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Abstract

We replicate the findings of Emlinger and Guimbardr (ERAE, 2020) on the heterogeneous effects of per-unit tariffs on trade patterns for developed and developing countries. Analysing import and export data from 2001 to 2013, they confirm the Alchian-Allen conjecture that per-unit trade costs induce higher export unit values. However, the effects are more pronounced for developed country exporters.. Understanding the effects of per-unit trade costs vis-a-vis ad-valorem tariffs is important to level the playing field of trade negotiations that involve pricing and non-pricing policies. We extend the original study with data for 191 exporting (190 importing) countries, and 670 HS6 digit products, covering the period 2001-2019 period.The general findings of the original study hold, with remarkable differences. First, using a data set that is constructed in a replicable way and introducing highly relevant bilateral fixed effects reduce effect sizes and the level of statistical significance. Second, the Alchian-Allen effect is not clearly separated by the economic development dimension of the exporter, but rather dependent on the price levels of the traded goods. These results have important policy implications as they call for deeper investigation on countries' industrial structures of exports to better shape the international debate on trade negotiations.

JEL classification

F13, Q17, Q18

Keywords

gravity, replication, trade, per-unit, ad-valorem

1. Introduction

One persistent empirical regularity in the trade literature is the observation that exporting firms charge different free-on-board (FOB) export prices for the same products they ship to various destinations (e.g., Martin, 2012; Manova and Zhang, 2012). For instance, Swiss HS8 product-level hard cheese (HS 04069099) exported by the same firm can yield FOB prices ranging from a low of 11 Swiss Francs (CHF) in Peru to a high of 16 CHF in South Korea (Fiankor, 2022). One mechanism that explains this systemic export price variation across destinations is a demand-driven composition effect known as the Alchian and Allen (1964) “shipping the good apples out” effect (Hummels and Skiba, 2004). It predicts that higher per-unit trade costs — e.g., transport costs, or per-unit duties — tend to reduce the relative price of high-quality products vis à-vis lower-quality products subject to the same cost.[1] However, the export price variation induced by the Alchian-Allen (AA) effect can be driven by quality sorting, variable markups or a combination of both mechanisms (Chen and Juvenal, 2022; Fiankor, 2022). Thus, evaluating potential gains from trade linked with this empirical regularity in trade data requires heterogeneous analyses of different dimensions. Our work revisits the AA conjecture in agriculture from an economic development perspective.

Evidence of the AA effect exists in agricultural trade. Using data on the EU-15, Curzi and Pacca (2015) show that the price and the quality of food exports are influenced differently by ad-valorem and specific trade costs. While ad valorem tariffs have a negative impact on the quality of exported products, specific tariffs[2] induce higher export prices but tend to have no effect on quality upgrading.[3] Miljkovic and Gómez (2019a) and Miljkovic et al. (2019b) examine the relative demand for quality-differentiated coffee varieties exported globally and confirm that a common per-unit charge increases the overall quality of coffee demanded.[4] Fiankor (2022) also provide supportive evidence that Swiss agri-food exporting firms increase their export prices when faced with a per-unit trade cost. We replicate and extend the evidence provided by Emlinger and Guimbard (2021), published in the European Review of Agricultural Economics. Emlinger and Guimbard (2021) is novel in providing evidence on the heterogeneous effects of per-unit trade costs – in their case, per-unit tariffs (referred to as “specific duties”) – on trade patterns across developed and developing countries. They show that the Alchian-Allen conjecture is more pronounced for developed country exporters vis-à-vis their developing country counterparts. Per-unit tariffs induce higher export prices. This effect is more pronounced in developed countries.

Investigating the development perspective is relevant for the policy debate. Per-unit tariffs are more restrictive than their ad valorem counterparts when targeted against cheap exports which are mainly from developing countries. For developing countries, transforming per-unit into ad valorem tariffs may help to increase participation in GVC and participation in high-value markets (cfr. Antimiani and Cerrat, 2021).

1 To understand the mechanism, consider a competitive sector in country i that exports two quality grades (q) of the same product *k*. Let $q = H, L$ for high- and low-quality grades of *k*, respectively. If prices at the destination *j* depend on prices at *i* (piH, pi L), and a per-unit charge, t_j, such that $p_{jk} = p_{ik} + t_j$. Supposing there is no loss in quality due to transport, and consumers in the destination perceive H and L as two grades of the same good, the Alchian and Allen theorem conjecture is that an increase in tj will lower the relative price of, and raise the relative demand for, high-priced (quality) goods.

2 In some papers the terms “specific duties”, “per-unit duties” and “per-unit tariffs” may be used interchangeably. For sake of clarity we prefer to use the term “per-unit tariffs”.

3 Curzi and Pacca (2015) argue against using price as a measure of product quality. In their work, they recover quality directly from trade data following Khandelwahl (2010) and Khandelwahl et al., (2013). This allows them to conclude separately on the effects of trade costs on prices and quality.

4 The authors define coffee quality as follows: Colombian Arabica (high-quality), Brazilian Arabica (medium-quality), and Brazilian Robusta (low-quality).

Theoretically, our work is situated within advances in international trade theory that emphasise product quality differences as an additional source of comparative advantage (Hallak, 2006; Kugler and Verhoogen, 2012; Crozet et al., 2012). This literature extends neoclassical trade models (e.g., Ricardian, Heckscher–Ohlin, Krugman) with vertical product differentiation as a driver of export performance. Insights from this literature show that product quality differences drive both the direction of trade and firm- and country-level export performance. Moreover, the empirical evidence suggests that successful exporters use higher-quality inputs and more skilled workers to produce higher-quality output that sell at higher prices. Yet, the role of product quality in driving trade in the agricultural sector remains an under-investigated and controversial topic (Martin, 2018; Fiankor et al., 2021). This is despite the fact that the influence of food safety and quality is pervasive in agriculture. Product quality affects not only firms' business strategies, but also countries' trade policy interventions. For instance, trade measures, such as tariffs and non-tariff measures, tend to be levied on specific types of products (i.e., high-quality products) (Ghodsi and Stehrer, 2022), and therefore have heterogeneous impacts on the extent to which developing and developed countries participate in global markets. Whether these trade costs are per-unit or ad-valorem determines how they affect trade patterns. Thus, how per-unit tariffs, ad-valorem tariffs, and non-tariff measures affect the decision making of agricultural firms in terms of the quality of exported products is a nascent but promising avenue to conduct policy-relevant research.

Our replication exercise proceeds as follows. First, we repeat the empirical investigation in Emlinger and Guimbard (2021) by running the Authors' code on their original data. We call this the push-button replication. Second, we construct the original dataset following the description provided by the authors in the paper and reconduct the empirical analysis. We call this the pure replication. Third, we conduct several sensitivity analyses twisting the econometric specification (i.e., using different sets of fixed effects, and redefining clusters for the standard errors), estimating the model on random subsamples, and challenging the results with a misspecified model. Then we extend their analysis to recent years using two more waves of data. Finally, we comment in detail on the effects of the ad-valorem duties to better place the contribution of the replicated paper into the economic debate.

The contribution of this replication exercise is at least twofold. First, we show that most of the results presented in Emlinger and Guimbard (2021) are valid. We confirm the Alchian-Allen effect. The additive nature of per-unit trade costs makes them a decreasing function of the price of the imports. Furthermore, the elasticity of export prices to per-unit tariffs is more pronounced for developed country exporters compared to developing country exporters subject to the same per-unit tariff. However, once we control for potential endogeneity of the import duties and export price relationship, this heterogeneity across the development level of the exporting country disappears, unless we consider products in the high and low price ranges. Second, we show that the validity of the AA effect along the economic development dimension and for ad-valorem duties requires further research. Finally, we also conclude on the importance of linking the AA effect with topical issues in agricultural trade: falling transportation costs, increasing relevance of quality issues, the heterogenous participation of developed and developing countries in GVCs and the effects that trade policies have on their welfare gains[5].

5 The decline in transportation costs and the increasing attention to food quality call for a better understanding of the role of the duties, in that, high-quality products (which are mainly produced by developed countries), tend to be both highly priced and highly protected, implying ambiguous and dynamic effects on trade (Hummels, 2007). Tariff escalation and participation in GVCs are also aspects that deserve further investigation: upstream and high-priced products are more protected in developed countries, and this may, in turn, explain (with a reserve causality logic) the positive correlation of ad-valorem duties and exports (Cheng, 2007; Ghodsi and Stehrer, 2022).

2. Empirical framework and data

To assess how per-unit tariffs affect trade patterns, we follow Emlinger and Guimbard (2021) and estimate the following generic equation using ordinary least squares (OLS)[6]:

$$\ln Z_{ijkt} = \alpha \ln \text{Per-unit}_{ijkt} + \beta \ln \text{Ad-valorem}_{ijkt} + \mathbf{X}_{ijt} + \lambda_{ihs2t} + \lambda_{jt} + \lambda_{kt} + \epsilon_{ijkt} \quad (1)$$

where Z_{ijkt} is the bilateral export price (measured as unit values) of the product *k* exported by country *i* to country *j* at time *t*. Lacking objective measures of product quality, we follow a standard approach in the literature (Emlinger and Guimbard, 2021) and use prices as a measure of unobserved product quality. The assumption here is that, on average, higher-quality products are also sold at higher prices. The variables Per-unit and Ad-valorem are explanatory variables, standing, respectively, for the per-unit and ad-valorem tariffs.[7] The export prices are proxied by the free-on-board (FOB) export values calculated as the ratio of trade values in United States dollars (USD) and trade quantities in tons. $\mathbf{X}_{ijt}$ is a vector of bilateral time-varying and invariant variables including geographical distance, contiguity, common language and membership of a regional trade agreement. To proxy the theoretical multilateral resistance terms, the authors include exporter-HS2 product group-time (λ_{ihs2t}), importer-time (λ_{jt}) and product-time (λ_{kt}) fixed effects. ϵ_{ijkt} is the error term which we cluster at the importer-exporter-product level.

Because we are interested in assessing how the elasticity varies across developed and developing countries, we estimate a second model as follows:

$$\ln Z_{ijkt} = \alpha_1 \ln \text{Per-unit}_{ijkt} \times \text{Dvping}_i + \alpha_2 \ln \text{Per-unit}_{ijkt} \times \text{Dvped}_i + \\ + \beta_1 \ln \text{Ad-valorem}_{ijkt} \times \text{Dvping}_i + \beta_2 \ln \text{Ad-valorem}_{ijkt} \times \text{Dvped}_i + \mathbf{X}_{ijt} + \lambda_{ihs2t} + \\ \lambda_{jt} + \lambda_{kt} + \epsilon_{ijkt} \quad (2)$$

where the variables in equation (2) remain as defined in equation (1). However, and a_1 and a_2 capture the effect of per-unit tariffs on export prices if the exporter is a developing or developed country, respectively. β_1 and β_2 capture the effect of ad-valorem duties on export prices if the exporter is a developing or developed country, respectively. To assess if the a_1 and a_2 estimates are statistically different from each other we conduct a Wald test. The same is true for and . We define developed and developing countries following the definition in the original paper. An exporter is classified as developing if its per capita Gross Domestic Product (GDP) falls within the first quartile of the per capita GDP distribution across all countries in 2013. All other exporting countries falling outside this quartile are classified as developed countries.[8]

It is possible that the per-unit and the ad-valorem tariffs are endogenous to FOB export prices. This is true if bilateral FOB Export prices and customs duties are determined by common unobserved factors. A country with high domestic prices due to consumer preferences for quality may tend to protect their domestic market with per-unit tariffs to ward off cheap imports (Emlinger and Guimbard, 2021). These concerns are also legitimate in the case of ad-valorem duties since countries generally impose higher duties on expensive products to collect higher revenue. To address this potential source of endogeneity we also estimate instrumental variable regressions. We adopt the instruments used in the original paper. To instrument per-unit tariffs, we use the share of product lines subject to per-unit tariffs in the HS4 sector of the HS6 product, while excluding the specific HS6 digit product under consideration from the share (IV: Per unit_{ijkt}). To instrument ad-valorem duties, we use the average ad valorem duties in the HS4 sector of the product HS6, excluding the HS6 digit product itself (IV: Ad-valorem_{ijkt}).

6 Due to the host of fixed effects and the large number of observations, we estimate all the models (IV and OLS) using the standard least square dummy variable estimator. We useuser-written command Reghdfe in Stata (Correia (2017), as reported in the Appendix A2, table A8.

7 The tariff variables are transformed into log form as Log (1 + Tariff)

8 In the published version of the manuscript, reference is made to the GDP per capita in 2003. We assume this is a typo as the authors do not use data from 2003 in their analysis.

The data we use for the analyses come from different secondary sources. The key data we require for the analyses are information on tariffs and trade data. For data on per-unit and ad-valorem tariffs, we use data from the MAcMap-HS6 database maintained by the Centre d'Études Prospectives et d'Informations Internationales (CEPII) and the International Trade Center (ITC) See Guimbard et al. (2012) for a description of the most recent version of the methodology used for its construction. This data set provides exhaustive and bilateral measurements of applied tariff duties at the product level, using the World Customs Organization's six-digit Harmonized System (HS) classification (hereafter HS6). We obtain data on trade values and quantities across country pairs from the BACI (Base pour l'Analyse du Commerce International) dataset (Gaulier and Zignago, 2010) maintained by CEPII. Data on the time-invariant gravity variables in vector **X** are from CEPII and data on regional trade agreements are from Egger and Larch (2008). Summary statistics on the variables are presented in the Appendix.

3. Replicating Emlinger and Guimbard (2021)

3.1 Push-button replication

The first step of our analysis is to conduct what we call a "push-button" replication of the results presented in Emlinger and Guimbard (2021). This exercise is not trivial for at least three reasons. First, accessing the original data of a scientific paper implies transparency, clarity, and care. In our case, we received the original dataset used in the paper directly from the authors. Second, the codes and the scripts used for the analyses may contain errors, and typos or they may simply be too personalized to be replicated by another researcher. Third, comparing the results presented in the paper with those obtained from a push-button replication process may reveal (potentially worrisome) biases in the presentation of the findings. As has been shown in several meta-analyses (Stanley, 2005; Stanley and Doucouliagos, 2014; Santeramo and Lamonaca, 2019), empirical findings tend to have two types of biases: type I bias due to over-report of findings that (i) do not contradict the existing theory and empirical evidence; (ii) do not contrast with the rationale of the paper; and (iii) are statistically and economically significant; type II bias consisting in more favorable outcomes in the publication process for papers presenting (i) thought-provoking results;; (ii) results connected to the literature hosted in top journals; (iii) statistically solid results. These biases reinforce the need to promote replication studies.

3.2 Pure replication

The second step of our replication exercise involves repeating the analysis in Emlinger and Guimbard (2021) using a new script, code and dataset. We begin by trying to reconstruct the original dataset following closely the information provided by the authors in their paper. There were, however, some differences in our dataset compared to those from the original paper. Some of these discrepancies are worthy of note. First, is the total number of observations. Our reconstructed dataset includes information on a total sample of 3,428,594 observations, excluding zero trade values. This encompasses 187 exporting countries, 182 importing countries, and 670 HS6 digit products over the years 2001, 2004, 2007, 2010 and 2013.[9] A list of importing and exporting countries is provided in Appendix Table A1. We also present summary statistics in Table A2 which allows us to compare sample averages across the datasets.

9 Over the same time period, the dataset in Emlinger and Guimbard (2021) covers 185 importing countries, 196 exporting countries and 677 HS6 digit agricultural products.

3.3 Sensitivity analyses: clusters, sub-samples, and stringent fixed effects

The third step of our replication exercise, and in our view the novel contribution to the scientific debate, involves subjecting the findings of Emlinger and Guimbard (2020) to a battery of sensitivity analyses. There are several potential sources of discretion in the empirical specification of the gravity model adopted by Emlinger and Guimbard (2020). Without prejudice, we ran alternate econometric specifications to verify the validity of their findings. The analyses in this subsection are based on the dataset generated in Section 3.2.

First, the authors cluster their standard errors by country pair and product. A general criticism against the clustering of standard errors is that the inclusion of fixed effects (a general norm in gravity-type models) eliminates the need to cluster standard errors (Arellano, 1987). Indeed, Abadie et al. (2020, 2022) argue that this is not necessarily the case, because the within-cluster correlations of residuals may not necessarily be eliminated by fixed effects. However, adopting a specific level of clustering for standard errors does not come without limitations. By defining the level of the specific clusters, the researcher assumes the level at which the variability is “naturally” bounded. In other terms, the cluster defines the boundaries within which the observations of a random variable are expected to be related. However, as pointed out in Abadie et al. (2022), “*because correlation may occur across more than one dimension […]it (is) difficult to justify […] clustering in some dimensions (rather than others)*”. We relax the level of clustering by country pair and product and instead cluster them at the country pair level.[10.]

A further exercise we undertake to validate the results presented in Emlinger and Guimbard (2020) is splitting the sample into four random subsamples. The rationale of this exercise is to verify the internal validity of the findings. This is confirmed if the estimates on subsampled observations do not contradict those obtained on the whole sample. This procedure, which is suggested in randomized controlled experiments (Athey and Imbens, 2017), allows us to conclude on the regularity of the estimates. We adopt an admittedly simple yet rigorous sub-sampling procedure. To preserve the structure of the panel data, we randomly assign importing and exporting countries into one of four subsamples. To avoid having heterogeneous samples, in terms of the level of economic development of the countries, we impose an additional constraint of having, in all subsamples, both developed and developing countries.

We also test the robustness of the results using a more stringent econometric specification. We replace the vector of time-invariant country-pair variables (i.e., contiguity, language, distance) in equations (1) and (2) with country-pair-product fixed effects. The country-pair-product fixed effects are better measures of bilateral trade costs than the standard set of bilateral varying gravity variables. They are used in several papers (e.g., Vandenbussche and Zanardi, 2010; Grant et al., 2021; Fiankor et al., 2021) to account for much of the unobserved heterogeneity and isolate the effect of the independent variable of interest. In addition, we also define another specification that includes exporter-product-time (λ_{ikt}) and importer-product-time (λ_{jkt}) fixed effects. In both cases, these are more stringent specifications compared to the exporter-HS2 product group-time (λ_{ihs2t}), importer-time (λ_{jt}) and product-time (λ_{kt}) fixed effects used in Emlinger and Guimbard (2021).

3.4 Extending the dataset to recent years

Finally, we extend the dataset with two more waves of tariff data for the years 2016 and 2019. The extended dataset includes 191 exporting countries, 190 importing countries, and 670 HS6-digit agricultural products. Here we define the developed or developing country status using the per capita GDPs of the exporting country in 2019.

10 Excessivley restrictive clusters may lead to excessively small standard errors, and possibly to severely inflated standard errors (Imbens and Athey, 2022), resulting in statistically not significant coefficients. We believe that the country-pair level is a sufficient clusterization. In any case, as the reader will note, this robusteness check does not affect the results at all.

4. Results and Discussion

4.1. Results

We begin by presenting the results from the baseline model in equation (1). The results of the push-button replication are reported in column (1) of Tables 1 – 5. A few words suffice to describe our findings here. The replication was smooth and successful. We encountered no difficulties and can replicate the coefficients as reported in Emlinger and Guimbard (2021) using the data and Stata “do files” provided by the authors. Where necessary we will highlight any discrepancies when we discuss the other results.

In column (2), we build the dataset as described by the authors in the original paper. We then estimate the baseline model on our dataset. To see how well our control variables behave vis-à-vis the results from the push-button replication we compare all the coefficients in column (1) against those in column (2). In most cases, where the effects are statistically significant, the variables in both columns have the same signs. The exception is the RTA variable where we find a negative effect on export prices, contrary to the positive effect reported in Emlinger and Guimbard (2021). We estimate a positive (and statistically significant) effect of per-unit tariffs on export prices and negative (but statistically insignificant) effects of ad-valorem tariffs. The latter finding is contrary to Emlinger and Guimbard (2021). Before we take this as conclusive evidence, it is important to note that there are some differences in the datasets used for both estimations. Notice that the number of observations differs between columns (1) and (2).[11] Thus, the extent to which the differences in sample sizes drive the differences in our findings is not clear. However, it is also clear that using a dataset that is constructed in a replicable way lead to smaller estimates and lower levels of statistical significance (from 0.013, statistically significant at the 1% level, to 0.008 and to 0.003, statistically significant only at the 5% level).

Going forward, we base the extension and sensitivity analyses on our version of the original dataset and discuss mainly the coefficient on per-unit tariffs.[12] In columns (3) – (6), we subject our findings in column (2) to a series of sensitivity analyses. As a rule of thumb, the estimates are robust if different econometric specifications lead to similar results. In column (3), we relax the level at which the standard errors are clustered. In column (4), we drop the variable contiguity from the regression model.[13] In column (5), we introduce country-pair-product fixed effects to account for much of the unobserved heterogeneity and isolate the effect of the independent variable of interest. In column (6), we report coefficient estimates identified from a representative sub-sample.[14] In all four sensitivity analyses (columns 3 – 4), our main findings in column (2) are confirmed. However, the magnitudes are much lower in column (5) when we introduce country-pair-product fixed effects. Consistent with the literature that uses bilateral fixed effects (e.g., Fiankor et al., 2021), we find that their exclusion overstates the policy effect. In column (7), we extend the analysis to recent years. Here too, our main findings are in line with those reported for the first five waves of data.[15]

11 It is not clear where this discrepancy arises from especially given that in Section 3.2, we show that the total number of importers and products are slightly higher in the original dataset compared to the version we recreate.

12 For completeness, we also conduct the robustness checks on the original dataset but relegate the results to the Appendix A4 (Table A14-A14, column 1).

13 As it is evident from columns (2) and (3), the contiguity variable is always statistically significant (at the 1% significance level) and the estimates are more than ten times larger than the estimated standard errors. Thus, we expect the omission of this relevant variable to alter the results.

14 Here we only report the results of one sub-sample and relegate the results for the other sub-samples in Appendix A7 (Tables A19 and A20).

15 For completeness, we also conduct the four different sensitivity analyses on the extended dataset. We present the results in the Appendix A5.

Table 1: The effect of per-unit tariffs on trade unit values

	Push button	Own data	Cluster	Omitted variable	Bilateral FE	Sub-sample sample	Extended data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per-unit$_{ijkt}$	0.013***	0.008***	0.008***	0.007***	0.003**	0.008***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ad-valorem$_{ijkt}$	0.018**	-0.007	-0.007	-0.007	-0.011	-0.026**	-0.006
	(0.007)	(0.008)	(0.008)	(0.008)	(0.013)	(0.013)	(0.007)
Distance$_{ij}$	0.090***	0.079***	0.079***	0.102***		0.079***	0.085***
	(0.001)	(0.001)	(0.001)	(0.001)		(0.002)	(0.001)
Contiguity$_{ij}$	-0.090***	-0.118***	-0.118***			-0.124***	-0.121***
	(0.003)	(0.003)	(0.003)			(0.005)	(0.003)
Language$_{ij}$	0.024***	0.020***	0.020***	0.004*		0.025***	0.016***
	(0.003)	(0.002)	(0.002)	(0.002)		(0.004)	(0.002)
RTA$_{ijt}$	0.011***	-0.055***	-0.055***	-0.053***	0.023***	-0.058***	-0.053***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.005)	(0.004)	(0.002)
Observations	1,855,975	2,408,092	2,408,092	2,408,092	2,038,191	599,806	3,428,577
R^2	0.682	0.578	0.578	0.578	0.816	0.589	0.578
Estimator	OLS	OLS	OLS	OLS	OLS	OLS	OLS

Notes: The dependent variable is FOB export prices of product k, from exporting country i to importing country j in year t. Fixed effects included but not reported. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (1) contains the results of the push-button replication of Emlinger and Guimbard (2021). Column (2) – (6) replicates the original analysis using data that we created from scratch following closely the descriptions provided in the original paper. Column (7) replicates the analysis but extends the data with two more waves in 2016 and 2019. In column (3), we estimate the baseline model but cluster the standard errors at the country-pair level. In all other cases, the standard errors are clustered at the country-pair product level. In column (4), we omit the contiguity variable. In column (5) we include country-pair-product fixed effects. In column (6) we estimate the baseline model on foursub-samples that retain the structure of the original dataset. We only report one of the subsamples here and relegate the rest to the appendix. Per-unitijkt and Ad-valoremijkt stand, respectively, for per-unit tariffs and ad-valorem tariffs. This table replicates column 1 of Table 1 in Emlinger and Guimbard (2021).

Next, we discuss the results from estimating equation (2). This step allows us to assess how the effects we identify for per-unit tariffs vary across developed and developing countries. To see if the coefficients on the differences in the effects of our variables of interest across developed and developing countries are statistically significant, we conduct a Wald test and report the p-values at the lower panels of the Tables. For brevity, here and hereafter we report only the most relevant results and focus on the findings related to the per-unit tariffs, which are the focus of the replicated paper.[16] We present the results in Table 2. Our findings in column (2) are in line with those of Emlinger and Guimbard (2021) in column (1), though like before the magnitudes differ. More precisely, we found that using a data set that is constructed in a replicable way and introducing highly relevant bilateral fixed effects reduce effect sizes and the level of statistical significance. The conclusion that the effect of per-unit tariffs on export prices is higher for developed country exporters compared to their developing country counterparts nevertheless remains the same across both papers. If we subject this finding to a host of sensitivity analyses in columns (3) – (6), we find that but for column (5), the main findings are confirmed. In extending our dataset to 2019, we confirm the main findings again in column (7). The Alchian-Allen effect is, however, no longer statistically significant for developing countries.[17]

16 We present the full results table with all the variables in the Appendix A4.

17 We are grateful to the authors of the replicated papers for having pointed that while the BACI, TUV and Geodist raw are available until

Table 2: The effect of per-unit tariffs on trade unit values across development status

	Push button	Own data	Cluster	Omitted variable	Bilateral-FE	Sub-sample	Extended data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per-unit$_{ijkt}$	0.007***	0.003***	0.003***	0.003**	-0.001	0.001	0.000
× Dvping$_i^A$	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.001)
Per-unit$_{ijkt}$	0.013***	0.009***	0.009***	0.009***	0.004***	0.011***	0.012***
× Dvped$_i^B$	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ad-valorem$_{ijkt}$	-0.154***	-0.191***	-0.191***	-0.194***	-0.065*	-0.228***	-0.083***
× Dvping$_i^C$	(0.024)	(0.016)	(0.016)	(0.016)	(0.035)	(0.028)	(0.014)
Ad-valorem$_{ijkt}$	0.031***	0.031***	0.031***	0.032***	-0.001	0.016	0.010
× Dvped$_i^D$	(0.008)	(0.008)	(0.008)	(0.008)	(0.014)	(0.014)	(0.007)
Observations	1,855,975	2,408,092	2,408,092	2,408,092	2,038,191	599,806	3,428,577
R^2	0.682	0.579	0.579	0.578	0.816	0.589	0.578
Estimator	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Prob > F (A=B)	0.004	0.000	0.000	0.000	0.179	0.004	0.000
Prob > F (C=D)	0.000	0.000	0.000	0.000	0.084	0.000	0.000

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *I* to importing country *j* in year *t*. Fixed effects included but not reported. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Columns 1-6: see note in table 1. We only report one of the subsamples here and relegate the rest to the appendix.. Per-unit$_{ijkt}$ and Ad-valorem$_{ijkt}$ stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvped$_i$ and Dvping$_i$ abbreviate, respectively, the words developed and developing countries. This table replicates column 2 of Table 1 in Emlinger and Guimbard (2021).

To address potential endogeneity in our estimates, we estimate equation (2) using two-stage least squares (2SLS) instead of OLS. The results are presented in Table 3. Column (1) replicates and reports the findings in Emlinger and Guimbard (2021). The findings in columns (2) – (7) which are based on our own dataset confirm those in column (1). What is interesting here, however, is that the coefficients on the per-unit tariffs are no longer statistically significantly different between developing and developed countries. This contradicts the findings reported in Emlinger and Guimbard (2021). However, the Wald test of equality we perform in the push-button replication, confirms that the findings reported in Emlinger and Guimbard (2021) are also not statistically different between developing and developed countries once we use the instrumental variable regressions.[18] Here again, before we take this contradiction as conclusive, we need to point out that we are only able to replicate the instrumental variables we use here following closely the definitions provided in the paper.[19] Nevertheless, a look at the summary statistics presented in the Appendix Tables A2 reveal that the sample means for the IVs for per-unit and ad valorem tariffs are close to those from Emlinger and Guimbard (2021). Our findings imply that once we control for endogeneity, the heterogeneity of the AA effect across developed and developing country exporters disappears.

2019, the updated version of BACI and TUV has been slightly modified from the one used in the replicated paper in that the procedure of CIF conversion and the data cleaning use the whole period each time as benchmark. Moreover, the MacMap dataset has been updated as well.

18 Even if the effects for developed and developing countries in Emlinger and Guimbard (2021) are statistically different from each other, the magnitudes of 0.014 and 0.015 are very close to each other. A potential problem associated with IV estimations is the so named "generated regressor" problem, consisting in the over-rejection of null hypotheses, and in finding statistical significance more often that what it should be (Croissant and Millo, 2018). The lack of statistical significance when we use IVs signal there is not such a caveat in our study.

19 We acknowledge the authors who were kind enough to share the script used for the creation of the IV in SAS. Having no access to SAS we replicate the process in Stata.

Table 3: The effect of per-unit tariffs on trade unit values across development status (IV regression)

	Push button	Own data	Cluster	Omitted variable	Bilateral-FE	Sub-sample	Extended data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per-unit_{ijkt}	0.014***	0.007***	0.007***	0.006***	-0.000	0.009***	-0.002
$\times\ \text{Dvping}_i^A$	(0.003)	(0.002)	(0.002)	(0.002)	(0.009)	(0.003)	(0.002)
Per-unit_{ijkt}	0.015***	0.005***	0.005***	0.005***	0.003	0.007***	0.008***
$\times\ \text{Dvped}_i^B$	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.001)
Ad-valorem_{ijkt}	-0.122***	-0.160***	-0.160***	-0.159***	-0.035	-0.164***	-0.051**
$\times\ \text{Dvping}_i^C$	(0.028)	(0.024)	(0.024)	(0.024)	(0.117)	(0.049)	(0.020)
Ad-valorem_{ijkt}	0.066***	0.110***	0.110***	0.110***	0.011	0.104***	0.114***
$\times\ \text{Dvped}_i^D$	(0.011)	(0.013)	(0.013)	(0.013)	(0.024)	(0.023)	(0.012)
Observations	1,855,975	2,408,092	2,408,092	2,408,092	2,038,191	599,806	3,428,577
Estimator	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Prob > F (A=B)	0.542	0.414	0.414	0.441	0.077	0.716	0.000
Prob > F (C=D)	0.000	0.000	0.000	0.000	0.664	0.000	0.000

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. Fixed effects included but not reported. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Columns 1-6: see note in table 1.We only report one of the subsamples here and relegate the rest to the appendix.. Per-unit_{ijkt} and Ad-valorem_{ijkt} stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvped_i and Dvping_i abbreviate, respectively, the words developed and developing countries. This table replicates column 3 of Table 1 in Emlinger and Guimbard (2021).

In Table 4, we restrict the sample to observations with unit values in the upper decile of the distribution of the unit values. The original finding from Emlinger and Guimbard (2021) in column (1) show that the effect of per-unit tariffs on developing countries' trade unit values is no longer significantly different from developed countries. Our replication and extension exercises, on the other hand, find that even at the high end of the unit value distribution, the magnitude of the Alchian-Allen effect is bigger for developed countries compared to developing countries. The differences here may also arise from an oversight we noticed in the original script of Emlinger and Guimbard (2021). When the authors analyse the effects for high and low priced products, they only instrument the per-unit tariffs and not the ad-valorem duties. In our replication, we instrument both tariff types.

Table 4: The effect of per-unit tariffs on trade unit values across development status for high-priced products

	Push button	Own data	Cluster	Omitted variable	Bilateral-FE	Sub-sample	Extend-ed data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per-unit$_{ijkt}$	0.024***	-0.007**	-0.007**	-0.007**	-0.005	-0.007**	-0.008***
× Dvping$_i^A$	(0.007)	(0.003)	(0.003)	(0.003)	(0.022)	(0.003)	(0.002)
Per-unit$_{ijkt}$	0.014***	0.004***	0.004***	0.004***	0.010	0.004***	0.003***
× Dvped$_i^B$	(0.002)	(0.001)	(0.001)	(0.001)	(0.008)	(0.001)	(0.001)
Ad-valorem$_{ijkt}$	0.066	0.151***	0.151***	0.152***	1.328	0.151***	0.044
× Dvping$_i^C$	(0.095)	(0.057)	(0.057)	(0.057)	(1.782)	(0.057)	(0.036)
Ad-valorem$_{ijkt}$	0.043***	0.023	0.023	0.023	0.021	0.023	0.018
× Dvped$_i^D$	(0.014)	(0.015)	(0.015)	(0.015)	(0.056)	(0.015)	(0.014)
Observations	180,095	464,621	464,621	464,621	244,354	464,621	656,552
Estimator	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
A = B	0.160	0.000	0.001	0.001	0.386	0.000	0.002
C = D	0.806	0.024	0.024	0.022	0.462	0.024	0.489

Notes: The dependent variable is FOB export prices of product k, from exporting country i to importing country j in year t. Fixed effects included but not reported. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Columns 1-6: see note in table 1. We only report one of the subsamples here and relegate the rest to the appendix.. Per-unit and Ad-valorem stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvped and Dvping abbreviate, respectively, the words developed and developing. This table replicates column 4 of Table 1 in Emlinger and Guimbard (2021).

In Table 5, we only consider product-country pairs with low range of unit values (with a standard deviation of unit values in the first decile of the distribution of standard deviation of unit values by product). Consistent with the findings in column (1), the effects are almost zero.

Table 5: The effect of per-unit tariffs on trade unit values across development status for low-priced products

	Push button	Own data	Cluster	Omitted variable	Bilateral-FE	Sub-sample	Extended data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$Per\text{-}unit_{ijkt}$	0.017	-0.005*	-0.005*	-0.005**	0.005	-0.003	-0.005*
× $Dvping_i^A$	(0.016)	(0.003)	(0.003)	(0.003)	(0.013)	(0.005)	(0.003)
$Per\text{-}unit_{ijkt}$	-0.016	0.001	0.001	0.001	0.011*	0.006*	0.002
× $Dvped_i^B$	(0.029)	(0.002)	(0.002)	(0.002)	(0.006)	(0.003)	(0.002)
$Ad\text{-}valorem_{ijkt}$	0.085	-0.130***	-0.130***	-0.133***	-0.150*	-0.167**	-0.050
× $Dvping_i^C$	(0.117)	(0.031)	(0.031)	(0.031)	(0.089)	(0.073)	(0.038)
$Ad\text{-}valorem_{ijkt}$	0.017	-0.005*	-0.005*	-0.005**	0.005	-0.003	-0.005*
× $Dvped_i^D$	(0.016)	(0.003)	(0.003)	(0.003)	(0.013)	(0.005)	(0.003)
Observations	2,165	405,261	405,261	405,261	332,710	99,076	583,212
Estimator	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Prob > F (A=B)	0.318	0.000	0.000	0.387	0.000	0.036	0.006
Prob > F (C=D)	0.248	0.024	0.022	0.463	0.024	0.000	0.000

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. Fixed effects included but not reported. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Columns 1-6: see note in table 1. We only report one of the subsamples here and relegate the rest to the appendix.Per-unit and Ad-valorem stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvped and Dvping abbreviate, respectively, the words developed and developing. This table replicates column 5 of Table 1 in Emlinger and Guimbard (2021).

Further sensitivity analysis

The first analysis is on fixed effects. If we replace the set of fixed effects in equations (1) and (2) with importer-product-time (i.e., λ_{jkt}) and exporter-product-time (i.e., λ_{ikt}) fixed effects, our general conclusions from this section remain largely the same. However, the magnitudes of the estimated coefficients on our variable of interest are larger compared to those reported in Emlinger and Guimbard (2021). We present the results in Table A3 of the Appendix. This finding and those reported in columns (5) of Tables 1 – 5, coupled with the fact that Emlinger and Guimbard (2021) offer no justifications for their fixed effects, show that the choice of fixed effects used in the empirical analyses does matter for the results.

A second check is made by dropping a relevant variable. We employ the method developed by Oster (2019) to estimate the bias that arises from omitting relevant variables on both export prices and per-unit tariffs. This analysis allows us to “transparently reveal how susceptible results are to unobserved confounders” (Cinelli and Hazlett, 2020, p. 66). We omit an explanatory variable that matters for the analysis: the contiguity (i.e., border) variable. Apart from a purely statistical point of view, the choice of omitting the contiguity variable relies on the theory of gravity models (Anderson, 1979). Distance is generally explained by physical distance and by the contiguity of the trading partners (Cheng and Wall, 2005; Pfaffermayr, 2019), which are good proxies for trade costs (Beghin and Schweizer, 2021). Through the approach by Oster (2019) we bound the bias that arises from omitting important controls, by comparing uncontrolled and controlled regressions under a set of assumptions about the relationship between observable and unobservable selection. The results are presented in Appendix A5, Table A18. All point estimates are statistically significant at the 1% level and the confidence intervals do not contain the value of zero.

A third analysis is made by using our version of the dataset used in the original paper. We reach conclusions similar to the original paper, but our findings, in terms of magnitudes, do not correspond one-to-one with those presented in Emlinger and Guimbard (2021). Since the sample sizes differ across the original study and ours, we consider it important to see if the findings from the original dataset provided by the authors survive the sensitivity analyses we conduct. Thus, we conduct another replication exercise and subject the original dataset from Emlinger and Guimbard (2021) to the various sensitivity analyses we propose in our paper. The results are presented in Appendix A2 (Tables A4 – A7).

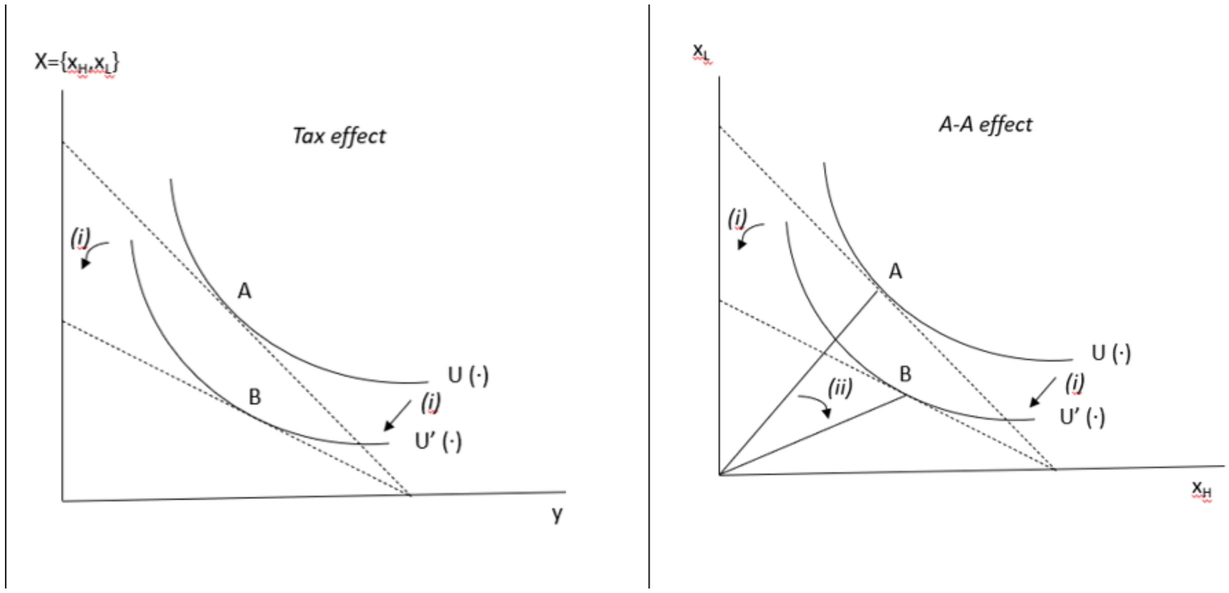
Finally, while not a key part of our replication exercise – since we are interested more in the effects of tariffs on export prices – Emlinger and Guimbard (2021) also assessed the effect of per-unit and ad valorem tariffs on trade flows. We replicate this analysis using our version of their data and also extend the analysis with the years 2016 and 2019. We estimate equations (1) and (2) and replace the dependent variable with trade quantities. Here again, there are differences in the total number of observations and magnitudes of the effects we estimate. However, the overall conclusion is the same as in the original paper. See Appendix A3 (Tables A9-A10).

5. Challenging the generalization of the Alchian-Allen effect

In the present section, we discuss the main contribution of the paper by Emlinger and Guimbard (2021, table 1), i.e., the empirical validation of the Alchian-Allen (AA) effect. The AA effect postulates that a (equal) fixed-amount increase in the prices of substitutes increases the demand of the high-priced good to the detriment of the low-priced good, as the former becomes relatively cheaper with respect to the latter (Alchian and Allen, 1964). This applies to trade as well, where we tend to observe that, due to transportation costs, firms tend "*to ship high-quality goods abroad while holding lower-quality goods for domestic consumption*" (Hummels and Skiba, 2004). The rationale is simple (Figure 1). Consumers buy a bundle (x and y, which we assume as *numeraire*) which includes less quantity of the expensive good (say x_H), and more of the cheap good (x_L). A per-unit tariff (T) on the composite good (x) makes it more expensive with respect to the numeraire and decreases the utility (the two shifts are denoted by *i*) , due to an income effect. In addition to these changes, the consumer will find it more convenient to substitute the low-price good with the high-price good (substitution effect, denoted by *ii*), which will become relatively cheaper. Another intuitive explanation of the effects that a tax has on differently priced (substitutable) goods can be appreciated by the relationships of the price ratio of the two goods before and after the addition of a fixed tax $(\frac{P_H}{P_L} > \frac{P_H+T}{P_L+T})$, showing that any positive fixed tax applied to both decreases the price ratio, making the expensive good relatively cheaper.[20]

20 This intuition is also discussed in Emlinger and Lamani (2020).

Figure 1 - The Rationale of the AA Effect



Source: Adapted from Tetsuya (2019)

Emlinger and Guimbard (2021) show that i) the effect of per-unit tariffs on export prices is positive; ii) the effects are more pronounced for higher priced goods. Although the manuscript focuses on per-unit tariffs, the authors also present the findings for the ad-valorem duties, for which the effects tend to be lower with respect to those observed for the per-unit tariffs and are expected to be lower than the effects of the per-unit, especially for the higher priced goods. The rationale is simple: per-unit tariffs are likely to be applied to goods that have higher unit value,[21] whereas the opposite is likely to be true for ad-valorem duties.[22] In this latter situation, the changes in price have a marked income effect, shifting the budget line toward the origin. To better interpret and compare the coefficients on per-unit and ad-valorem tariffs, we compute the effects of a 1% change in the customs duties on import prices, by multiplying the marginal effects by the unit values (cfr. Table A.2, panel b): the effects of a one percent increase in the per-unit tariff are about ten times bigger than a 1% increase in the ad-valorem duty.[23]

The novelty in Emlinger and Guimbard (2021) is that they investigate the heterogeneity of the AA effect across the level of economic development of the exporting country. In the OLS models, our replication exercises find that the AA applies both for Developing and Developed countries (i.e., the coefficient of the per unit duty is positive), as postulated by the theory.[24] However, once we account for endogenetiety, any differences in the AA effect across income levels disappears. In short, while the AA effect is supported by (average) estimates, we cannot be conclusive on its heterogenous effects along the economic development dimension.

21 Exception, of course, exists. For instance, Switzerland relies almost exclusively on per-unit tariffs.

22 Our estimates include product-fixed effects which address this issue, unless differences in the units values of the same product/good across different countries result in different choices regarding per-unit and ad-valorem tariffs across the countries. This is not investigated and left for future research. We gratefully acknowledge an anonymous reviewer for pointing this out.

23 We gratefully acknowledge the comment, raised by the anonymous reviewer, on the importance of making comparable the effects of the ad-valorem and the per-unit tariffs. Since we have a log-log model, the coefficients are directly interpreted as elasticities..

24 In a private correspondence the authors of the paper argued that the AA effect seems stronger for developed exporters due to a composition effect exactly because it is found stronger for per-unit tariffs applied on high priced products. We believe this is a valid statement that deserve further investigation.

Focusing briefly on the ad valorem duties, a null or negative effect on export prices would not be in contrast with the AA effect. This is because an ad-valorem duty leaves unaltered the relative prices and increase the expenditure of the two goods. If separability in consumption holds, and goods are normal, we should expect a decrease in consumption.[25] However, the direction of the effect remains an empirical question that deserves further attention; exporters can price-to-market where they absorb part of the ad valorem charges and thus charger lower export prices. They may also pass on the costs of the ad valorem tariffs to consumers in the importing country as higher prices. This aspect deserves further investigation in future research, and should be also related to the different trade regimes, and pricing vis-a-vis non-pricing mechanism being adopted by developed and developed countries.[26]

Another puzzling result is related to the irregularities observed for low and high-priced goods (columns 4 and 5, in table 1 of Emlinger and Guimbard, 2021). We found that the coefficient of the per unit duty is positive (as it should) for high-price goods (column 4) and for Developed countries; the coefficient of the ad-valorem duty is mixed and heterogenous for Developed and Developing countries.[27]

We do not intend to undermine the value of the paper we have replicated which clearly focuses on the impact of the per-unit component of tariffs and analyses heterogeneities across developed versus developing countries, and high and low-priced products. As the authors have stated in private correspondence, the effects on ad valorem and per-unit components of the tariffs should not be directly compared as the two components do not enter with the same unit, but are expressed, respectively, as a percentage of the value and as dollar per tons. As they claim, understanding whether the two effects are comparable is an open question that goes beyond the scope of their paper.

6. Final remarks

Replication of economic studies is a costly exercise in that posited data and software are often hard to be used by other researchers (Anderson and Kichkha, 2017). Despite the high costs, the replication of economic papers is an important activity to decrease the potential paucity that may be perceived in studies that do not have transparent and fully replicable accompanying data and codes (Hamermesh, 2007). It is also important to validate the findings and detect potential biases in the existing literature. However, these exercises are not exempt from threats in that the replication itself is subject to incentives that may lead to biases, such as the “overturn bias”, where authors report false positives or claim mistakes in the original analysis without solid justifications (Galiani et al., 2017).

Our replication exercise consisted of several steps: we execute the authors’ code on their original data (push-button replication), construct the dataset following the information provided in the original paper and repeat the analysis (pure replication). We found that using a data set that is constructed in a replicable way and introducing highly relevant bilateral fixed effects reduce effect sizes and the level of statistical significance.We also conduct several sensitivity analyses to test the sensitivity of the results in the original paper from several points of view (i.e. using different sets of fixed effects, and level of clusters for the standard errors, by estimating the model on subsamples, and using a misspecified model), and extend the original analysis with two more waves of data for 2016 and 2019. In many cases, we conclude that the finding that the Alchian-Allen effect is heterogeneous across developed country status of the exporter reported in Emlinger and Guimbard (2021) weakly holds: when we use a dataset that is replicable, and control for stringent fixed effects, the (statistical

25 Despite this logical explanation, it needs to be pointed that Curzi et al (2015) found a negative coefficient of ad-valorem duties on unit values on European trade. Further research is needed.

26 The evidence on the different trade regimes applied by developed and developing countries in the agri-good sector is vast and growing (e.g. Beghin, and Schweizer, 2021; Santeramo and Lamonaca, 2022). We believe that focusing on the heterogenous effects of ad valorem and per-unit tariffs is a promising area of research.

27 Notably, for Developing countries, the coefficient of the per unit duty is positive (as it should) for high-priced goods, and not statistically significant for low-priced goods. Thus, there is not a violation of the AA effect.

and economic) differences are negligible.

We found that the generalization of the Alchian-Allen effects along the economic development dimension is still not clear and leaves room for further research and should be coupled with more information on recent dynamics in global trade (e.g. declining transportation costs, rising attention to food quality, tariff escalation and participation in the GVC).

Furthermore, once we control for endogeneity of the unit duties and export price relationship, the differences in estimated effects for per-uni and ad-valorem tariffs are evident only for the high-price products. Future research should focus on exploring the heteropgeity along the price dimension, with rich and informative dataset, such as firm-level datasets. Likewise, our analysis points at the need, for policymakers, to gain insights on the differential effects that per-unit and ad-valorem tairffs may exert across industries. For instance, our results are informative to feed the debate on how to shape tariffs to increase the participation of LDCs into the GVC. Antimiani and Cernat (2021, p.700) suggests to "*offer dutyfree access to LDC value-added that 'travels' inside finished products exported by all other WTO members*". To the extent that upstream and downstream produce are priced differently, bringing the price dimension into the debate on reforming trade policies to facilitate participation in the GVCs would be an important addition.

A few words of caution are needed. This empirical exercise is not itself exempt from limitations[28] and should be taken as an exercise to set boundaries on what we may learn from the paper by Emlinger and Guimbard (2021) and what still deserves investigation. More specifically, while we have asserted that the AA effect holds, our warning sentences on difficulties in finding heterogenous effects along the economic development dimensions do not need to be generalized to the point of concluding that the AA does not hold in these cases. Instead, we encourage further investigation into this promising area of research. Finally, it remains to be seen whether the higher AA effect for developed country exporters is driven by their ability to produce higher-quality products or their ability to vary their markups. Recent firm-level analysis in this literature have tried to disentangle the markup and quality elements (Chen and Juvenal, 2022; Fiankor, 2022) and find, for instance, that the markup components are lower for high-quality products. It will be an important future contribution to assess if these conclusions are also heterogeneous across the development status of the exporting country. These aspects are particularly relevant in a GVC context, which poses new challenges to the understanding of the global trade regime.

28 For instance, we have not included other pricing and non-pricing mechanisms (e.g. quota, NTMs, etc.), as suggested by a reviewer, nor we have investigated the political economy of trade regimes in developing and developed countries. Our exercise has to be interpreted as a descriptive analysis of the average effects of the per-unit and ad-valorem tariffs in the agri-food sector. Needless to say, this contribution is per se a good addition to the extant empirical literature.

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Appendix A1

Table A1: List of importing and exporting countries

Afghanistan, Albania, Algeria, Andorra[i], Angola, Anguilla[j], Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Belize, Benin, Bermuda, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana[j], Brazil, British Virgin Islands[i], Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Cayman Islands, Central African Republic, Chad, Chile, China, Colombia, Comoros, Congo, Cook Islands[j], Costa Rica, Croatia, Cuba, Cyprus, Czech Republic, Côte d'Ivoire, Democratic People's Republic of Korea, Denmark, Djibouti, Dominica Dominican Republic, Ecuador, Egypt, El Salvador, Equatorial Guinea, Estonia, Ethiopia, Fiji, Finland, France, French Polynesia, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar[i], Greece, Greenland[i], Grenada, Guatemala, Guinea, Guinea-Bissau, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Iran, Iraq[i], Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Kiribati, Kuwait, Kyrgyzstan, Laos, Latvia, Lebanon, Lesotho[j], Liberia, Libya, Lithuania, Luxembourg[j], Macau, Macedonia, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Marshall Islands[i], Mauritania, Mauritius, Mexico, Micronesia, Mongolia, Montserrat[j], Morocco, Mozambique, Myanmar, Nauru[j], Nepal, Netherlands, New Caledonia[i], New Zealand, Nicaragua, Niger, Nigeria, Northern Mariana Islands[i], Norway, Oman, Pakistan, Palau, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Republic of Moldova, Russian Federation, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Pierre and Miquelon[j], Saint Vincent and the Grenadines, Samoa, San Marino[i], Sao Tome and Principe, Saudi Arabia, Senegal, Seychelles, Sierra Leone, Singapore, Slovakia, Slovenia, Solomon Islands, Somalia[i], South Africa, South Korea, Spain, Sri Lanka, Sudan, Suriname, Swaziland[j], Sweden, Switzerland, Syrian Arab Republic, Taiwan[j], Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Turks and Caicos Islands[i], Tuvalu, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States of America, Uruguay, Uzbekistan, Vanuatu, Venezuela, Vietnam, Wallis and Futuna Island[i], Yemen, Zambia, Zimbabwe

Notes: countries with superscript *i* are only exporters. Countries with superscript *j* are only importers. Countries with no superscript are both importers and exporters.

Table A2: Summary statistics

	Mean	S.D.	Min.	Max.	Observation
Sample for push-button replication					
Contiguity$_{ij}$	0.142	0.349			1859427
Language$_{ij}$	0.201	0.400			1859427
RTA$_{ijt}$	0.619	0.486			1859427
Distance$_{ij}$	4650.140	4267.021	94.273	19650.135	1857258
Ad-valorem$_{ijkt}$	1.078	0.385	1.000	31.000	1859427
Per-unit$_{ijkt}$	65.295	1219.875	1.000	548455.250	1859427
IV: Ad-valorem$_{ijkt}$	0.174	0.529	0.000	30.000	833255
IV: Per-unit$_{ijkt}$	0.066	0.228	0.000	1.000	1859427
Trade value$_{ijkt}$	2.125	27.887	0.001	17154.082	1859427
Trade volume$_{ijkt}$	2538.337	62368.599	0.000	32235350.000	1859427
Unit value$_{ijkt}$	13885.843	232103.171	3.405	65448284.000	1859427
Sample for pure replication					
Contiguity$_{ij}$	0.112	0.316			3571554
Language$_{ij}$	0.217	0.412			3571554
RTA$_{ijt}$	0.472	0.499			3571554
Distance$_{ij}$	5128.085	4352.150	59.617	19812.043	3571554
Ad-valorem$_{ijkt}$	0.087	0.383	0.000	30.000	3571554
Per-unit$_{ijkt}$	76.379	1825.245	0.000	548454.063	3571554
IV: Ad-valorem$_{ijkt}$	0.084	0.400	0.000	30.000	2408109
IV: Per-unit$_{ijkt}$	0.069	0.228	0.000	1.000	3571554
Trade value$_{ijkt}$	1221.973	20418.010	0.001	17152948	3571554
Trade volume$_{ijkt}$	1438.180	43597.901	0.001	32246996	3571554
Unit value$_{ijkt}$	13.175	208.573	0.003	50000.496	3571554
Extended dataset (2004 – 2019)					
Contiguity$_{ij}$	0.106	0.308			5085149
Language$_{ij}$	0.207	0.405			5085149
RTA$_{ijt}$	0.495	0.500			5085149
Distance$_{ij}$	5174.143	4350.847	59.617	19951.160	5085149
Ad-valorem$_{ijkt}$	0.084	0.393	0.000	30.000	5085149
Per-unit$_{ijkt}$	80.335	1972.428	0.000	548454.063	5085149
IV: Ad-valorem$_{ijkt}$	0.081	0.411	0.000	30.000	3428594
IV: Per-unit$_{ijkt}$	0.067	0.223	0.000	1.000	5085149
Trade value$_{ijkt}$	1271.495	19630.602	0.001	17152948	5085149
Trade volume$_{ijkt}$	1384.938	41206.527	0.001	32246996	5085149
Unit value$_{ijkt}$	14.250	216.628	0.003	48494.469	5085149

Table A3: Effect of per-unit tariffs on trade unit values (2004 - 2013) – including country-product-time fixed effects

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	2SLS	2SLS	2SLS
	All	All	All	High priced	Low priced
Per-unit$_{ijkt}$	0.020***				
	(0.001)				
Ad-valorem$_{ijkt}$	0.019				
	(0.016)				
Distance$_{ij}$	0.096***				
	(0.001)				
Contiguity$_{ij}$	-0.117***	-0.116***	-0.118***	-0.041***	-0.047***
	(0.003)	(0.003)	(0.003)	(0.005)	(0.006)
Language$_{ij}$	-0.002	-0.003	-0.006***	-0.046***	-0.010**
	(0.002)	(0.002)	(0.002)	(0.004)	(0.005)
RTA$_{ijt}$	-0.047***	-0.047***	-0.054***	-0.015***	-0.027***
	(0.002)	(0.002)	(0.004)	(0.004)	(0.005)
Per-unit$_{ijkt}$ × Dvping$_i$		0.018***	0.026***	0.010***	0.005
		(0.001)	(0.002)	(0.004)	(0.004)
Per-unit$_{ijkt}$ × Dvped$_i$		0.022***	0.029***	0.019***	0.014***
		(0.001)	(0.002)	(0.003)	(0.004)
Ad-valorem$_{ijkt}$ × Dvping$_i$		-0.021	-0.462***	0.140***	-0.129***
		(0.018)	(0.101)	(0.042)	(0.037)
Ad-valorem$_{ijkt}$ × Dvped$_i$		0.032**	-0.343***	0.106***	-0.084**
		(0.016)	(0.105)	(0.037)	(0.035)
Distance$_{ij}$ × Dvping$_i$		0.099***	0.104***	0.019***	0.079***
		(0.002)	(0.002)	(0.004)	(0.004)
Distance$_{ij}$ × Dvped$_i$		0.095***	0.095***	0.077***	0.066***
		(0.001)	(0.001)	(0.002)	(0.003)
Observations	3430864	3430864	3430864	546663	502755
Under identification			32.99	9309.76	4790.21
Weak identification			182.29	19954.27	9190.98
Weak identification p-value			0.00	0.00	0.00
Hausman-Wu test p-value			0.00	0.01	0.55

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include importer-product-time and exporter-product-time fixed effects. This table replicates the results presented in Table 1 of Emlinger and Guimbard (2021) but replace the sets of fixed effects used (i.e., exporter-HS2 product-time, importer-time and HS6 product-time) by importer-product-time and exporter-product-time fixed effects.

Appendix A2: Sensitivity analyses on original data from Emlinger and Guimbard (2021)

Table A4: Effect of per-unit tariffs on trade unit values: clustering standard errors at the country-pair level)

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	2SLS	2SLS	2SLS
	All	All	All	High priced	Low priced
Per-unit$_{ijkt}$	0.013***				
	(0.001)				
Ad-valorem$_{ijkt}$	0.018*				
	(0.010)				
Distance$_{ij}$	0.090***				
	(0.003)				
Contiguity$_{ij}$	-0.090***	-0.090***	-0.091***	-0.040***	-0.012
	(0.009)	(0.009)	(0.009)	(0.009)	(0.042)
Language$_{ij}$	0.024***	0.025***	0.025***	-0.004	-0.019
	(0.007)	(0.007)	(0.007)	(0.006)	(0.029)
RTA$_{ijt}$	0.011*	0.008	0.009	-0.009	0.038
	(0.006)	(0.006)	(0.006)	(0.007)	(0.029)
Per-unit$_{ijkt}$ × Dvping$_i$		0.007**	0.014***	0.024***	0.018
		(0.003)	(0.004)	(0.007)	(0.015)
Per-unit$_{ijkt}$ × Dvped$_i$		0.013***	0.015***	0.014***	-0.011
		(0.001)	(0.001)	(0.002)	(0.036)
Ad-valorem$_{ijkt}$ × Dvping$_i$		-0.154***	-0.122***	0.066	0.083
		(0.035)	(0.040)	(0.092)	(0.121)
Ad-valorem$_{ijkt}$ × Dvped$_i$		0.031***	0.066***	0.043***	-0.097
		(0.010)	(0.015)	(0.015)	(0.126)
Distance$_{ij}$ × Dvping$_i$		0.071***	0.070***	0.017	0.046
		(0.010)	(0.010)	(0.013)	(0.028)
Distance$_{ij}$ × Dvped$_i$		0.091***	0.090***	0.047***	0.005
		(0.003)	(0.003)	(0.004)	(0.021)
Observations	1855975	1855975	1855975	180095	2165
Under identification			35.26	2550.31	21.97
Weak identification			36.61	518.18	8.12
Weak identification p-value			0.00	0.00	0.00
Hausman-Wu test p-value			0.00	0.00	0.28

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t* All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include importer-product-time and exporter-product-time fixed effects. This table replicates the results presented in Table 1 of Emlinger and Guimbard (2021) but cluster the standard errors at the country-pair level. The underidentification and weak identification tests are based on Kleibergen-Paap rk LM and Wald F statistics.

Table A5: Effect of per-unit tariffs on trade unit values: omitting the contiguity variable

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	2SLS	2SLS	2SLS
	All	All	All	High priced	Low priced
Per-unit$_{ijkt}$	0.013***				
	(0.001)				
Ad-valorem$_{ijkt}$	0.017**				
	(0.007)				
Distance$_{ij}$	0.109***				
	(0.001)				
Language$_{ij}$	0.012***	0.013***	0.013***	-0.011**	-0.020
	(0.003)	(0.003)	(0.003)	(0.005)	(0.028)
RTA$_{ijt}$	0.011***	0.009***	0.011***	-0.009	0.038
	(0.003)	(0.003)	(0.003)	(0.006)	(0.030)
Per-unit$_{ijkt}$ × Dvping$_i$		0.007***	0.013***	0.024***	0.017
		(0.002)	(0.003)	(0.007)	(0.016)
Per-unit$_{ijkt}$ × Dvped$_i$		0.013***	0.015***	0.014***	-0.011
		(0.001)	(0.001)	(0.002)	(0.030)
Ad-valorem$_{ijkt}$ × Dvping$_i$		-0.156***	-0.122***	0.069	0.082
		(0.024)	(0.028)	(0.095)	(0.117)
Ad-valorem$_{ijkt}$ × Dvped$_i$		0.030***	0.065***	0.042***	-0.096
		(0.008)	(0.011)	(0.014)	(0.137)
Distance$_{ij}$ × Dvping$_i$		0.095***	0.094***	0.026**	0.049*
		(0.004)	(0.004)	(0.011)	(0.027)
Distance$_{ij}$ × Dvped$_i$		0.110***	0.109***	0.053***	0.006
		(0.001)	(0.001)	(0.002)	(0.020)
Observations	1855975	1855975	1855975	180095	2165
Under identification			251.64	13721.23	23.71
Weak identification			360.26	8050.95	8.52
Weak identification p-value			0.00	0.00	0.00
Hausman-Wu test p-value			0.00	0.00	0.32

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include importer-product-time and exporter-product-time fixed effects. This table replicates the results presented in Table 1 of Emlinger and Guimbard (2021) but omits the contiguity variable.

Table A6: Effect of per-unit tariffs on trade unit values: subsample analysis

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	2SLS	2SLS	2SLS
	All	All	All	High priced	Low priced
Per-unit$_{ijkt}$	0.014***				
	(0.001)				
Ad-valorem$_{ijkt}$	0.014				
	(0.012)				
Distance$_{ij}$	0.089***				
	(0.002)				
Contiguity$_{ij}$	-0.087***	-0.088***	-0.088***	-0.029**	-0.223
	(0.005)	(0.005)	(0.005)	(0.013)	(0.248)
Language$_{ij}$	0.021***	0.022***	0.022***	-0.007	-0.074
	(0.004)	(0.004)	(0.004)	(0.010)	(0.179)
RTA$_{ijt}$	0.008*	0.006	0.007	-0.024*	0.080
	(0.005)	(0.005)	(0.005)	(0.013)	(0.142)
Per-unit$_{ijkt}$ × Dvping$_i$		0.071***	0.071***	-0.023	-0.159
		(0.007)	(0.007)	(0.024)	(0.136)
Per-unit$_{ijkt}$ × Dvped$_i$		0.090***	0.089***	0.049***	0.037
		(0.002)	(0.002)	(0.005)	(0.081)
Ad-valorem$_{ijkt}$ × Dvping$_i$		-0.127***	-0.087*	-0.048	1.573
		(0.040)	(0.053)	(0.167)	(1.538)
Ad-valorem$_{ijkt}$ × Dvped$_i$		0.023*	0.055***	0.058*	0.396
		(0.013)	(0.019)	(0.030)	(0.992)
Distance$_{ij}$ × Dvping$_i$		0.011***	0.015***	0.017	0.071
		(0.004)	(0.005)	(0.017)	(0.064)
Distance$_{ij}$ × Dvped$_i$		0.014***	0.016***	0.017***	-0.241
		(0.001)	(0.002)	(0.003)	(0.232)
Observations	462360	462360	462360	43106	225
Under identification			146.85	4546.20	1.08
Weak identification			169.06	2868.12	6.20
Weak identification p-value			0.00	0.00	0.01
Hausman-Wu test p-value			0.02	0.00	0.08

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include importer-product-time and exporter-product-time fixed effects. This table replicates the results presented in Table 1 of Emlinger and Guimbard (2021) on a random sub-sample.

Table A7: Effect of per-unit tariffs on trade unit values: including country-pair fixed effects

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	2SLS	2SLS	2SLS
	All	All	All	High priced	Low priced
Per-unit$_{ijkt}$	0.008***				
	(0.001)				
Ad-valorem$_{ijkt}$	-0.003				
	(0.008)				
RTA$_{ijt}$	0.005	0.005	0.005	-0.014	0.065
	(0.004)	(0.004)	(0.004)	(0.011)	(0.636)
Per-unit$_{ijkt}$ × Dvping$_i$		0.003	0.004	0.014	0.074
		(0.002)	(0.003)	(0.011)	(0.111)
Per-unit$_{ijkt}$ × Dvped$_i$		0.009***	0.006***	0.010***	1.508
		(0.001)	(0.001)	(0.002)	(18.897)
Ad-valorem$_{ijkt}$ × Dvping$_i$		-0.046	-0.018	0.174	-0.091
		(0.029)	(0.035)	(0.128)	(0.506)
Ad-valorem$_{ijkt}$ × Dvped$_i$		0.000	0.050***	0.031**	-0.695
		(0.008)	(0.011)	(0.014)	(0.819)
Observations	1853960	1853960	1853960	177935	1591
Under identification			391.24	447.21	0.00
Weak identification			548.23	376.85	0.01
Weak identification p-value			0.00	0.00	0.91

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include importer-product-time and exporter-product-time fixed effects. This table replicates the results presented in Table 1 of Emlinger and Guimbard (2021) but includes importer-exporter fixed effects.

Due to the high number of fixed effects and the sample size, our empirical analyses and those reported by Emlinger and Guimbard (2021) use the user-written command reghdfe in Stata. Reghdfe is a Stata package that runs linear and instrumental-variable regressions with many levels of fixed effects, by implementing the estimator of Correia (2017). Thus, we conduct the pure replication of the paper using an alternative approach to derive the estimates as advised by Head and Mayer (2014), to test for the robustness of the empirical results. We implement the standard least squares dummy variable estimator. The results are reported in table A8. We also estimated the model on trade values (column 2) and quantities (column 3). The results for trade values are in line with those related for trade volumes, providing further evidence that the AA effect is driven by the price of the goods, irrespective of the traded quantity.

Table A8: Robustness checks: clustered standard errors and misspecified model

	LS-HDFE Unit-values	LS-HDFE Quantity	LS-HDFE Values
	(1)	(2)	(3)
Per-unit$_{ijkt}$	0.01290***	-0.0858***	-0.0724***
	(0.0006)	(0.0022)	(0.0020)
Ad-valorem$_{ijkt}$	0.0181*	-1.0296***	-1.0491***
	(0.0900)	(0.0634)	(0.0287)

Appendix A3: The effect of per-unit tariffs on trade quantities

Table A9: Effect of per-unit tariffs on trade quantities (2004 - 2013)

	(1)	(2)	(3)	(4)	(5)
	OLS	OLS	2SLS	2SLS	2SLS
	All	All	All	High priced	Low priced
Per-unit$_{ijkt}$	-0.091***				
	(0.002)				
Ad-valorem$_{ijkt}$	-1.363***				
	(0.027)				
Distance$_{ij}$	-0.682***				
	(0.004)				
Contiguity$_{ij}$	0.986***	0.992***	0.992***	0.666***	0.493***
	(0.011)	(0.011)	(0.011)	(0.020)	(0.022)
Language$_{ij}$	0.262***	0.259***	0.268***	0.349***	0.322***
	(0.008)	(0.008)	(0.008)	(0.013)	(0.018)
RTA$_{ijt}$	0.289***	0.287***	0.317***	0.152***	0.394***
	(0.007)	(0.007)	(0.007)	(0.013)	(0.015)
Per-unit$_{ijkt}$ × Dvping$_i$		-0.098***	-0.073***	0.007	-0.061***
		(0.004)	(0.005)	(0.009)	(0.009)
Per-unit$_{ijkt}$ × Dvped$_i$		-0.085***	-0.078***	-0.024***	-0.067***
		(0.002)	(0.003)	(0.005)	(0.008)
Ad-valorem$_{ijkt}$ × Dvping$_i$		-1.083***	0.470***	-0.564***	0.397***
		(0.053)	(0.104)	(0.210)	(0.152)
Ad-valorem$_{ijkt}$ × Dvped$_i$		-1.452***	-0.569***	-0.148**	-0.706***
		(0.029)	(0.043)	(0.064)	(0.127)
Distance$_{ij}$ × Dvping$_i$		-0.550***	-0.563***	-0.422***	-0.602***
		(0.007)	(0.007)	(0.013)	(0.012)
Distance$_{ij}$ × Dvped$_i$		-0.720***	-0.721***	-0.614***	-0.678***
		(0.004)	(0.004)	(0.007)	(0.010)
Obs.	3569521	3569521	3569521	710812	649644
Under identification			75.90	19.03	23.19
Weak identification			562.89	418.24	89.84
Weak identification p-value			0.00	0.00	0.00
Hausman-Wu test p-value			0.00	0.00	0.00

Notes: The dependent variable is export values of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Per-unit and Ad-valorem stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvped and Dvping abbreviate, respectively, the words developed and developing.

Table A10: Effect of per-unit tariffs on trade quantities (2004 - 2019)

	(1) OLS All	(2) OLS All	(3) 2SLS All	(4) 2SLS High priced	(5) 2SLS Low priced
Per-unit$_{ijkt}$	-0.096***				
	(0.002)				
Ad-valorem$_{ijkt}$	-1.399***				
	(0.025)				
Distance$_{ij}$	-0.733***				
	(0.004)				
Contiguity$_{ij}$	0.982***	0.989***	1.024***	0.673***	0.593***
	(0.010)	(0.010)	(0.012)	(0.022)	(0.025)
Language$_{ij}$	0.285***	0.280***	0.311***	0.388***	0.403***
	(0.007)	(0.007)	(0.009)	(0.015)	(0.021)
RTA$_{ijt}$	0.292***	0.292***	0.309***	0.147***	0.401***
	(0.007)	(0.007)	(0.008)	(0.014)	(0.018)
Per-unit$_{ijkt}$ × Dvping$_i$		-0.117***	-0.042***	0.053***	-0.070***
		(0.003)	(0.007)	(0.012)	(0.012)
Per-unit$_{ijkt}$ × Dvped$_i$		-0.087***	-0.048***	-0.002	-0.056***
		(0.002)	(0.004)	(0.006)	(0.009)
Ad-valorem$_{ijkt}$ × Dvping$_i$		-1.104***	-0.972***	-1.236***	-1.084***
		(0.046)	(0.079)	(0.151)	(0.151)
Ad-valorem$_{ijkt}$ × Dvped$_i$		-1.497***	-0.981***	-0.458***	-1.210***
		(0.028)	(0.045)	(0.057)	(0.140)
Distance$_{ij}$ × Dvping$_i$		-0.607***	-0.625***	-0.379***	-0.673***
		(0.006)	(0.008)	(0.015)	(0.014)
Distance$_{ij}$ × Dvped$_i$		-0.771***	-0.793***	-0.688***	-0.742***
		(0.004)	(0.005)	(0.008)	(0.012)
Observations	5,082,234	5,082,234	3,428,577	656,552	583,212
Under identification			1519.96	4014.47	41.08
Weak identification			11416.47	17454.86	233.98
Weak identification p-value			0.00	0.00	0.00
Hausman-Wu test p-value			0.00	0.00	0.00

Notes: The dependent variable is export values of product *k*, from exporting country *i* to importing country *j* in year *t* All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Per-unit and Ad-valorem stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvped and Dvping abbreviate, respectively, the words developed and developing.

Appendix A4: Full coefficients for results presented in manuscript

In this section, we report the full table of coefficients on the tables reported in the manuscript.

Table A11: Replicating column 2 of Table 1 in Emlinger and Guimbard (2021).

	Push button	Own data	Cluster	Omitted variable	Bilateral-FE	Sub-sample	Extended data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per-unit$_{ijkt}$	0.007***	0.003***	0.003***	0.003**	-0.001	0.001	0.000
× Dvping$_i$	(0.002)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.001)
Per-unit$_{ijkt}$	0.013***	0.009***	0.009***	0.009***	0.004***	0.011***	0.012***
× Dvped$_i$	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ad-valorem$_{ijkt}$	-0.154***	-0.191***	-0.191***	-0.194***	-0.065*	-0.228***	-0.083***
× Dvping$_i$	(0.024)	(0.016)	(0.016)	(0.016)	(0.035)	(0.028)	(0.014)
Ad-valorem$_{ijkt}$	0.031***	0.031***	0.031***	0.032***	-0.001	0.016	0.010
× Dvped$_i$	(0.008)	(0.008)	(0.008)	(0.008)	(0.014)	(0.014)	(0.007)
Distance$_{ij}$	0.071***	0.095***	0.095***	0.119***		0.100***	0.096***
× Dvping$_i$	(0.004)	(0.002)	(0.002)	(0.002)		(0.004)	(0.002)
Distance$_{ij}$	0.091***	0.075***	0.075***	0.097***		0.074***	0.082***
× Dvped$_i$	(0.001)	(0.001)	(0.001)	(0.001)		(0.002)	(0.001)
Contiguity$_{ij}$	-0.090***	-0.118***	-0.118***			-0.123***	-0.120***
	(0.003)	(0.003)	(0.003)			(0.005)	(0.003)
Language$_{ij}$	0.025***	0.018***	0.018***	0.002		0.023***	0.015***
	(0.003)	(0.002)	(0.002)	(0.002)		(0.004)	(0.002)
RTA$_{ijt}$	0.008***	-0.052***	-0.052***	-0.051***	0.023***	-0.056***	-0.053***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.005)	(0.004)	(0.002)
Observations	1,855,975	2,408,092	2,408,092	2,408,092	2,038,191	599,806	3,428,577

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t* All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (1) contains the results of the push-button replication of Emlinger and Guimbard (2021). Column (2) – (6) replicates the original analysis using data that we created from scratch following closely the descriptions provided in the original paper. Column (7) replicates the analysis but extends the data with two more waves in 2016 and 2019. In column (3), we estimate the baseline model but cluster the standard errors at the country-pair level. In all other cases, the standard errors are clustered at the country-pair product level. In column (4), we omit the contiguity variable. In column (5) we include country-pair-product fixed effects. In column (6) we estimate the baseline model on a random sample. Per-unitijkt and Ad-valoremijkt stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvpedi and Dvpingi abbreviate, respectively, the words developed and developing countries.

Table A12: Replicating column 3 of Table 1 in Emlinger and Guimbard (2021).

	Push button	Own data	Cluster	Omitted variable	Bilateral-FE	Sub-sample	Extended data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per-unit_{ijkt}	0.014***	0.007***	0.007***	0.006***	-0.000	0.009***	-0.002
$\times \text{Dvping}_i$	(0.003)	(0.002)	(0.002)	(0.002)	(0.009)	(0.003)	(0.002)
Per-unit_{ijkt}	0.015***	0.005***	0.005***	0.005***	0.003	0.007***	0.008***
$\times \text{Dvped}_i$	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)	(0.001)
Ad-valorem_{ijkt}	-0.122***	-0.160***	-0.160***	-0.159***	-0.035	-0.164***	-0.051**
$\times \text{Dvping}_i$	(0.028)	(0.024)	(0.024)	(0.024)	(0.117)	(0.049)	(0.020)
Ad-valorem_{ijkt}	0.066***	0.110***	0.110***	0.110***	0.011	0.104***	0.114***
$\times \text{Dvped}_i$	(0.011)	(0.013)	(0.013)	(0.013)	(0.024)	(0.023)	(0.012)
Distance_{ij}	0.070***	0.093***	0.093***	0.117***		0.097***	0.095***
$\times \text{Dvping}_i$	(0.004)	(0.002)	(0.002)	(0.002)		(0.004)	(0.002)
Distance_{ij}	0.090***	0.076***	0.076***	0.097***		0.074***	0.082***
$\times \text{Dvped}_i$	(0.002)	(0.001)	(0.001)	(0.001)		(0.002)	(0.001)
Contiguity_{ij}	-0.091***	-0.117***	-0.117***			-0.123***	-0.120***
	(0.003)	(0.003)	(0.003)			(0.005)	(0.003)
Language_{ij}	0.025***	0.018***	0.018***	0.002		0.022***	0.015***
	(0.003)	(0.002)	(0.002)	(0.002)		(0.004)	(0.002)
RTA_{ijt}	0.009***	-0.049***	-0.049***	-0.048***	0.023***	-0.052***	-0.050***
	(0.003)	(0.002)	(0.002)	(0.002)	(0.005)	(0.004)	(0.002)
Observations	1,855,975	2,408,092	2,408,092	2,408,092	2,038,191	599,806	3,428,577

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (1) contains the results of the push-button replication of Emlinger and Guimbard (2021). Column (2) – (6) replicates the original analysis using data that we created from scratch following closely the descriptions provided in the original paper. Column (7) replicates the analysis but extends the data with two more waves in 2016 and 2019. In column (3), we estimate the baseline model but cluster the standard errors at the country-pair level. In all other cases, the standard errors are clustered at the country-pair product level. In column (4), we omit the contiguity variable. In column (5) we include country-pair-product fixed effects. In column (6) we estimate the baseline model on a random sample. Per-unitijkt and Ad-valoremijkt stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvpedi and Dvpingi abbreviate, respectively, the words developed and developing countries.

Table A13: Replicating column 4 of Table 1 in Emlinger and Guimbard (2021).

	Push button	Own data	Cluster	Omitted variable	Bilateral-FE	Sub-sample	Extended data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per-unit_{ijkt}	0.024***	-0.007**	-0.007**	-0.007**	-0.005	-0.007**	-0.008***
$\times \text{Dvping}_i$	(0.007)	(0.003)	(0.003)	(0.003)	(0.022)	(0.003)	(0.002)
Per-unit_{ijkt}	0.014***	0.004***	0.004***	0.004***	0.010	0.004***	0.003***
$\times \text{Dvped}_i$	(0.002)	(0.001)	(0.001)	(0.001)	(0.008)	(0.001)	(0.001)
Ad-valorem_{ijkt}	0.066	0.151***	0.151***	0.152***	1.328	0.151***	0.044
$\times \text{Dvping}_i$	(0.095)	(0.057)	(0.057)	(0.057)	(1.782)	(0.057)	(0.036)
Ad-valorem_{ijkt}	0.043***	0.023	0.023	0.023	0.021	0.023	0.018
$\times \text{Dvped}_i$	(0.014)	(0.015)	(0.015)	(0.015)	(0.056)	(0.015)	(0.014)
Distance_{ij}	0.017	-0.011***	-0.011***	-0.005		-0.011***	-0.013***
$\times \text{Dvping}_i$	(0.011)	(0.004)	(0.004)	(0.004)		(0.004)	(0.003)
Distance_{ij}	0.047***	0.043***	0.043***	0.049***		0.043***	0.048***
$\times \text{Dvped}_i$	(0.003)	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)
Contiguity_{ij}	-0.040***	-0.040***	-0.040***			-0.040***	-0.034***
	(0.006)	(0.004)	(0.004)			(0.004)	(0.004)
Language_{ij}	-0.004	-0.015***	-0.015***	-0.021***		-0.015***	-0.020***
	(0.005)	(0.003)	(0.003)	(0.003)		(0.003)	(0.003)
RTA_{ijt}	-0.009	-0.019***	-0.019***	-0.018***	-0.007	-0.019***	-0.019***
	(0.006)	(0.003)	(0.003)	(0.003)	(0.011)	(0.003)	(0.003)
Observations	180,095	464,621	464,621	464,621	244,354	464,621	656,552

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. Fixed effects included but not reported. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (1) contains the results of the push-button replication of Emlinger and Guimbard (2021). Column (2) – (6) replicates the original analysis using data that we created from scratch following closely the descriptions provided in the original paper. Column (7) replicates the analysis but extends the data with two more waves in 2016 and 2019. In column (3), we estimate the baseline model but cluster the standard errors at the country-pair level. In all other cases, the standard errors are clustered at the country-pair product level. In column (4), we omit the contiguity variable. In column (5) we include country-pair-product fixed effects. In column (6) we estimate the baseline model on a random sample. Per-unitijkt and Ad-valoremijkt stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvpedi and Dvpingi abbreviate, respectively, the words developed and developing countries.

Table A14: Replicating column 5 of Table 1 in Emlinger and Guimbard (2021).

	Push button	Own data	Cluster	Omitted variable	Bilateral-FE	Sub sample	Extended data
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per-unit$_{ijkt}$	0.017	-0.005*	-0.005*	-0.005**	0.005	-0.003	-0.005*
× Dvping$_i$	(0.016)	(0.003)	(0.003)	(0.003)	(0.013)	(0.005)	(0.003)
Per-unit$_{ijkt}$	-0.016	0.001	0.001	0.001	0.011*	0.006*	0.002
× Dvped$_i$	(0.029)	(0.002)	(0.002)	(0.002)	(0.006)	(0.003)	(0.002)
Ad-valorem$_{ijkt}$	0.085	-0.130***	-0.130***	-0.133***	-0.150*	-0.167**	-0.050
× Dvping$_i$	(0.117)	(0.031)	(0.031)	(0.031)	(0.089)	(0.073)	(0.038)
Ad-valorem$_{ijkt}$	-0.099	0.123***	0.123***	0.122***	0.056	0.128***	0.129***
× Dvped$_i$	(0.138)	(0.035)	(0.035)	(0.035)	(0.049)	(0.041)	(0.028)
Distance$_{ij}$	0.045	0.075***	0.075***	0.086***		0.078***	0.080***
× Dvping$_i$	(0.029)	(0.004)	(0.004)	(0.003)		(0.006)	(0.003)
Distance$_{ij}$	0.005	0.056***	0.056***	0.066***		0.056***	0.058***
× Dvped$_i$	(0.021)	(0.003)	(0.003)	(0.003)		(0.005)	(0.003)
Contiguity$_{ij}$	-0.013	-0.053***	-0.053***			-0.054***	-0.056***
	(0.043)	(0.006)	(0.006)			(0.010)	(0.005)
Language$_{ij}$	-0.020	0.014***	0.014***	0.010**		0.018**	0.003
	(0.028)	(0.005)	(0.005)	(0.005)		(0.009)	(0.004)
RTA$_{ijt}$	0.037	-0.029***	-0.029***	-0.030***	0.023***	-0.030***	-0.035***
	(0.030)	(0.004)	(0.004)	(0.004)	(0.009)	(0.007)	(0.004)
Observations	2,165	405,261	405,261	405,261	332,710	99,076	583,212

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (1) contains the results of the push-button replication of Emlinger and Guimbard (2021). Column (2) – (6) replicates the original analysis using data that we created from scratch following closely the descriptions provided in the original paper. Column (7) replicates the analysis but extends the data with two more waves in 2016 and 2019. In column (3), we estimate the baseline model but cluster the standard errors at the country-pair level. In all other cases, the standard errors are clustered at the country-pair product level. In column (4), we omit the contiguity variable. In column (5) we include country-pair-product fixed effects. In column (6) we estimate the baseline model on a random sample. Per-unitijkt and Ad-valoremijkt stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvpedi and Dvpingi abbreviate, respectively, the words developed and developing countries.

Appendix A5: Sensitivity analyses on the extended dataset (2004 – 2019)

Here, we conduct the different sensitivity analyses on the extended version of the dataset

Table A15: Replicating column 1 of Table 1 in Emlinger and Guimbard (2021): 2004 – 2019

	Own data	Cluster	Omitted variable	Bilateral FE	Random sample
	(1)	(2)	(3)	(4)	(5)
Per-unit_{ijkt}	0.009***	0.009***	0.009***	0.004***	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ad-valorem_{ijkt}	-0.006	-0.006	-0.005	0.005	-0.010
	(0.007)	(0.007)	(0.007)	(0.011)	(0.011)
Distance_{ij}	0.085***	0.085***	0.107***		0.085***
	(0.001)	(0.001)	(0.001)		(0.002)
Contiguity_{ij}	-0.121***	-0.121***			-0.122***
	(0.003)	(0.003)			(0.004)
Language_{ij}	0.016***	0.016***	0.001		0.016***
	(0.002)	(0.002)	(0.002)		(0.004)
RTA_{ijt}	-0.053***	-0.053***	-0.052***	0.029***	-0.051***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)
Observations	3,428,577	3,428,577	3,428,577	3,019,074	854,106

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (1) extends the data in Emlinger and Guimbard (2021) with two more waves from 2016 and 2019. In column (2), we estimate the baseline model but cluster the standard errors at the country-pair level. In all other cases, the standard errors are clustered at the country-pair product level. In column (3), we omit the contiguity variable. In column (4) we include country-pair-product fixed effects. In column (4) we estimate the baseline model on a random sample. Per-unitijkt and Ad-valoremijkt stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvpedi and Dvpingi abbreviate, respectively, the words developed and developing countries.

Table A16: Replicating column 2 of Table 1 in Emlinger and Guimbard (2021): 2004 – 2019

	Own data	Cluster	Omitted variable	Bilateral FE	Random sample
	(1)	(2)	(3)	(4)	(5)
Per-unit_{ijkt}	0.000	0.000	-0.000	0.001	-0.000
× Dvping_i	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Per-unit_{ijkt}	0.012***	0.012***	0.012***	0.005***	0.011***
× Dvped_i	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ad-valorem_{ijkt}	-0.083***	-0.083***	-0.081***	0.013	-0.086***
× Dvping_i	(0.014)	(0.014)	(0.014)	(0.027)	(0.024)
Ad-valorem_{ijkt}	0.010	0.010	0.011	0.004	0.005
× Dvped_i	(0.007)	(0.007)	(0.007)	(0.012)	(0.012)
Distance_{ij}	0.096***	0.096***	0.119***		0.095***
× Dvping_i	(0.002)	(0.002)	(0.002)		(0.004)
Distance_{ij}	0.082***	0.082***	0.104***		0.083***
× Dvped_i	(0.001)	(0.001)	(0.001)		(0.002)
Contiguity_{ij}	-0.120***	-0.120***			-0.122***
	(0.003)	(0.003)			(0.004)
Language_{ij}	0.015***	0.015***	0.000		0.015***
	(0.002)	(0.002)	(0.002)		(0.004)
RTA_{ijt}	-0.053***	-0.053***	-0.051***	0.029***	-0.051***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)
Observations	3,428,577	3,428,577	3,428,577	3,019,074	854,106

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects.. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (1) extends the data in Emlinger and Guimbard (2021) with two more waves from 2016 and 2019. In column (2), we estimate the baseline model but cluster the standard errors at the country-pair level. In all other cases, the standard errors are clustered at the country-pair product level. In column (3), we omit the contiguity variable. In column (4) we include country-pair-product fixed effects. In column (4) we estimate the baseline model on a random sample. Per-unit_{ijkt} and Ad-valorem_{ijkt} stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvped_i and Dvping_i abbreviate, respectively, the words developed and developing countries.

Table A17: Replicating column 3 of Table 1 in Emlinger and Guimbard (2021): 2004 – 2019

	Own data	Cluster	Omitted variable	Bilateral FE	Random sample
	(1)	(2)	(3)	(4)	(5)
Per-unit_{ijkt}	-0.002	-0.002	-0.003*	-0.015**	-0.003
× Dvping_{i}	(0.002)	(0.002)	(0.002)	(0.007)	(0.003)
Per-unit_{ijkt}	0.008***	0.008***	0.008***	0.000	0.007***
× Dvped_{i}	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)
Ad-valorem_{ijkt}	-0.051**	-0.051**	-0.047**	0.012	-0.017
× Dvping_{i}	(0.020)	(0.020)	(0.020)	(0.071)	(0.039)
Ad-valorem_{ijkt}	0.114***	0.114***	0.115***	0.002	0.102***
× Dvped_{i}	(0.012)	(0.012)	(0.012)	(0.021)	(0.017)
Distance_{ij}	0.095***	0.095***	0.118***	0.000	0.094***
× Dvping_{i}	(0.002)	(0.002)	(0.002)	(0.000)	(0.004)
Distance_{ij}	0.082***	0.082***	0.104***	0.000	0.083***
× Dvped_{i}	(0.001)	(0.001)	(0.001)	(0.000)	(0.002)
Contiguity_{ij}	-0.120***	-0.120***		0.000	-0.121***
	(0.003)	(0.003)		(0.000)	(0.004)
Language_{ij}	0.015***	0.015***	0.001	0.000	0.016***
	(0.002)	(0.002)	(0.002)	(0.000)	(0.004)
RTA_{ijt}	-0.050***	-0.050***	-0.049***	0.028***	-0.049***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)
Observations	3,428,577	3,428,577	3,428,577	3,019,074	854,106

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects. . Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (1) extends the data in Emlinger and Guimbard (2021) with two more waves from 2016 and 2019. In column (2), we estimate the baseline model but cluster the standard errors at the country-pair level. In all other cases, the standard errors are clustered at the country-pair product level. In column (3), we omit the contiguity variable. In column (4) we include country-pair-product fixed effects. In column (4) we estimate the baseline model on a random sample. Per-unit_{ijkt} and Ad-valorem_{ijkt} stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvped_i and Dvping_i abbreviate, respectively, the words developed and developing countries.

Appendix A6: Oster Bounds

Table A18 presents the bounding sets. For comparison, the baseline estimates, *$\hat{B}$(δ = 0)* are taken from the baseline regressions with controls and included in row (1). Following the recommendation in Oster (2017), we set R_{max} to 1.3×R^2 in rows (2) and (4). In row (3) we set R_{max} to 1 in row (3). We also use different values of delta (δ). Osters approach consistently provide an upper bound to our results in column (1), and lower bounds to our results in columns (2) and (3). All point estimates are statistically significant at the 1% level and the confidence intervals do not contain the value of zero.

Table A18: Robustness of the main effects to selection on unobservables (Oster bounds)

	Push button replication	Pure replication	Extension
	(1)	(2)	(3)
(1). $\hat{B}(\delta = 0)$	0.013***	0.008***	0.009***
	(0.001)	(0.001)	(0.001)
(2). $\beta^*(\delta = 1, R_{max} = 1.3\tilde{R})$	0.016***	0.005***	0.006***
	[0.000]	[0.000]	[0.000]
(3). $\beta^*(\delta\ R_{max} = 1)$	0.184***	0.001***	0.001***
	[0.000]	[0.006]	[0.008]
(4). $\beta^*(\delta = 0.75, R_{max} = 1.3\tilde{R})$	0.156***	0.005***	0.007***
	[0.000]	[0.000]	[0.000]

Notes: Robust standard errors in parenthesis. Standard errors in squared brackets are bootstrapped. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. Estimation is performed with the *psacalc* command by Oster (207) in Stata.

Appendix A7: Sub-sample analysis

In this section, we present the results of the other three sub-samples on which the sub-sample component of the main manuscript is based. To save space, we present the results without the additional steps of separating the samples into high-priced and low-priced goods.

Table A19: Replicating columns 1 - 3 of Table 1 in Emlinger and Guimbard (2021) using different sub-samples (original dataset)

	Sub-sample 2			Sub-sample 3			Sub-sample 4		
	(1) OLS	(2) OLS	(3) 2SLS	(6) OLS	(7) OLS	(8) 2SLS	(11) OLS	(12) OLS	(13) 2SLS
Per-unit$_{ijkt}$	0.013***			0.014***			0.015***		
	(0.001)			(0.001)			(0.001)		
Ad-valorem$_{ijkt}$	0.017			0.025**			0.028**		
	(0.012)			(0.012)			(0.013)		
Distance$_{ij}$	0.088***			0.089***			0.093***		
	(0.002)			(0.002)			(0.002)		
Contiguity$_{ij}$	-0.088***	-0.088***	-0.089***	-0.097***	-0.098***	-0.098***	-0.088***	-0.088***	-0.089***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Language$_{ij}$	0.028***	0.028***	0.028***	0.025***	0.027***	0.027***	0.020***	0.021***	0.021***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
RTA$_{ijt}$	0.009**	0.007	0.008*	0.010**	0.005	0.007	0.017***	0.014***	0.016***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Per-unit$_{ijkt}$ × Dvping$_i$		0.079***	0.078***		0.057***	0.056***		0.071***	0.071***
		(0.007)	(0.007)		(0.007)	(0.007)		(0.007)	(0.007)
Per-unit$_{ijkt}$ × Dvped$_i$		0.089***	0.088***		0.091***	0.090***		0.094***	0.093***
		(0.002)	(0.002)		(0.002)	(0.002)		(0.002)	(0.002)
Ad-valorem$_{ijkt}$ × Dvping$_i$		-0.146***	-0.098*		-0.138***	-0.077		-0.116**	-0.111**
		(0.042)	(0.054)		(0.044)	(0.066)		(0.046)	(0.055)
Ad-valorem$_{ijkt}$ × Dvped$_i$		0.029**	0.056***		0.036***	0.086***		0.037***	0.082***
		(0.013)	(0.017)		(0.013)	(0.017)		(0.013)	(0.019)
Distance$_{ij}$ × Dvping$_i$		0.003	0.009*		0.010***	0.018***		0.014***	0.019***
		(0.003)	(0.004)		(0.004)	(0.005)		(0.004)	(0.005)
Distance$_{ij}$ × Dvped$_i$		0.013***	0.015***		0.014***	0.015***		0.015***	0.018***
		(0.001)	(0.002)		(0.001)	(0.002)		(0.001)	(0.002)
N	462259	462259	462259	462375	462375	462375	462411	462411	462411

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects. Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. Per-unit$_{ijkt}$ and Ad-valorem$_{ijkt}$ stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvped$_i$ and Dvping$_i$ abbreviate, respectively, the words developed and developing countries.

Table A20: Replicating columns 1 - 3 of Table 1 in Emlinger and Guimbard (2021) using different sub-samples (our version of the dataset)

Notes: The dependent variable is FOB export prices of product *k*, from exporting country *i* to importing country *j* in year *t*. All models include exporter-HS2 product-time, importer-time and HS6 product-time fixed effects. Column (4) includes extra columns for country-pair fixed effects. . Standard errors are in parentheses. ***, ** and * denote statistical significance at 1%, 5% and 10%, respectively. Per-unit$_{ijkt}$ and Ad-valorem$_{ijkt}$ stand, respectively, for per-unit tariffs and ad-valorem tariffs. Dvped$_{i}$ and Dvping$_{i}$ abbreviate, respectively, the words developed and developing countries.

	Sample 2	Sample 3	Sample 4	Sample 2	Sample 3	Sample 4	Sample 2	Sample 3	Sample 4
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS	OLS	OLS	OLS	OLS	OLS	2SLS	2SLS	2SLS
Per-unit$_{ijkt}$	0.007***	0.008***	0.008***						
	(0.001)	(0.001)	(0.001)						
Ad-valorem$_{ijkt}$	-0.004	-0.014	0.003						
	(0.011)	(0.011)	(0.011)						
Distance$_{ij}$	0.086***	0.085***	0.085***						
	(0.002)	(0.002)	(0.002)						
Contiguity$_{ij}$	-0.126***	-0.119***	-0.130***	-0.125***	-0.118***	-0.129***	-0.125***	-0.117***	-0.128***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Language$_{ij}$	0.012***	0.018***	0.019***	0.010***	0.016***	0.017***	0.009**	0.015***	0.016***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
RTA$_{ijt}$	-0.059***	-0.063***	-0.062***	-0.057***	-0.061***	-0.059***	-0.053***	-0.057***	-0.057***
	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Per-unit$_{ijkt}$ × Dvping$_{i}$				0.001	0.005***	0.005***	0.006**	0.008***	0.006***
				(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Per-unit$_{ijkt}$ × Dvped$_{i}$				0.009***	0.009***	0.009***	0.010***	0.008***	0.006***
				(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ad-valorem$_{ijkt}$ × Dvping$_{i}$				-0.160***	-0.177***	-0.138***	-0.260***	-0.291***	-0.238***
				(0.021)	(0.022)	(0.022)	(0.049)	(0.049)	(0.051)
Ad-valorem$_{ijkt}$ × Dvped$_{i}$				0.035***	0.028**	0.039***	0.106***	0.090***	0.086***
				(0.012)	(0.012)	(0.012)	(0.023)	(0.024)	(0.022)
Distance$_{ij}$ × Dvping$_{i}$				0.100***	0.097***	0.102***	0.100***	0.097***	0.102***
				(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Distance$_{ij}$ × Dvped$_{i}$				0.082***	0.082***	0.080***	0.081***	0.081***	0.080***
				(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	889,908	889,951	889,867	889,908	889,951	889,867	889,908	889,951	889,867
									0.013

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