which provides information on the universe of foreign affiliates of German firms. We exclude trade flows of merchanting firms with a foreign affiliate in either the export and/or import country and re-estimate our baseline specification in column (5). However, this leaves the coefficient on distance of trade specialists essentially unchanged in terms of magnitude and significance. We conclude that intra-firm trade is not an important factor for the observed trade cost differences between trade specialists and common traders.

Lastly, one potential alternative explanation for the differences between common traders and trade specialists is that they engage in trade with different types of products, i.e., that trade specialists trade "easier" products associated with lower trade costs. This could lead to a composition effect, wherein the empirical results are influenced by the types of products traded. However, this rationale seems inconsistent with the descriptive statistics presented in Section 3.2 suggesting that trade specialists select into particularly difficult country pairs and products. In any case, while performing the estimation at a more disaggregated level is impossible given the lack of more detailed product-level information, we address this criticism by checking whether the difference in trade costs is the same when performing the estimation with aggregate data. The results, as shown in column (6), closely resemble our baseline estimate at the HS-2 digit level, suggesting that composition effects are unlikely to significantly impact our findings.

4.2.4 Product-specific Results

Having established the robustness of our main findings, in the next few experiments we explore alternative dimensions of the data to shed more light on the channels for the dominant performance of trade specialists. We start by obtaining estimates across the four Broad Economic Categories (BEC) of the United Nations, which include 'Consumer Goods', 'Capital Goods', 'Processed Intermediate Goods', and 'Primary Intermediate Goods'. For brevity and, more importantly, because the main differences in the trade costs between the specialists and non-specialists are captured by the estimates of the effects of distance, we limit the analysis to the distance estimates from Table 7. The main conclusion that we draw based on these results is that the trade cost efficiency gains for trade specialists vary across the four BEC sectors. Specifically, trade specialists are

Table 6: Robustness: Wholesalers, Intra-Firm Trade, and Aggregation

	Baseline sample		Less. cons. sample		Baseline sample	
	Only wholesaler (1)	Excl. wholesaler (2)	Only wholesaler (3)	Excl. wholesaler (4)	Excl. intra-firm (5)	Aggregate level (6)
$DIST_{ij}$	-0.828***	-0.828***	-0.828***	-0.828***	-0.828***	-0.616***
	(0.095)	(0.095)	(0.095)	(0.095)	(0.095)	(0.032)
$DIST_{ij} \times S_i$	0.416***	0.200	0.619***	0.267**	0.513***	0.241**
	(0.099)	(0.127)	(0.122)	(0.115)	(0.095)	(0.108)
$CNTG_{ij}$	0.505***	0.505***	0.505***	0.505***	0.505***	0.566***
	(0.072)	(0.072)	(0.072)	(0.072)	(0.072)	(0.076)
$CNTG_{ij} \times S_i$	-0.448	-0.367***	-0.140	-0.902***	-0.377	-0.685***
	(0.347)	(0.135)	(0.156)	(0.219)	(0.272)	(0.205)
$FTA_{ij,t}$	0.297***	0.297***	0.297***	0.297***	0.297***	0.273***
	(0.063)	(0.063)	(0.063)	(0.063)	(0.063)	(0.067)
$FTA_{ij,t} \times S_i$	-0.589***	-0.707**	-0.283***	0.170	-0.654***	-0.629**
	(0.150)	(0.324)	(0.097)	(0.349)	(0.166)	(0.259)
$CU_{ij,t}$	0.754***	0.754***	0.754***	0.754***	0.754***	0.237
	(0.160)	(0.160)	(0.160)	(0.160)	(0.160)	(0.146)
$CU_{ij,t} \times S_i$	-1.202**	-0.773**	-0.001	-0.540	-1.293**	-1.081***
	(0.484)	(0.391)	(0.691)	(0.465)	(0.534)	(0.342)
$EIA_{ij,t}$	0.419***	0.419***	0.419***	0.419***	0.419***	0.543***
	(0.118)	(0.118)	(0.118)	(0.118)	(0.118)	(0.097)
$EIA_{ij,t} \times S_i$	-1.712***	-0.094	-0.028	-0.302	-1.150***	-1.270***
	(0.206)	(0.385)	(0.572)	(0.239)	(0.240)	(0.357)
$TARIFF_{ij,t}$	-5.393***	-5.393***	-5.393***	-5.393***	-5.393***	-4.613***
	(0.999)	(0.999)	(0.999)	(0.999)	(0.999)	(0.656)
$TARIFF_{ij,t} \times S_i$	2.709	-1.354	4.799**	2.894	0.961	1.816
	(2.400)	(2.922)	(2.011)	(2.335)	(2.936)	(2.830)
$LANG_{ij}$	0.151***	0.151***	0.151***	0.151***	0.151***	0.056
	(0.045)	(0.045)	(0.045)	(0.045)	(0.045)	(0.062)
$LANG_{ij} \times S_i$	-0.090	0.138	-0.022	0.081	0.020	0.344*
	(0.239)	(0.230)	(0.145)	(0.172)	(0.155)	(0.200)
$CLNY_{ij}$	0.204*	0.204*	0.204*	0.204*	0.204*	0.278***
	(0.106)	(0.106)	(0.106)	(0.106)	(0.106)	(0.105)
$CLNY_{ij} \times S_i$	-1.069***	-0.242	-0.367	-0.243	-0.808***	-1.273***
	(0.292)	(0.228)	(0.318)	(0.191)	(0.251)	(0.241)
Observations	7,019,554	6,920,459	7,160,159	6,944,173	7,040,949	121,066
Exporters	131	131	131	131	131	132
Importers	158	158	158	158	158	159
Products	92	92	92	92	92	1
Years	4	4	4	4	4	4
R^2	0.93	0.93	0.93	0.93	0.93	0.94
Trader × Exporter × product × year FE	Yes	Yes	Yes	Yes	Yes	
Trader × Importer × product × year FE	Yes	Yes	Yes	Yes	Yes	
Trader × Exporter × year FE						Yes
Trader × Importer × year FE						Yes

Notes: The table presents Poisson pseudo-maximum-likelihood (PPML) regression results, using exports as a dependent variable that vary over the trader-exporter-importer-product-year (columns (1)-(5)) or the trader-exporter-importer-year dimension (column (6)). Robust standard errors in parentheses are clustered by country-pair and product. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. Columns (1) and (3) only include merchanting transactions of wholesalers. Columns (2) and (4) exclude merchanting transactions of wholesalers. Column (5) excludes merchanting transactions of merchanting firms with a foreign affiliate in either the export and/or import country. Column (6) is based on aggregate rather than HS2 product data. Columns (1), (2), (5), and (6) are based on the baseline sample. Columns (3) and (4) are based on the less conservative sample.

significantly 'better' at trading consumer goods and capital goods, moderately 'better' at trading processed intermediates, and have no advantage in trading primary intermediates. Primary intermediate goods are mostly commodities, which are homogeneous products that are often traded based on long-term contracts and supply arrangements. Hence, it appears reasonable that the efficiency gains of trade specialists do not matter much for these goods.

In Table 8, we use our main specification to obtain estimates for several broad Harmonized System (HS) sections. To ensure a sufficient number of observations in the merchanting sample, we aggregate the full list of 21 HS sections to 9 broad sectoral aggregates.[31] Similar to the analysis of the BEC categories, we focus our attention on the estimates of the effects of distance. First, we note that trade specialists have no advantage in trading 'Agriculture', 'Base Metal', and 'Miscellaneous' products. The former two product groups feature many commodities, such that the results appear broadly in line with those found in Table 7. Second, on the other end of the spectrum, our estimates suggest that trade specialists have the most pronounced advantage in trading 'Textiles and Footwear' and 'Articles of Stone, Glass, and Precious Metals'.[32] Finally, among the other categories, the advantage of trade specialists is more pronounced in trading 'Chemical Products' and 'Raw Hides and Skins, Leather, Wood, and Paper', and less pronounced for trade of 'Machinery, Electrical Equipment' and 'Vehicles, Aircraft, Vessels and Transport Equipment'. Based on these results, we conclude that the main advantages of trade specialists are in less concentrated sectors and sectors with more heterogeneous products.

[31] Column (1) of Table 8 includes HS sections 1–4 (i.e., HS chapters 1–24). Column (2) includes HS sections 5–7 (i.e., HS chapters 25–40). Column (3) includes HS sections 8–10 (i.e., HS chapters 41–49). Column (4) includes HS sections 11–12 (i.e., HS chapters 50–67). Column (5) includes HS sections 13–14 (i.e., HS chapters 68–71). Column (6) includes HS section 15 (i.e., HS chapters 72–83). Column (7) includes HS section 16 (i.e., HS chapters 84–85). Column (8) includes HS section 17 (i.e., HS chapters 86–89). Column (9) includes HS sections 18–21 (i.e., HS chapters 90–97).

[32] We do note, however, that the estimate of the impact of distance on the trade specialist's trade of 'Articles of Stone, Glass, and Precious Metals' is not very precisely estimated.

Table 7: Results by BEC sectors

	(1) Cons. goods	(2) Cap. goods	(3) Proc. intm.	(4) Prim. intm.
$DIST_{ij}$	-0.843***	-0.633***	-0.899***	-1.043***
	(0.060)	(0.029)	(0.133)	(0.099)
$DIST_{ij} \times S_i$	0.647***	0.427***	0.469***	0.190
	(0.216)	(0.075)	(0.126)	(0.640)
$CNTG_{ij}$	0.583***	0.555***	0.456***	0.656***
	(0.083)	(0.155)	(0.070)	(0.190)
$CNTG_{ij} \times S_i$	-0.520*	-0.802***	-0.434	-0.583
	(0.288)	(0.152)	(0.328)	(1.348)
$FTA_{ij,t}$	0.318***	0.350***	0.260***	0.302**
	(0.103)	(0.067)	(0.073)	(0.144)
$FTA_{ij,t} \times S_i$	-1.317**	-0.905***	-0.270	-0.533
	(0.606)	(0.217)	(0.239)	(0.573)
$CU_{ij,t}$	0.735***	0.967***	0.638***	0.931***
	(0.148)	(0.171)	(0.198)	(0.206)
$CU_{ij,t} \times S_i$	-0.324	-2.891***	-0.517	-4.612**
	(0.893)	(0.224)	(0.432)	(1.824)
$EIA_{ij,t}$	0.339**	0.380**	0.467***	0.582***
	(0.145)	(0.163)	(0.132)	(0.187)
$EIA_{ij,t} \times S_i$	-1.156*	-1.163**	-1.005***	-0.355
	(0.602)	(0.496)	(0.357)	(0.864)
$TARIFF_{ij,t}$	-4.164***	-11.307***	-4.867***	-4.011***
	(0.542)	(3.096)	(1.350)	(0.999)
$TARIFF_{ij,t} \times S_i$	2.109	24.611	2.065	-17.259***
	(3.282)	(15.647)	(3.326)	(6.198)
$LANG_{ij}$	0.283***	0.137***	0.125**	0.093
	(0.076)	(0.047)	(0.052)	(0.094)
$LANG_{ij} \times S_i$	-0.455	-0.183	0.151	0.381
	(0.329)	(0.271)	(0.201)	(0.402)
$CLNY_{ij}$	0.346***	0.018	0.269**	0.432***
	(0.098)	(0.174)	(0.123)	(0.108)
$CLNY_{ij} \times S_i$	-0.197	-0.308	-0.859***	-1.277***
	(0.261)	(0.544)	(0.223)	(0.254)
Observations	2,164,132	573,163	3,668,432	582,261
Exporters	131	131	131	130
Importers	158	158	158	158
Products	28	7	48	8
Years	4	4	4	4
R^2	0.92	0.95	0.92	0.89
Trader × exporter × product × year FE	Yes	Yes	Yes	Yes
Trader × importer × product × year FE	Yes	Yes	Yes	Yes

Notes: The table presents Poisson pseudo-maximum-likelihood (PPML) regression results, using exports as the dependent variable that vary over the trader-exporter-importer-product-year dimension. Robust standard errors in parentheses are clustered by country pair and product. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. "Cons. goods" refers to consumer goods, "cap. goods" to capital goods, "proc. intm." to processed intermediate goods and "prim. intm." to primary intermediate goods.

Table 8: Results by HS sectors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$DIST_{ij}$	-0.913***	-1.057***	-0.923***	-0.937***	-0.604***	-0.954***	-0.655***	-0.684***	-0.639***
	(0.058)	(0.176)	(0.100)	(0.051)	(0.055)	(0.049)	(0.041)	(0.087)	(0.053)
$DIST_{ij} \times S_i$	0.066	0.658***	0.520***	1.268***	1.046**	0.171	0.512***	0.462***	0.214
	(0.194)	(0.144)	(0.199)	(0.312)	(0.505)	(0.153)	(0.048)	(0.107)	(0.145)
$CNTG_{ij}$	0.690***	0.373***	0.875***	0.380***	0.758***	0.568***	0.387***	0.809***	0.459***
	(0.081)	(0.079)	(0.154)	(0.080)	(0.101)	(0.074)	(0.071)	(0.062)	(0.153)
$CNTG_{ij} \times S_i$	0.273	0.198	-1.308***	-0.495	-0.276	-1.298***	-0.891***	-0.923***	-0.994***
	(0.566)	(0.265)	(0.508)	(0.431)	(0.612)	(0.292)	(0.270)	(0.112)	(0.224)
$FTA_{ij,t}$	0.344***	0.304***	0.483***	0.173	-0.169	0.415***	0.336***	0.387***	0.304**
	(0.102)	(0.063)	(0.069)	(0.107)	(0.109)	(0.075)	(0.111)	(0.077)	(0.144)
$FTA_{ij,t} \times S_i$	-2.182***	-0.198	-1.546*	-0.070	0.375	-0.767**	-0.399	0.506	-1.615**
	(0.693)	(0.200)	(0.791)	(0.758)	(0.835)	(0.322)	(0.494)	(0.445)	(0.628)
$CU_{ij,t}$	0.734***	0.562**	0.727***	0.404***	0.328	0.372**	1.222***	0.862*	1.070***
	(0.152)	(0.248)	(0.140)	(0.131)	(0.326)	(0.154)	(0.196)	(0.442)	(0.164)
$CU_{ij,t} \times S_i$	-4.114**	0.624	-3.541***	-0.325	4.782***	-1.513***	-2.002**	-2.188	-1.428
	(1.674)	(0.653)	(0.534)	(1.236)	(1.732)	(0.493)	(1.012)	(1.437)	(1.098)
$EIA_{ij,t}$	0.548***	0.284*	0.394*	0.148	0.588***	0.656***	0.487***	0.426	0.339
	(0.181)	(0.147)	(0.227)	(0.152)	(0.118)	(0.180)	(0.133)	(0.457)	(0.242)
$EIA_{ij,t} \times S_i$	-0.552	-0.186	-2.303***	-0.978	0.145	-1.879***	-0.702***	-0.476	-2.788***
	(0.408)	(0.334)	(0.763)	(0.696)	(0.519)	(0.694)	(0.159)	(1.025)	(0.570)
$TARIFF_{ij,t}$	-3.638***	-4.939**	-3.976	-4.662***	-10.863***	-5.937***	-2.987***	-13.285***	-3.039
	(0.557)	(2.472)	(3.079)	(0.948)	(2.550)	(1.704)	(1.100)	(3.072)	(3.656)
$TARIFF_{ij,t} \times S_i$	6.493**	14.640***	-3.525	0.110	29.032**	-11.425	13.577	-0.988	5.791
	(2.955)	(2.506)	(6.314)	(3.417)	(11.462)	(7.436)	(22.273)	(8.339)	(7.512)
$LANG_{ij}$	0.219***	0.130**	0.171	0.369***	-0.118	0.208***	0.101*	0.121	0.185*
	(0.074)	(0.053)	(0.154)	(0.077)	(0.085)	(0.076)	(0.054)	(0.078)	(0.109)
$LANG_{ij} \times S_i$	-0.094	-0.268	0.192	-0.760**	-0.008	0.548	0.310	-0.034	-0.557*
	(0.343)	(0.184)	(0.290)	(0.309)	(1.070)	(0.370)	(0.294)	(0.990)	(0.300)
$CLNY_{ij}$	0.402***	0.312***	0.200	0.273***	0.949***	0.194**	0.122	-0.248	0.145
	(0.098)	(0.097)	(0.147)	(0.104)	(0.204)	(0.085)	(0.141)	(0.191)	(0.157)
$CLNY_{ij} \times S_i$	-0.896	-0.918**	-0.462	0.130	-1.937***	-0.760***	-0.434***	1.265***	-1.470***
	(0.590)	(0.363)	(0.703)	(0.441)	(0.459)	(0.213)	(0.135)	(0.397)	(0.372)
Observations	1,685,872	1,274,142	588,804	1,250,458	318,704	821,159	185,050	312,531	614,352
Exporters	131	131	131	131	131	131	131	131	131
Importers	158	158	158	158	158	158	158	158	158
Products	22	16	8	17	4	11	2	4	8
Years	4	4	4	4	4	4	4	4	4
R^2	0.87	0.90	0.92	0.93	0.88	0.91	0.96	0.94	0.96
Trader × exporter × product × year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Trader × importer × product × year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The table presents Poisson pseudo-maximum-likelihood (PPML) regression results, using exports as the dependent variable that vary over the trader-exporter-importer-product-year dimension. Robust standard errors in parentheses are clustered by country pair and product. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. (1) Agricultural products. (2) Chemical products. (3) Raw hides and skins, leather, wood, paper. (4) Textiles, footwear. (5) Articles of stone, glass, precious metals. (6) Base metals. (7) Machinery, electrical equipment. (8) Vehicles, aircraft, vessels and associated transport equipment. (9) Optical instruments, medical instruments, clocks and watches, misc. manufactured articles, works of art.

4.2.5 Heterogeneity of the Distance Effect

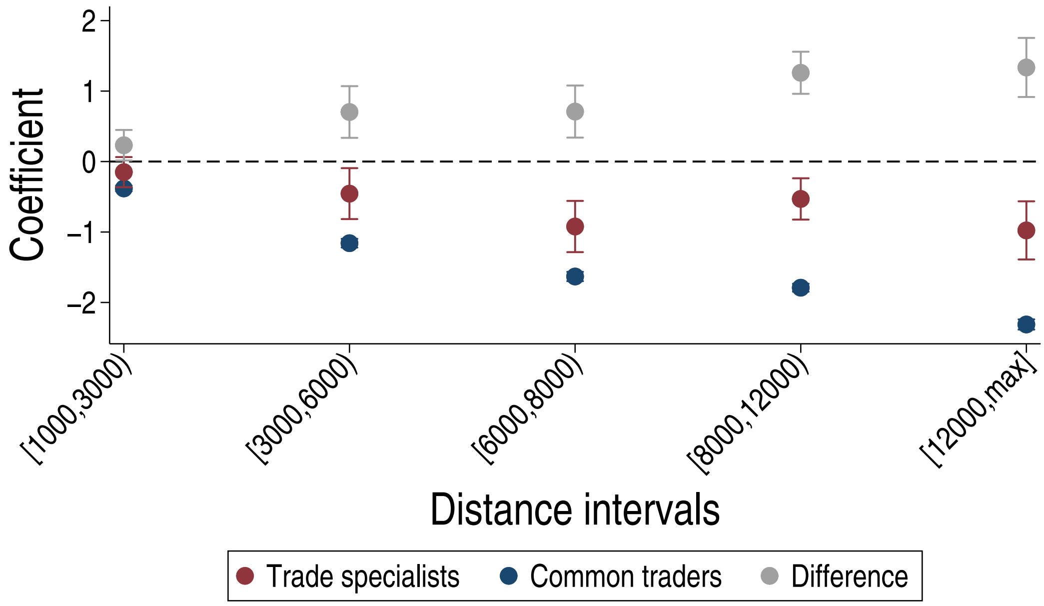
We conclude the analysis in this section by exploring the heterogeneity of our findings concerning distance since it is the main driver of the difference in the trade costs between specialists and non-specialists. Specifically, we replicate our preferred specification from column (4) of Table 3, however, instead of the continuous distance variable, we employ dummy variables representing distinct distance intervals to account for potential non-linear effects. To achieve this, we establish boundaries between distance intervals approximately aligning with the 5^{th}, 20^{th}, 40^{th}, 60^{th}, and 80^{th} percentiles of the distance variable distribution.

Our findings are presented in Figure 4, which displays the coefficient on the different distance intervals for trade specialists and common traders, as well as their differences. Consistent with our main findings and the previous literature, the results for the common traders show that trade is negatively impacted by distance and that this effect steadily increases with distance. While distance also negatively impacts trade of the trade specialists, it does less so, in particular, for larger distances. As a result, the differential effect of distance between the specialists and the common traders increases with distance. This suggests that the advantage of the trade specialists is particularly large for destinations that are generally more difficult to serve, reinforcing our previous results.

5 The Welfare Gains from Efficient Trading

In this section, we use our theory of trade specialists versus common traders and develop it further into a full general equilibrium model to translate the partial equilibrium trade cost efficiency gains obtained in Section 4 into welfare gains from trade. For our counterfactual analysis, we focus on one sector and on one point in time. Hence, we can drop the sector and time indices k and t, and set $\alpha_i^k = 1$. Furthermore, we assume that labor, L_i, is the only factor of production. To allow for the observed trade imbalances in the data, we denote TI_i the trade imbalance in country i given by $TI_i = E_i - Y_i$.

Figure 4: Non-parametric estimate of the effect of distance on trade



Notes: The figure shows the coefficients on distance along with their 95% confidence intervals from our preferred specification from column (4) of Table 3, in which the continuous distance variable was replaced by dummy variables representing distinct distance intervals. The boundaries between distance intervals approximately align with the 5^{th}, 20^{th}, 40^{th}, 60^{th}, and 80^{th} percentiles of the distance variable distribution. The distance coefficients for trade specialists are displayed in red, those for common traders in blue, and the difference of their coefficients (i.e., trade specialists minus common traders) in gray.

The expression for bilateral trade flows for each type of firm $V \in \{S, C\}$ is given by Equation (3), and re-stated here:

$$X_{ij}^{V} = N_i^{V} \left(\frac{\sigma}{\sigma - 1} \frac{c_i \tau_{ij}^{\alpha^V} n_{ij}^{\beta^V} b_{ij}^{\gamma^V}}{P_j} \right)^{1-\sigma} E_j, \tag{7}$$

where the corresponding CES price index from Equation (4) is:

$$(P_j)^{1-\sigma} = \sum_i \left(N_i^S \left[\frac{\sigma}{\sigma - 1} c_i \tau_{ij}^{\alpha^S} n_{ij}^{\beta^S} b_{ij}^{\gamma^S} \right]^{1-\sigma} + N_i^C \left[\frac{\sigma}{\sigma - 1} c_i \tau_{ij}^{\alpha^C} n_{ij}^{\beta^C} b_{ij}^{\gamma^C} \right]^{1-\sigma} \right). \tag{8}$$

Market clearing ensures that, at delivered prices, the value of total production from each type of firm is equal to total sales, which can formally be stated as follows:

$$Y_i^V = \sum_j X_{ij}^V. \tag{9}$$

The total value of production in each country is given by the sum of production of each type of firm, i.e.,

$$Y_i = \sum_V Y_i^V. \tag{10}$$

As we assume a fixed number of firms, existing firms earn positive profits. The expression for profits can be written as $\Pi_i = Y_i/\sigma$.[33] Hence, from the production side, the total value of production in an economy is given by labor income and profits:

$$Y_i = c_i L_i + \Pi_i = c_i L_i + \frac{Y_i}{\sigma} \Rightarrow Y_i = \frac{\sigma}{\sigma - 1} c_i L_i. \tag{11}$$

Last, the total expenditure in each country has to equal the total value of output plus trade imbalances:

$$E_i = Y_i + TI_i. \tag{12}$$

We report in Table 9 the real GDP per capita changes (in percent, ΔW_i), our measure of welfare, which are given by:

$$\Delta W_i = \left(\frac{\frac{E_i^c}{P_i^c L_i}}{\frac{E_i^b}{P_i^b L_i}} - 1 \right) \times 100,$$

where superscript b denotes baseline values and superscript c counterfactual values.

The hypothetical scenario that we simulate is *'A World with Efficient Trade'*, i.e., a world in which both the trade specialists and the common traders can trade subject to the trade costs faced by the trade specialists. Thus, mechanically, our counterfactual experiment is to decrease the vector of bilateral trade costs for the common traders to the level of trade costs for the trade specialists. Trade costs are constructed based on our preferred specification from column (4) of Table 3. We also employ the obtained estimates for the elasticities for α^V, β^V, and γ^V.

While simple to describe, the analysis that we present here is subject to two caveats. First, for the counterfactual analysis, we rely on the manufacturing sectors of the WIOD

[33]See for a derivation Appendix C.1.

instead of our estimating sample from Section 4 since it provides fully balanced information on production and bilateral trade including domestic trade flows.[34] Second, since we only have access to merchanting data for Germany, we cannot directly adjust the trade flows in the WIOD data to distinguish between the total bilateral trade flows for the specialists versus the common traders. To do so, we combine data on aggregate merchanting trade, data on the number of exporters, and an adjustment factor from the German merchanting dataset on the average export value of merchanting firms.[35] In the baseline, we focus on manufacturing firms only to ensure comparability with the trade data.[36] In addition, we also consider a variant, in which we include all services firms.

Table 9 presents the results of our general equilibrium counterfactual analysis of a world with efficient trade. Column (1) lists the countries using their ISO3 country codes. Column (2) presents our baseline results for the real GDP changes, our measure of welfare, and we set $\sigma = 5.393$ taken from the estimated coefficient for tariffs from our most preferred specification in column (4) of Table 3 (implying $\alpha^C = \sigma/(\sigma - 1)$). Column (2) includes services firms but is otherwise identical to the specification in column (1). Columns (3) and (4) are based on the same assumptions and data as column (1) but change σ to 4 and 7, respectively (instead of 5.393), which are values commonly obtained in the trade literature.[37] The last column uses the trade cost estimates from the

[34]To ensure consistency between the trade cost estimates and the data, we re-estimate the trade cost elasticities for common traders using the WIOD data on manufacturing for the years 2001, 2004, 2007, and 2010, which turn out to be very close to our baseline estimate in column (4) of Table 3. The trade costs of the trade specialists for the WIOD sample are then obtained by multiplying the corresponding trade costs of common traders by the ratio between the trade costs of trade specialists and common traders from our baseline estimate.

[35]More specifically, we use data from the OECD and Eurostat on aggregate merchanting trade of countries and impute bilateral merchanting shares based on the bilateral trade shares of countries in goods trade. Next, we use data from the OECD on the total number of exporting firms for the number of common traders. Finally, to obtain the number of trade specialists, we combine the information on bilateral merchanting shares with an adjustment factor that takes the larger size of merchanting firms relative to the average exporting firm into account. We do so based on the German merchanting dataset.

[36]Note that we exclude the manufacture of vehicles since these include a few very large firms and because the manufacture of vehicles has also a very specific role in Germany. Furthermore, many of the merchanting firms in the manufacture of vehicles are likely excluded in the estimation since these have many transactions at the month-country-product level for which we cannot infer the bilateral direction of trade flows. Hence, excluding the manufacture of vehicles aligns the data used for estimation with the data used for the counterfactual analysis.

[37]See Head and Mayer (2014) for a meta-analysis.

common sample reported in Table 4 column (5), but otherwise the same assumptions as column (1).

Several findings stand out from Table 9. First, when trade costs in all countries decrease to the level of trade costs for trade specialists, all countries gain in terms of real GDP. Second, the welfare effects of switching to efficient trading are substantial but heterogeneous. They range from about 10% for India to up to about 130% for Australia. On average, real GDP increases by 80%. The large welfare gains that we obtain are in contrast to the relatively small estimates from most of the existing trade literature. However, before we discuss possible explanations for the large differences, we demonstrate that our results are robust to some sensitivity experiments.

The estimates in column (2) of Table 9 are obtained after including services firms in the computation of the firm size adjustment factor. The motivation is that services firms such as wholesalers are included in the empirical analysis in Section 4, while, naturally, they are not part of the manufacturing firms and sectors under consideration here, which is why we did not include them in column (1). We see that the welfare effects decrease a little bit, but are otherwise very similar to our baseline results.[38] Thus, excluding services firms does not drive our results.

Next, in columns (3) and (4) of Table 9, we experiment with alternative values for the trade elasticity, i.e., we set it to 4 in column (3) and to 7 in column (5). The motivation for these experiments is twofold. First, we want to confirm that our model captures the intuition that a lower σ implies that customers value variety more, increasing the welfare effects of easier access to foreign varieties. Second, we want to gauge the sensitivity of our results to alternative values for the trade elasticity. Comparisons between the estimates from columns (3) and (4) and the baseline results in column (1) have two implications. First, we see that the change in the welfare estimates is in the expected direction, i.e., they are larger in column (3), when the elasticity is smaller, and they are smaller in

[38]Since merchanting firms in services in our sample are, on average, smaller than those in manufacturing, including them increases the number of merchanting firms in the baseline. Therefore given the higher level of efficient trading in the baseline, by construction, the welfare gains in the counterfactual scenario are smaller.

Table 9: General equilibrium counterfactual analysis of a world with efficient trade

(1) Countries	(2) Baseline	(3) With services firms	(4) $\sigma = 4$	(5) $\sigma = 7$	(6) Common sample
AUS	132.09	115.85	171.64	94.36	84.35
AUT	85.76	79.69	111.41	57.18	38.20
BEL	89.09	82.13	113.56	64.07	41.26
BGR	46.16	44.55	93.04	17.23	16.17
BRA	43.88	42.20	78.76	23.95	14.56
CAN	114.17	100.31	150.07	81.17	72.05
CHE	85.54	80.42	120.84	51.87	41.11
CHN	14.69	14.23	23.67	9.18	5.80
CYP	50.68	46.75	66.55	23.76	28.59
CZE	76.23	72.43	109.68	43.84	30.59
DEU	87.14	81.27	108.99	65.74	38.64
DNK	98.06	90.02	124.61	65.01	48.45
ESP	79.00	73.81	111.94	49.32	33.03
EST	96.93	89.72	130.17	51.91	46.23
FIN	105.84	97.38	132.93	68.85	52.86
FRA	82.93	77.07	108.27	57.84	35.68
GBR	86.58	78.96	108.77	63.06	42.26
GRC	51.08	47.35	86.50	22.78	20.31
HRV	71.35	66.95	121.79	31.69	34.75
HUN	94.18	87.75	121.14	62.62	43.89
IDN	43.50	42.12	77.49	24.35	15.94
IND	9.22	8.95	18.70	4.47	3.24
IRL	130.94	120.62	152.38	98.30	71.23
ITA	69.59	65.68	98.47	44.70	28.09
JPN	92.04	85.74	119.45	68.29	44.42
KOR	111.90	102.72	137.27	85.20	60.75
LTU	81.62	77.18	121.39	38.97	34.22
LUX	88.72	80.37	113.60	55.91	42.84
LVA	73.06	68.49	115.88	30.72	30.54
MEX	86.89	80.79	131.25	55.90	38.51
MLT	97.92	87.25	130.90	49.06	54.48
NLD	98.63	91.44	121.11	73.29	46.63
NOR	115.13	106.03	140.45	80.48	54.80
POL	53.78	51.65	87.35	28.67	19.25
PRT	70.18	65.83	111.43	36.33	28.51
ROM	42.39	40.88	83.38	17.81	14.94
RUS	53.89	51.69	83.01	33.30	21.02
SVK	89.30	83.44	118.90	54.55	40.18
SVN	78.64	73.82	114.84	39.65	33.34
SWE	111.17	101.58	135.10	79.85	58.90
TUR	39.00	37.77	74.08	18.13	13.16
USA	102.55	90.67	130.97	78.06	57.12
Mean	79.32	73.42	109.80	50.03	37.64

Notes: The table presents results from the general equilibrium counterfactual analysis of a world with efficient trade, in which both trade specialists and common traders can trade subject to the trade costs faced by trade specialists. The results in columns (2) to (5) are based on trade cost differences between trade specialists and common traders from column (4) of Table 3 and those in column (6) are based on column (5) of Table 4. Columns (2) and (4) to (6) use an adjustment factor based on manufacturing firms, while the adjustment factor in column (3) also includes services firms. In columns (2) to (3) and (6) $\sigma = 5.393$, while $\sigma = 4$ in column (4) and $\sigma = 7$ in column (5). The last row reports the simple mean across countries.

column (4), when the elasticity is larger. Second, while the welfare effects do change in magnitude, the correlations with the benchmark estimates are very high (i.e., larger than 0.95 in each case).

Finally, in the last column of Table 9, we base our analysis on the trade costs from the common sample. The motivation for this experiment is that the common sample would ensure a close match between the observations that we use for trade specialists versus non-specialists. As expected, this decreases the welfare effects, however, they are still quite sizeable. The lowest welfare effects for India amount to about 3%, while the largest effects for Australia are predicted to be 84%. On average, real GDP increases by around 38%. To sum up, our findings for positive and large efficiency gains from trading are robust across several specifications based on different trade cost estimates and using different values for the elasticity of substitution.

To highlight the importance and credibility of our results, we compare them to three prominent strands of the related literature on the gains from trade. First, and most frequently, many academic papers and policy analyses focus on the gains from trade liberalization, e.g., in the form of lower tariffs or the formation of trade agreements. The estimates of the welfare gains from this literature usually vary between 1% and 6%, e.g., for the impact of NAFTA. Thus, they are an order of magnitude smaller than our estimates. The natural explanation for our larger estimates is that we allow for and provide evidence for significantly lower transportation costs for trade specialists, which are assumed to be constant in traditional trade liberalization studies. The implication is that there is potential for significant further gains from trade that go beyond those that are due to traditional liberalization of trade policies.

Second, our estimates are also significantly larger than estimates from the literature that gauge the cumulative gains from trade liberalization and globalization relative to a state of autarky, e.g., Arkolakis et al. (2012) or Costinot and Rodríguez-Clare (2014). We view the two approaches as complementary because the latter analysis is based on a comparison of the current levels of openness relative to autarky, while we use the estimated trade costs for merchants to quantify the efficiency gains from trading. To understand where the differences come from, we note that in the year 2014 for the 42 countries used for our quantification, the share spent on domestic goods was on average 81%, varying between 50% and 97%. Hence, when quantifying the gains from international trade relying on current openness levels, this implies, on average, a decrease in trade costs associated with an increase in openness of 19 percentage points (varying from 3 percentage points to 50 percentage points). Importantly, under complete free trade, assuming equally sized countries and symmetric preferences, the theory would predict a domestic spending share of 2.4% (1/42). This comparison implies that, while positive and significant, the welfare gains due to existing policies and globalization effects are quite small relative to the potential gains from (fully) efficient international trade.

Finally, the study most closely related to our analysis in terms of approach and findings is Anderson et al. (2018), who quantify the welfare gains from trade liberalization based on an all-inclusive trade cost index that captures the comprehensive effects of international borders and trade protection apart from geography. The welfare gains in Anderson et al. (2018) vary between 5% and 50%. Thus, they are also significantly larger than the estimates from the rest of the literature and they are comparable, but still smaller, than our estimates. The explanation is that, unlike Anderson et al. (2018) who take the effects of distance as given, we allow for and provide evidence that the effects of distance are in fact significantly smaller for trade specialists.

In sum, this section demonstrates that the trade cost efficiency gains for trade specialists may translate into remarkable welfare effects. Thus, we believe that our analysis sends an important and very encouraging message from a policy perspective. Specifically, we demonstrate that there are very substantial opportunities for further gains from trade, which are in the hands of individual economic agents and which go far beyond the scope and abilities for trade liberalization due to traditional trade policies, e.g., free trade agreements and the removal of tariffs.

6 Conclusion

What are the potential gains from efficient trading? We tackle this question by quantifying the role of trade specialists in conducting efficient international trade. To do so, we develop a quantitative framework that distinguishes between 'trade specialists' versus 'common traders', where 'trade specialists' are defined as firms specializing in international trading. We use a unique firm-level dataset on the universe of German merchanting transactions to identify the trade transactions conducted by 'trade specialists'. This allows us to distinguish the bilateral trade transactions of trade specialists versus common traders. We find strong evidence for lower trade costs, and hence, efficiency gains from trading, for trade specialists. Specifically, we find that trade specialists are less sensitive to transportation costs, especially so for long-distance trade. In contrast to common traders, we find that contiguous borders, free trade agreements, and currency unions have no significant effect on trade specialists.

Utilizing the theoretical general equilibrium model, we translate our trade cost estimates of the gains for trade specialists into welfare effects. Lowering trade costs in all countries to the level of trade costs for trade specialists, i.e., moving to efficient trading, we find that all countries gain in terms of welfare with an average increase in real GDP per capita of 80%. Hence, the potential gains of moving toward efficient trading are large.

While we hope that this novel way of quantifying the gains from efficient trading is convincing, we also hope that our analysis spurs future research in this area. First, we think that utilizing data of merchants from more countries than only Germany would be interesting to enrich our insights into the working of trade specialists. Furthermore, future theoretical investigations could try to disentangle different channels for the efficiency gains of trade specialists. This could then also be utilized in an enriched quantitative framework.

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Appendix

A Variable Description and Data Sources

Table A1: Variable description and data sources.

Variable	Definition	Frequency	Source
$X_{ij,t}^{k,S}$	German merchanting trade in 1,000 euro	Annual	Deutsche Bundesbank
S_i	Dummy variable equal to one if trade flow corresponds to German merchanting trade and zero otherwise	Annual	Deutsche Bundesbank
$X_{ij,t}^{k,C}$	International trade in 1,000 euro	Annual	CEPII, BACI Database
$DIST_{ij}$	Population-weighted distance between countries' most populated cities in kilometers	Constant	CEPII, Gravity Database
$DIST_{ij}^{sm}$	Simple distance between countries' most populated cities in kilometers	Constant	CEPII, Gravity Database
$DIST_{ij}^{cap}$	Simple distance between countries' capitals in kilometers	Constant	CEPII, Gravity Database
$CNTG_{ij}$	Dummy variable equal to one if countries share a common border and zero otherwise	Constant	CEPII, Gravity Database
$LANG_{ij}$	Dummy variable equal to one if countries have a common official or primary language and zero otherwise	Constant	CEPII, Gravity Database
$CLNY_{ij}$	Dummy variable equal to one if countries ever in colonial relationship and zero otherwise	Constant	CEPII, Gravity Database
$TARIFF_{ij,t}$	Mean applied tariff rate	Triennial	CEPII (MAcMap-HS6 and Houssein Guimbard)
$TARIFF_{ij,t}^{wm}$	Trade-weighted mean applied tariff rate	Triennial	CEPII (MAcMap-HS6 and Houssein Guimbard)
$FTA_{ij,t}$	Dummy variable equal to one if countries in free trade agreement and zero otherwise	Annual	Mario Larch's Regional Trade Agreements Database
$CU_{ij,t}$	Dummy variable equal to one if countries in custom union and zero otherwise	Annual	Mario Larch's Regional Trade Agreements Database
$EIA_{ij,t}$	Dummy variable equal to one if countries in economic integration agreement and zero otherwise	Annual	Mario Larch's Regional Trade Agreements Database
$RTA_{ij,t}^{cmbd}$	Dummy variable equal to one if any of $FTA_{ij,t}$, $CU_{ij,t}$, and $EIA_{ij,t}$ equal to one	Annual	Mario Larch's Regional Trade Agreements Database
$RTA_{ij,t}^{cepii}$	Dummy variable equal to one if countries in regional trade agreement and zero otherwise	Annual	CEPII, Gravity Database

B Additional Summary Statistics

Table A2: Merchanting trade shares by economic sector

	trade value	firms
Wholesale trade and commission trade (except of motor vehicles and motorcycles)	44.76	60.18
Manufacture of motor vehicles, trailers and semi-trailers	22.51	1.12
Manufacture of chemicals and chemical products	12.22	3.86
Manufacture of electrical machinery and apparatus n.e.c.	.	1.74
Management activities of holding companies	2.73	1.70
Electricity, gas, steam and hot water supply	2.71	0.28
Manufacture of radio, television and communication equipment and apparatus	1.83	0.97
Manufacture of basic metals	1.49	0.73
Manufacture of machinery and equipment n.e.c.	1.39	7.47
Other business activities	0.84	2.28

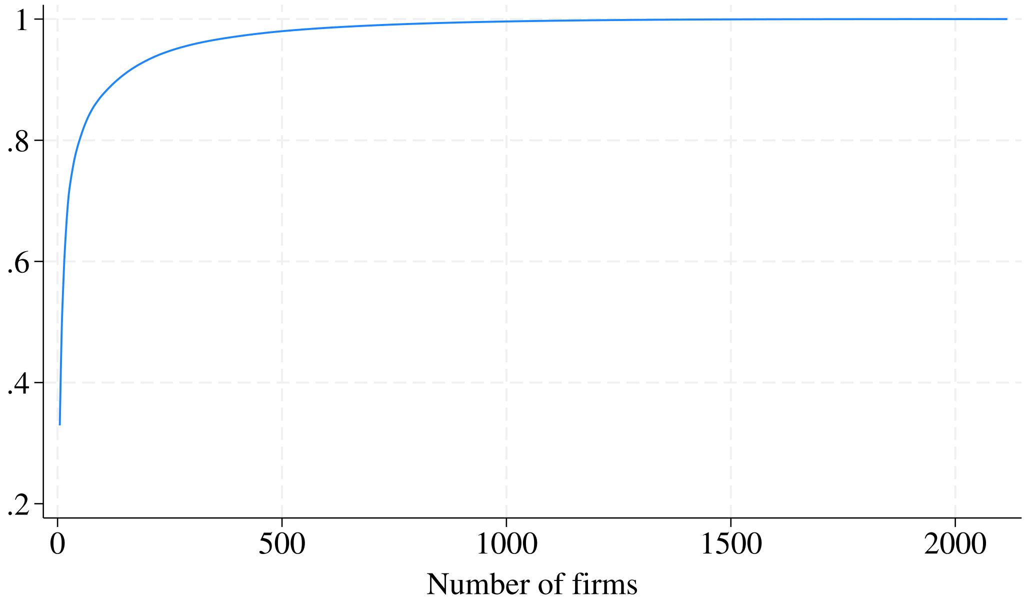
Notes: The table presents the top ten economic sectors of trade specialists in terms of trade value computed across the whole estimation sample. The column 'firms' reports the corresponding value for the number of distinct firms. The values reported are shares in % of the total. For confidentiality reasons, some values in the table have been suppressed (indicated by '.')

Table A3: Merchanting firm-level summary statistics

	2001	2004	2007	2010
Firm level				
Number of products				
Mean	2.6	2.3	2.2	2.1
Median	1	1	1	1
SD	3.4	3.0	2.8	2.8
Number of export countries				
Mean	6.5	6.8	7.0	7.5
Median	3	3	3	3
SD	9.9	10.8	11.3	11.8
Number of import countries				
Mean	4.2	3.9	4.0	4.1
Median	2.0	2.0	2.0	2.0
SD	5.3	5.4	5.3	5.5
Exports (million euros)				
Mean	23.6	30.5	46.3	46.7
Median	0.9	0.9	1.1	1.2
SD	200.4	236.0	380.0	373.4
Aggregate level				
Number of firms	2,415	2,237	2,238	2,098

Notes: The table reports the mean, median, and standard deviation ('SD') of the number of products, the number of export countries, the number of import countries, and exports in million euros for trade specialists at the firm level for the years 2001, 2004, 2007, and 2010 in the raw data. In addition, the total number of firms per year is reported.

Figure A1: Cumulative distribution function for merchanting trade (2010)



Notes: The figure shows the cumulative distribution function of the total trade value of trade specialists as a function of the number of firms for the year 2010 in the raw data. For confidentiality reasons, only values including at least five firms are shown.

Table A4: Joint distribution of merchanting exports across products and countries (2010)

Number of countries	1	2	3	4	5+	All
(a) Share of firms						
Number of products						
1	28.2	8.2	4.9	3.1	19.5	63.9
2	2.8	3.0	2.0	1.3	7.2	16.4
3	1.1	1.5	0.8	0.4	3.8	7.7
4	0.5	0.6	0.2	0.3	2.3	4.1
5+	0.4	0.3	0.6	0.6	6.1	8.0
All	33.1	13.6	8.5	5.7	39.0	100.0
(b) Share of trade value						
Number of products						
1	1.0	0.8	0.4	0.3	41.2	43.7
2	0.1	0.2	0.1	0.5	15.0	15.9
3	0.1	0.4	.	.	3.6	4.3
4	0.0	.	.	0.0	.	6.9
5+	0.1	0.1	.	0.1	28.9	29.3
All	1.2	1.6	0.8	1.0	95.4	100.0

Notes: The table displays the joint distribution of trade specialists (panel (a)) or their trade value (panel (b)) according to the number of products firms export (rows) and their number of export destinations (columns) for the year 2010 in the raw data. Products are defined as HS2 chapters. For confidentiality reasons, some values in the table have been suppressed (indicated by '.')

Table A5: Joint distribution of merchanting imports across products and countries (2010)

Number of countries	1	2	3	4	5+	All
(a) Share of firms						
Number of products						
1	34.8	10.8	5.6	2.9	9.3	63.4
2	3.3	4.4	2.9	1.5	4.9	17.0
3	1.0	1.4	1.1	1.0	2.4	7.0
4	0.2	0.4	1.0	0.7	2.3	4.7
5+	0.3	0.4	0.4	0.5	6.4	8.0
All	39.5	17.3	11.1	6.6	25.5	100.0
(b) Share of trade value						
Number of products						
1	3.2	4.8	3.7	2.3	24.8	38.8
2	0.5	0.3	0.5	0.2	21.0	22.5
3	.	0.1	.	0.3	2.2	4.0
4	.	0.0	0.1	0.1	7.6	7.8
5+	0.1	0.1	.	.	26.4	26.9
All	4.3	5.3	5.4	3.0	82.0	100.0

Notes: The table displays the joint distribution of trade specialists (panel (a)) or their trade value according to the number of products firms import (rows) and their number of import destinations (columns) for the year 2010 in the raw data. Products are defined as HS2 chapters. For confidentiality reasons, some values in the table have been suppressed (indicated by '.')

Table A6: Services trade and multinational activity of merchanting firms

	2001	2004	2007	2010
(a) Services trader	55.6	59.1	57.7	56.7
(i) Service trade with export country	31.2	36.2	33.9	35.0
(ii) Service trade with import country	27.5	33.9	32.6	35.2
(b) Multinational enterprise	16.0	12.8	14.5	15.0
(i) Affiliate in export country	7.1	6.7	6.8	7.3
(ii) Affiliate in import country	5.4	5.9	6.6	7.3

Notes: The table reports the co-occurrence of merchanting activity in the raw data and services trade (Biewen and Meinusch, 2022) or multinational activity (Friederich et al., 2023), respectively. Panel (a) reports the share of trade specialists that are also services trader. Row (i) and (ii) indicate the share of export and import destinations of trade specialists for which they also report services trade, respectively. Panel (b) reports the share of trade specialists that are also multinational enterprises. Row (i) and (ii) indicate the share of export and import destinations of trade specialists for which they also report a foreign affiliate, respectively.

C Additional Details on Theoretical Model

C.1 Derivation of Profit Function

The expression for profits is calculated as follows:

$$\begin{aligned}
\Pi_i &= p_i \sum_V \sum_j \frac{X_{ij}^V}{p_i} - c_i \sum_V \sum_j \frac{X_{ij}^V}{p_i} \\
&= (p_i - c_i) \sum_V \sum_j \frac{X_{ij}^V}{p_i} \\
&= \left(\frac{\sigma}{\sigma - 1} c_i - c_i \right) \sum_V \sum_j \frac{X_{ij}^V}{p_i} \\
&= \left(\frac{\sigma}{\sigma - 1} - 1 \right) c_i \sum_V \sum_j \frac{X_{ij}^V}{p_i} \\
&= \left(\frac{1}{\sigma - 1} \right) \frac{c_i}{p_i} \sum_V \sum_j X_{ij}^V \\
&= \left(\frac{1}{\sigma - 1} \right) \frac{c_i}{\frac{\sigma}{\sigma - 1} c_i} \sum_V \sum_j X_{ij}^V \\
&= \frac{1}{\sigma} \sum_V \sum_j X_{ij}^V \\
&= \frac{Y_i}{\sigma}.
\end{aligned}$$

C.2 A More General Theory of Trade Specialists vs. Common Traders

In our paper, we use a very stylized simple framework. The main reason is that our data do not allow us to calibrate a more complex, micro-founded model. Our estimating equation, however, is consistent with a more general framework. Hence, we develop in this appendix a more general theoretical framework.

We model a world where economic agents consume and produce in J countries, indexed by $\{i, j\}$, K sectors, indexed by $\{k\}$, and T periods, indexed by $\{t\}$. Consumer preferences are proxied by CES demand for differentiated varieties, which are nested within Cobb-

Douglas preferences across sectors, with α_j^k denoting the spending share of country j in sector k, with $\sum_k \alpha_j^k = 1$. There are two types of firms: trade specialists, denoted by superscript S, and common traders, denoted by superscript C. The two types of firms are different in their ability to trade, and hence they experience different incidences of variable and fixed trade costs.

Each variety is uniquely supplied by a single firm and indexed by ϕ from the respective distribution for trade specialists and common traders, which also indexes and corresponds to the respective firm's productivity level. As firms are unique sellers of their variety, they have some market power. To reflect that, we assume that firms are monopolistically competitive and produce under increasing returns to scale due to fixed costs. The degree of competitiveness in a sector is governed by the sector-specific elasticity of substitution among the varieties, σ^k. At time t, goods in country i and sector k are produced using factors for production at variable costs per efficiency unit given by $c_{i,t}^k$. These assumptions imply the following solution to the factory-gate price in each country, sector, and point in time:

$$p_{i,t}^k(\phi) = \frac{\sigma^k}{\sigma^k - 1}\frac{c_{i,t}^k}{\phi}, \tag{A1}$$

where, $\sigma^k/(\sigma^k - 1)$ is the markup over marginal costs.

Trade is subject to (variable) trade costs and (fixed) market-access costs. We rely on the customary iceberg assumption to model variable trade costs, which enables us to define the delivered price of goods in sector k from origin i to destination j at time t as:

$$p_{ij,t}^k(\phi) = p_{i,t}^k(\phi)\tau_{ij,t}^k n_{ij,t}^k b_{ij,t}^k, \tag{A2}$$

where, motivated by our data and expectations about the different channels that may lead to different effects of trade costs for trade specialists, we decompose the iceberg trade costs in our model into three categories: $\tau_{ij,t}^k \geq 1$ denotes the vector of bilateral transportation costs; $n_{ij,t}^k \geq 1$ denotes the vector of other non-tariff trade barriers (e.g., trade policies that target protection or liberalization beyond tariffs); and $b^k_{ij,t} \geq 1$ denotes *ad-valorem* tariffs. Regarding fixed market-access costs, we assume that they are indexed akin to variable trade costs, whereby firms in country i and sector k have to use production factors in the same way of bundling as for production to generate market access to country j. The associated fixed market access costs are denoted by $c^k_{i,t} f^k_{ij,t}$.

Armed with these assumptions and notation, we can derive the revenues (at delivered prices and inclusive of tariffs) from the sales of a firm with productivity ϕ, which produces in sector k in country i and sells to country j at time t as:

$$x^k_{ij,t}(\phi) = \left(\frac{\sigma^k}{\sigma^k - 1} \frac{c^k_{i,t} \tau^k_{ij,t} n^k_{ij,t} b^k_{ij,t}}{\phi P^k_{j,t}} \right)^{1-\sigma^k} E^k_{j,t}, \tag{A3}$$

where $E^k_{j,t}$ denotes the aggregate expenditures on products from sector k in destination j at time t, and $P^k_{j,t}$ is the corresponding sectoral CES price aggregator. In addition, we can express the profits associated with these revenues (excluding tariffs) as:

$$\pi^k_{ij,t}(\phi) = \frac{(b^k_{ij,t})^{-\sigma^k}}{\sigma^k} \left(\frac{c^k_{i,t} \tau^k_{ij,t} n^k_{ij,t}}{\phi P^k_{j,t}} \right)^{1-\sigma^k} E^k_{j,t} - c^k_{i,t} f^k_{ij,t}. \tag{A4}$$

The implied productivity cutoff level, at which a firm from sector k in origin i is indifferent between selling or not to customers in country j at time t, is given by:

$$\phi^k_{ij,t} = A^k \tau^k_{ij,t} n^k_{ij,t} \left(c^k_{i,t} b^k_{ij,t} \right)^{\frac{\sigma^k}{\sigma^k - 1}} (P^k_{j,t})^{-1} (E^k_{j,t})^{\frac{1}{1-\sigma^k}} (f^k_{ij,t})^{\frac{1}{\sigma^k - 1}}, \tag{A5}$$

where A^k is a constant. To derive aggregate sectoral sales (inclusive of tariffs) from i to j, we use (A5) together with (A3), and we integrate over the firms in origin i. Importantly, we allow for different probability density functions (p.d.f.) of productivity parameters for trade specialists ($g^{k,S}_i(\phi)$) versus common traders ($g^{k,C}_i(\phi)$). This leads to separable expressions for the sales of each type of trader:

$$X_{ij,t}^{k,S} = B^k N_{i,t}^{k,S} \left(c_{i,t}^k \tau_{ij,t}^k n_{ij,t}^k b_{ij,t}^k\right)^{1-\sigma^k} (P_{j,t}^k)^{\sigma^k - 1} E_{j,t}^k \int_{\phi_{ij,t}^k}^{\infty} \phi^{\sigma^k - 1} g_i^{k,S}(\phi) d\phi, \tag{A6}$$

$$X_{ij,t}^{k,C} = B^k N_{i,t}^{k,C} \left(c_{i,t}^k \tau_{ij,t}^k n_{ij,t}^k b_{ij,t}^k\right)^{1-\sigma^k} (P_{j,t}^k)^{\sigma^k - 1} E_{j,t}^k \int_{\phi_{ij,t}^k}^{\infty} \phi^{\sigma^k - 1} g_i^{k,C}(\phi) d\phi. \tag{A7}$$

Here, B^k is a constant, and $N_{i,t}^{k,S}$ and $N_{i,t}^{k,C}$ denote the number of operating trade specialists and the number of operating common traders, respectively, which sell goods from i to j in sector k at time t. As demonstrated below, allowing for different productivity distributions for trade specialists versus common traders would enable us to identify separate trade cost elasticities for each type of trader. The intuition and motivation for this modeling choice are that, even though the trade costs between two countries are *ex ante* the same for trade specialists and common traders (e.g., consider the distance between the two countries), trade specialists are better at handling these trade costs, i.e., they have knowledge/abilities that allow them to handle the same obstacles to trade more efficiently than common traders.

Let V (for *Vendor*) denote the set of the two types of firms $\{S, C\}$. Moreover, to obtain a log-linear specification for the sectoral bilateral sales, we assume the following Pareto p.d.f. for the distribution of ϕ for the firms in our model:

$$g_i^{k,V}(\phi) = \theta^{k,V} h_i^k \phi^{-\theta^{k,V}-1}, \quad V \in \{S, C\}. \tag{A8}$$

Thus, while we assume a Pareto p.d.f. for the distribution of ϕ both for trade specialists and common traders, we allow for different shape parameters, which will translate into different trade cost elasticities for each type of trader. Under these assumptions, we derive the following combined expression for the bilateral sectoral sales of the two types of traders in our model (see Appendix C.3 for a detailed derivation):

$$X_{ij,t}^{k,V} = C^{k,V} N_{i,t}^{k,V} h_i^k c_{i,t}^k b_{ij,t}^k f_{ij,t}^k (\phi_{ij,t}^k)^{-\theta^{k,V}}, \quad V \in \{S, C\}, \tag{A9}$$

where $C^{k,V}$ is composite constant term that collects k, V-specific parameters. Substitute the explicit expression for $\phi^s_{ij,t}$ from Equation (A5) into Equation (A9) and simplify to obtain:

$$X^{k,V}_{ij,t} = D^{k,V}(T^k_{ij,t})^{-\theta^{k,V}} N^{k,V}_{i,t} h^k_i (c^k_{i,t})^{1-\frac{\theta^{k,V}\sigma^k}{\sigma^k-1}} (P^k_{j,t})^{\theta^{k,V}} (E^k_{j,t})^{\frac{\theta^{k,V}}{\sigma^k-1}}, \quad V \in \{S, C\}, \qquad \text{(A10)}$$

where, $(T^k_{ij,t})^{-\theta^{k,V}} \equiv (\tau^k_{ij,t})^{-\theta^{k,V}} (n^k_{ij,t})^{-\theta^{k,V}} (b^k_{ij,t})^{1-\frac{\theta^{k,V}\sigma^k}{\sigma^k-1}} (f^k_{ij,t})^{1-\frac{\theta^{k,V}}{\sigma^k-1}}$, and $D^{k,V}$ is a composite constant term. We note that the term $b^k_{ij,t}$ does not have the same exponent as the other variable trade cost terms in Equation (A10). This is due to our assumption that tariffs are applied to sales revenues rather than costs. More importantly, we note that the trade cost elasticities in the definition of the vector of bilateral trade costs $(T^k_{ij,t})^{-\theta^{k,V}}$ are firm-type-specific, i.e., they are different for trade specialists and common traders.

Note that relative to our simple framework, we obtain here another type of trade costs – fixed costs. We may relate the fixed cost components to common official language $(LANG_{ij})$ and the presence of colonial ties $(CLNY_{ij})$. See Footnote 15 in the main text for more details.

C.3 Derivation of Equation (A9)

Start with Equations (A6) and (A7), using the notation V to denote the set of the two types of firms $\{S, C\}$:

$$X^{k,V}_{ij,t} = B^k N^{k,V}_{i,t} \left(c^k_{i,t}\tau^k_{ij,t}n^k_{ij,t}b^k_{ij,t}\right)^{1-\sigma^k} (P^k_{j,t})^{\sigma^k-1} E^k_{j,t} \int_{\phi^k_{ij,t}}^{\infty} \phi^{\sigma^k-1} g^{k,V}_i(\phi)d\phi,$$

and use $g_i^{k,V}(\phi) = \theta^{k,V} h_i^k \phi^{-\theta^{k,V}-1}$:

$$\begin{aligned}
X_{ij,t}^{k,V} &= B^k N_{i,t}^{k,V} \left(c_{i,t}^k \tau_{ij,t}^k n_{ij,t}^k b_{ij,t}^k\right)^{1-\sigma^k} (P_{j,t}^k)^{\sigma^k-1} E_{j,t}^k \int_{\phi_{ij,t}^k}^{\infty} \phi^{\sigma^k-1} \theta^{k,V} h_i^k \phi^{-\theta^{k,V}-1} d\phi \\
&= B^k \theta^{k,V} h_i^k N_{i,t}^{k,V} \left(c_{i,t}^k \tau_{ij,t}^k n_{ij,t}^k b_{ij,t}^k\right)^{1-\sigma^k} (P_{j,t}^k)^{\sigma^k-1} E_{j,t}^k \int_{\phi_{ij,t}^k}^{\infty} \phi^{\sigma^k-\theta^{k,V}-2} d\phi \\
&= B^k \theta^{k,V} h_i^k N_{i,t}^{k,V} \left(c_{i,t}^k \tau_{ij,t}^k n_{ij,t}^k b_{ij,t}^k\right)^{1-\sigma^k} (P_{j,t}^k)^{\sigma^k-1} E_{j,t}^k \left(\frac{1}{\sigma^k - \theta^{k,V} - 1} \phi^{\sigma^k-\theta^{k,V}-1} \Big|_{\phi_{ij,t}^k}^{\infty} \right).
\end{aligned}$$

As $\sigma^k - \theta^{k,V} - 1 < 0$, we end up with:

$$X_{ij,t}^{k,V} = B^k \theta^{k,S} h_i^k N_{i,t}^{k,V} \left(c_{i,t}^k \tau_{ij,t}^k n_{ij,t}^k b_{ij,t}^k\right)^{1-\sigma^k} (P_{j,t}^k)^{\sigma^k-1} E_{j,t}^k \frac{1}{\theta^{k,V} - \sigma^k + 1} \left(\phi_{ij,t}^k\right)^{\sigma^k-\theta^{k,V}-1}.$$

Now we us $\phi_{ij,t}^k = A^k \tau_{ij,t}^k n_{ij,t}^k \left(c_{i,t}^k b_{ij,t}^k\right)^{\frac{\sigma^k}{\sigma^k-1}} (P_{j,t}^k)^{-1} (E_{j,t}^k)^{\frac{1}{1-\sigma^k}} (f_{ij,t}^k)^{\frac{1}{\sigma^k-1}}$ from Equation (A5) to replace $\left(\phi_{ij,t}^k\right)^{\sigma^k-1} = \left(A^k \tau_{ij,t}^k n_{ij,t}^k\right)^{\sigma^k-1} \left(c_{i,t}^k b_{ij,t}^k\right)^{\sigma^k} (P_{j,t}^k)^{1-\sigma^k} (E_{j,t}^k)^{-1} f_{ij,t}^k$:

$$\begin{aligned}
X_{ij,t}^{k,V} =& B^k \theta^{k,V} \frac{1}{\theta^{k,V} - \sigma^k + 1} N_{i,t}^{k,V} h_i^k \left(c_{i,t}^k \tau_{ij,t}^k n_{ij,t}^k b_{ij,t}^k\right)^{1-\sigma^k} (P_{j,t}^k)^{\sigma^k-1} E_{j,t}^k \left(\phi_{ij,t}^k\right)^{-\theta^{k,V}} \left(A^k \tau_{ij,t}^k n_{ij,t}^k\right)^{\sigma^k-1} \\
&\times \left(c_{i,t}^k b_{ij,t}^k\right)^{\sigma^k} (P_{j,t}^k)^{1-\sigma^k} (E_{j,t}^k)^{-1} f_{ij,t}^k \\
=& C^{k,V} N_{i,t}^{k,V} h_i^k c_{i,t}^k b_{ij,t}^k f_{ij,t}^k \left(\phi_{ij,t}^k\right)^{-\theta^{k,V}},
\end{aligned}$$

where $C^{k,V}$ again collects all all k, V-specific terms.