

Chowdhry, Sonali; Felbermayr, Gabriel

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ORIGINAL ARTICLE

Trade liberalization along the firm size distribution: The case of the EU-South Korea FTA

Sonali Chowdhry¹  | Gabriel Felbermayr²

¹DIW Berlin, European University Institute & Kiel Institute for the World Economy, Berlin, Germany

²Austrian Institute of Economic Research, Vienna, Austria

Correspondence

Sonali Chowdhry, DIW Berlin, European University Institute & Kiel Institute for the World Economy, Germany.
Email: schowdhry@diw.de

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Abstract

Leading theories suggest that amongst continuing exporters, lower variable trade costs should boost exports of smaller firms by the same or greater percentage rate than larger firms. However, investigating the impact of the deep EU-South Korea FTA with French customs data, we find robust evidence to the contrary. Applying a triple-difference framework, we report that the FTA increased sales in the top quartile of continuous exporters by 71.5% points more than in the bottom quartile. More than 90% of that growth premium is driven by reductions in NTBs. These findings suggest an additional channel driving the distributional effects of FTAs.

KEYWORDS

firm heterogeneity, nontariff barriers, trade policy

JEL CLASSIFICATION

F13, F14

1 | INTRODUCTION

Free trade agreements (FTAs) are regularly criticized for privileging the interests of the largest firms. Such concerns have contributed to public resistance against mega-regional deep FTAs such as the Transatlantic Trade and Investment Partnership (TTIP) and the EU-Canada

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Comprehensive Economic and Trade Agreement (CETA). Since then, policymakers have worked to include chapters in recent FTAs that are dedicated to supporting small enterprises. However, for such provisions to be effective, an improved understanding of the distributional effects of deep FTAs is required.¹

While there is ample research on selection effects from trade liberalization, see, for example, the survey by Melitz and Redding (2014), evidence on the heterogeneous impact of lower tariffs or non-tariff barriers (NTBs) on *continuing* exporters remains scarce. The latter constitutes another, hitherto under-explored channel through which trade liberalization could further increase pre-existing inequality across firms, with implications for labor markets, social welfare, and the design of FTAs.

We address this gap in the literature by examining a prototypical deep trade agreement between the EU and South Korea (EUKFTA) and comparing the magnitude of its effects along the size distribution of incumbent exporters using detailed customs data from France. In examining how gains from such trade liberalization are distributed across firms, we therefore provide additional evidence on the issue raised by Rodrik (2018): “What Do Trade Agreements Really Do?”.

Our baseline result is that the agreement boosted sales of incumbent exporters (i.e., at the intensive margin) in the top quartile of the size distribution by 71.5% points more than firms in the bottom quartile. The result is prominently driven by lower NTBs, but larger firms appear to react more strongly to lower trade costs too.² While the result on the intensive margin is at odds with the standard Melitz (2003) model, our findings on exporter entry and the product-level extensive margin are in line with theory: the FTA does indeed increase the likelihood of export participation by medium-sized firms.

Our key result, therefore, sheds doubt on the frequent assumption that all firms face identical (variable and fixed) trade costs and demand elasticities. Interestingly, leading models that relax one of these assumptions predict the opposite of what we observe. For example, models featuring linear demand systems and endogenous markups such as Melitz and Ottaviano (2008) or Edmond et al. (2015) imply that more productive (and, hence, larger) exporters expand sales by less than their less productive peers when trade costs fall, as they face less elastic demand. Thus, our finding also sheds doubt on the existence of pro-competitive gains from trade generated by the free trade agreement. The finding also contrasts with the predictions of Arkolakis (2010) wherein trade liberalization boosts the sales of larger exporters by lower rates than those of smaller firms due to increasing marginal foreign market penetration costs.

Our intensive margin result would be consistent with a configuration where the FTA lowers trade barriers more strongly for larger firms.³ For instance, it is conceivable that detailed provisions of FTAs such as rules of origin reflect the interests of dominant firms rather than of smaller firms. Alternatively, our result would emerge if larger firms react more strongly to identical trade cost reductions. This would be the case if, unlike in Arkolakis (2010), marginal market access costs are decreasing in sales, or if taking advantage of the FTA entails recurring investment that firms with larger sales find easier to undertake.⁴

The EUKFTA is an excellent case to study the effects of trade liberalization along the firm size distribution. First, the agreement concerns two sizeable advanced economies and was the largest EU FTA in terms of joint market size when it entered into force in 2011.⁵ Second, it is an ambitious agreement that mandated the reduction to zero of 94% of all EU tariff lines and 80% of South Korean tariff lines within the first year. This implies that the size of tariff cuts was primarily determined by the pre-existing level of MFN tariffs, alleviating concerns regarding endogeneity. Third, the EUKFTA is still considered the prototype of a deep trade

agreement with ambitious language on NTBs, both at the sectoral and cross-sectoral levels (Mattoo et al., 2020).

In terms of methodology, we adopt a triple-difference approach that includes the most extensive set of three-way fixed effects to minimize omitted variable bias and other sources of possible endogeneity.⁶ To study the heterogeneous effects of NTB reductions on firms, we employ a novel “umbrella” approach inspired by the gravity literature (Baier & Bergstrand, 2007). Essentially, this amounts to an events-study technique where the application of the FTA is summarized by an indicator variable. This indicator captures *all* trade effects attributable to NTBs, since tariff cuts are precisely observable and their effects can be netted out.⁷ This strategy bypasses the need to measure the wide range of NTBs addressed by the FTA and therefore complements existing literature that uses specific proxies of NTBs (such as concerns raised by countries about technical barriers to trade or sanitary and phytosanitary measures).

Finally, the long panel dimension of French customs data enables us to deal with another methodological challenge—the anticipation of trade liberalization by firms. Official negotiations over the EUKFTA began in 2007, with the FTA entering into force in 2011. To deal with firm anticipation, we compare export performance after the inception of the FTA (2011–2016) to the period prior to official negotiations (2000–2006). In addition, we take an agnostic approach to constructing the control group of countries by including all export markets that are reported in the customs data (besides South Korea).⁸

Our paper is related to several strands of research. First, it extends prior firm-level literature on the impact of trade liberalization by jointly studying the role of tariff and NTB reductions on firms’ trading activities. Earlier work such as Iacovone and Javorcik (2010) on NAFTA and Bustos (2011) on MERCOSUR has examined the impact of tariff reductions on a variety of firm outcomes. NTBs and their impact on firms have also been discussed, although separately, in papers such as Fontagné and Orefice (2018) on technical barriers to trade (TBTs) and Fontagné et al. (2015) on sanitary and phytosanitary (SPS) measures.⁹ Much of this literature has focused on the selection effect (i.e., the extensive margin of trade liberalization) while we have a special interest in *differential* size effects along the intensive margin of continuing exporters.

Our findings also contribute to a small but growing literature that reports the advantages of large firms from NTB reductions; see Fontagné et al. (2020) on border formalities, Carballo et al. (2016) on border entry timings, and Karpaty and Tingvall (2015) on corruption. This paper broadens the analysis to the wide range of NTBs that are addressed by a deep FTA, compares the impact of NTBs to tariffs, and studies the variation in NTB effects over time and across sectors. Although our primary focus lies on FTA effects for incumbent exporters, we also provide an extension for the import side.

Third, we contribute to prior research on the trade effects of the EUKFTA that has so far focused exclusively on aggregate outcomes. In contrast, our findings provide novel insights on firm-level responses to NTB provisions of the EUKFTA. For instance, Lakatos and Nilsson (2017) report an increase of 11.2% in the probability to export and a 10.7% increase in the value of EU exports from the EUKFTA using trade data at the 8-digit product level in a gravity-type model. Jung (2022) uses trade data on manufacturing goods in gravity estimations to show an increase in EU exports from South Korea on average but no significant effect on their imports. Using a CGE with multiple countries, multiple sectors and value chains following Caliendo and Parro (2015), European Commission (2017) examine the general equilibrium effects of the EUKFTA using GTAP data. They find that the agreement increased EU exports to South Korea by 42% relative to the benchmark scenario with no FTA. We are aware of only one existing study that uses firm-level data but only for one month (November 2016) to evaluate the EUKFTA: Kasteng and

Tingvall (2019) use transaction-level import data for Swedish firms and show that they widely use the FTA's tariff provisions and take advantage of over 90% of the potential duty savings within three to four years of the agreement's entry into force.

The rest of the paper is structured as follows. Section 2 provides the necessary background for the EUKFTA and discusses the tariff liberalization and NTB reductions envisioned by the agreement. It describes the customs database used and our measure of firm size. Section 3 sets out our empirical methodology for examining the impact of the agreement along the size distribution and shows baseline results. A range of robustness checks are reported in Section 4. Finally, concluding remarks and policy implications are presented in Section 5.

2 | THE EU-SOUTH KOREA FTA

2.1 | The EU-South Korea FTA as a prototypical “New Generation” FTA

The EUKFTA was the first trade agreement signed by the EU with an Asian economy. Formal negotiations were launched in 2007 and after eight official rounds of talks, the agreement was signed in 2010. Following ratification in respective parliaments, the FTA was applied from July 2011 onwards. Since then, the EUKFTA has become a model for the EU's “new generation” FTAs because of its unprecedented scope, depth, and speed of liberalization. In that, it differs from earlier agreements and is an excellent example of what the literature refers to as a “deep” trade agreement (see Dür et al., 2014; Mattoo et al., 2020). In particular, the commitments under EUKFTA extend beyond tariff reductions to so-called WTO-X provisions covering competition policy, intellectual property rights, and capital mobility. The EUKFTA also features provisions on transparency and regulatory stability aimed at supporting small firms.¹⁰

The agreement led to deep tariff cuts across the board. Upon its implementation in 2011, most industries experienced rapid liberalization with duties completely eliminated. In all, South Korea eliminated nearly 64% of its tariff lines immediately, with another 16% of tariff lines being already duty-free. Approximately 1.8% of tariff lines were phased out over ten years and longer, largely for relatively sensitive products in the agri-food and textiles sectors. As a consequence, for EU exporters, the simple average of South Korean duties fell from 12.1% to 6.2% upon entry in force, and, within five years, the agreement had eliminated 98.7% of duties in trade value for both agricultural and industrial goods (European Commission, 2010).

On the import side, the simple average of the EU's applied MFN tariffs in 2010 stood at 5.1%. With the FTA's implementation, this was reduced, essentially without phase-in, to approximately 0.5% in 2011.¹¹ In our analysis, we use a complete global matrix of applied bilateral tariffs at the HS 6-digit product level that is drawn from Felbermayr et al. (2019). This database includes the phasing-out of tariffs from FTAs and fills in missing MFN tariffs by examining the nearest preceding or succeeding observation.

In comparison to tariffs, the precise measurement of NTBs poses several challenges. This stems from the fact that NTBs group together all frictions to trade other than tariffs and tariff-rate quotas. They include impediments to trade that arise from geographic and historical factors such as distances, cultural norms, languages, and institutional frameworks as well as “behind-the-border” policy measures. The EUKFTA acted upon the latter through a range of provisions. Amongst other trade reforms, South Korea lowered the burden of third-party testing for EU electronics, recognized UNECE as the relevant standard-setting body for motor vehicles, and agreed to policy coordination in SPS and TBT measures. The agreement also featured several

“horizontal” clauses that would benefit all sectors, for example, by improving transparency, availability of information and customs facilitation.¹² In our analysis, we work with an event studies approach to capture the comprehensive effects of NTB reductions.

We use French data spanning 2000–2016 to investigate the agreement. Within the EU, France is amongst the top trade partners of South Korea. In 2016, it accounted for approximately 8.85% of the EU’s total goods exports to South Korea, ranking fourth after Germany (39.40%), UK (11.91%) and Italy (9.06%). France has also widened its trade surplus in goods with respect to South Korea in recent years. This surplus stood at €1.57 billion in 2016, a 45% increase over the trade surplus of €1.08 billion in 2010, the year before the FTA went into effect. Turning to the composition of trade baskets, we note that French exports to South Korea are dominated by manufacturing industries such as machinery, transport, chemicals, and plastics. At a more disaggregated level, manufactured goods such as cars and car parts, other aircraft and aircraft parts, packaged medicines, and electronics capture substantially high shares in overall exports.

2.2 | Data on trade flows

To examine the impact of the agreement on firms, we use customs data from France over the period of 2000–2016 (dataset DGDDI, 2018). These data provide information on export sales and import purchases of French trading firms (denoted by f), disaggregated by destination or source country (d) and product (p) over time (t). Services trade is not included. Since each firm is assigned a unique identifier (“SIREN”), it is possible to follow its export and import activities over time. We aggregate transactions from the monthly to yearly level and products from the 8-digit Combined Nomenclature classification to the 6-digit HS 1992 Classification (to match the tariffs data). Due to changes in the reporting threshold in 2011, we follow Bergounhon et al. (2018) by dropping observations where a firm’s annual exports or imports amount to less than €1000. In all, the customs data cover firms trading in over 5000 products with 194 countries. Note that these data are ideally suited to study the EUKFTA, but their limited time coverage does not allow us to carry out a fair horse race of different EU FTAs.

2.3 | Measuring size

We use the customs data described above to construct a proxy for firm size. In principle, the customs data could be merged with a balance sheet survey of firms that contains more conventional measures of size such as revenue, capital stock, or employment.¹³ However, the balance sheet data has no size information on firms with less than 25 employees. These firms account for more than half of French exporters (Fontagné et al., 2020). For the current analysis, retaining these firms is important as the objective is to study the differential impact of the FTA along the size distribution.

Furthermore, using customs data instead of balance sheet information allows us to define size at the firm-product level, which is not feasible with balance sheet data. Defining firm size at the product level facilitates the estimation of size-specific tariff elasticities since tariffs vary at the product level. For this reason, most of our analysis relies on a firm-product level measure of size. However, we provide sensitivity checks to examine the robustness of results regarding this choice.

Our baseline size measure is defined as the total trade (exports and imports) of a firm across destinations within an HS-6 digit product over the control period (2000–2006), using the GDP deflator (base year 2015) to adjust for price changes and excluding any trade with South Korea.

TABLE 1 Size distribution of exporters (million €).

Destination	Mean	<i>p</i> 25	<i>p</i> 50	<i>p</i> 75	Mean/ <i>p</i> 50
South Korea	38.041	0.062	0.588	5.531	64.708
RoW	1.558	0.005	0.019	0.117	81.358

Note: This table reports summary statistics for our size measure calculated as the (deflated) global trade of a firm in a given HS-6 digit product (excluding trade with South Korea) over the control period spanning 2000 to 2006. It describes the size distribution of firm-product combinations that are exported to South Korea or to the rest of the world (RoW). The 25th, 50th, and 75th percentile of the size distribution are denoted as *p*25, *p*50, and *p*75, respectively.

This definition is based on a time window that ends five years before entry into force of the EUK-FTA and even before negotiations on the agreement began, thereby taking into account the fact that size is endogenous to trade liberalization. Excluding trade with South Korea has the same advantage. Defined in this manner, our size measure is time-invariant. Such a trade-based proxy for size is also supported by prior literature (Fontagné et al., 2020; Melitz & Redding, 2014).¹⁴

To check for the sensitivity of our results to the baseline size measure, we also consider an alternative proxy that is based only on global exports of the firm-product pair in the control period (excluding South Korea). To account for the geographical specialization of the firm following Chaney (2014), we also construct three additional proxies. These are based on aggregating extra-EU trade, intra-EU trade or exports to neighboring economies (Japan and Taiwan) within a firm-product pair over the control period. Finally, we provide robustness checks that vary the levels of product disaggregation by constructing all size measures at the HS-4 digit and HS-2 digit levels.

2.4 | Characteristics of French exporters in South Korea

We next turn toward analyzing the characteristics of French exporters that are present in South Korea. Table 1 reports summary statistics regarding their size and provides a comparison to the remaining exporters in the sample. Within product classes, we find that exporters to South Korea are (on average) nearly 24 times larger than exporters serving other destinations. This becomes more pronounced when looking at median (*p*50) values, with the size of exporters to South Korea being nearly 30 times higher than other firms. Moreover, within those groups, there is a substantial degree of skewness which is lower amongst firms exporting to South Korea. Against the backdrop of existing literature, these results are as expected given the comparably high trading costs resulting from the geographical and cultural distance between France and South Korea.¹⁵

French firms exporting to South Korea also tend to be diversified across destinations and products. For instance, in 2016, a large proportion of these firms exported not only within the EU but also to economies such as the US (72.2%), China (58.2%), and Japan (56.2%). Moreover, out of all firms selling to South Korea in 2016, 19.4% sold two, and 24.6% sold more than two HS 6-digit products to South Korea. Hence, there is ample variation across markets and products within French firms that export to South Korea. This feature of the data enables us to use a broad range of firm fixed effects in our regressions.

Next, quite in line with prior research, we find that multi-product firms, firms serving multiple destinations, and firms serving neighboring markets like Japan and Taiwan are significantly more likely to export to South Korea in the control period (2000–2006). Using simple two-period linear probability panel models, Table B1 in the Appendix B shows that multi-product firms have a

probability of exporting to South Korea that is by about 1.8% higher than that of other firms, multi-destination firms display a premium of 1.1%, and firms exporting to Japan and/or to Taiwan have a 7.4% higher likelihood. The latter observation suggests thinking of Japan and Taiwan as plausible alternative destinations for French exporters to South Korea.

2.5 | Effects of the FTA—First glance at the data

Before estimating difference-in-differences regressions, we first examine the contributions of various margins to overall growth in exports to South Korea. To do this, we follow the methodology proposed by Bernard et al. (2009) and decompose France's exports to South Korea into the (i) unique number of firms; (ii) unique number of products; (iii) average exports per firm-product pair and; (iv) density that is, the fraction of all possible firm-product pairs for which exports are positive. We then compute changes in these margins, where the margins are first averaged across years within the control (2000–2006) and FTA (2011–2016) and then differenced. Finally, we compare exports to South Korea with exports to Japan and Taiwan since they are similarly distant markets that imported comparable baskets of goods from France.¹⁶

Panel A in Figure 1 depicts changes for these various margins between the control and FTA periods. We find that exports to South Korea posted a steep jump following the implementation of the FTA. The contrast with Japan and Taiwan is also striking. Exports to South Korea increased by approximately 29% points, driven by increases in the number of exported firm-product combinations and the average sales per firm-product combination. In subsequent regressions, we expand the control group to include all other countries in the customs data and introduce high dimensional fixed effects in order to account for a wide range of variables that can influence export outcomes such as demand shocks, macroeconomic conditions, firms' market knowledge, and distribution networks.

In Appendix A, we further decompose the change in aggregate exports into the change in sales of continuously exporting firms, entrants, and exiting firms (Figure A2). We find that exports to South Korea in the FTA period were approximately €5.95 billion higher compared to the control period. This is primarily driven by a €7.69 billion increase in the sales of continuous firms. In comparison, firms that newly entered the South Korean market contributed €3.23 billion in additional exports, whereas firms that exited the market led to a decline in sales of €4.97 billion. In Japan and Taiwan, total exports of French firms shrank due to exiting firms.

These preliminary findings indicate that the EUKFTA provided a substantial boost to French exports to South Korea and that the export growth was overwhelmingly driven by continuous exporters that is, firms that had already exported to South Korea in the period before the start of the EUKFTA negotiations. Looking at the set of continuously exported firm-product combinations, the top quartile (Q4) of the size distribution saw an increase in exports to South Korea by 38% (at the median) whereas the bottom quartile Q1 grew by approximately 26% (see panel B of Figure 1).¹⁷ In the following sections, we explore this skewness in export growth and compare the role of tariffs and NTB reductions in generating these growth differentials.

Finally, it is worth noting that tariff cuts are identical for all firms within product categories. Of course, it is perfectly possible that product classes populated by larger firms have experienced larger tariff cuts. Table A2 in Appendix A shows, however, that simple averages of tariff reductions within size classes are not biased in favor of large firms.¹⁸

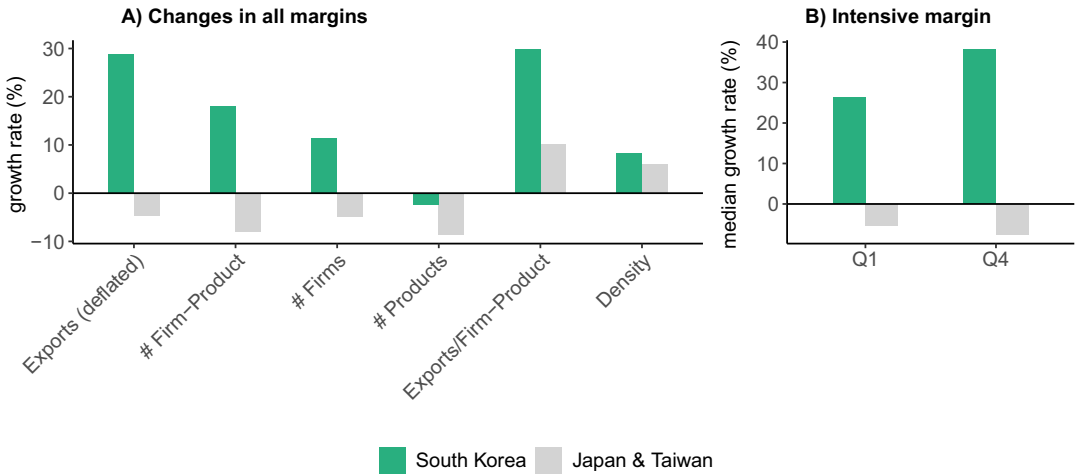


FIGURE 1 Growth in exports from France (Panel A shows the growth rate in various margins of French exports, where the margins are first averaged across years within the control (2000–2006) and FTA periods (2011–2016) and then differenced. Panel B shows the median growth rates in sales of firm-product combinations that were exported in both control and FTA periods to all three destinations (South Korea, Japan and Taiwan). The median growth is computed over all firm-product combinations within the bottom quartile (Q1) and the top quartile (Q4) of the size distribution. In both panels, export values are adjusted by France's GDP deflator drawn from the World Bank Database). [Colour figure can be viewed at wileyonlinelibrary.com]

3 | EMPIRICAL METHODOLOGY AND BASELINE RESULTS

3.1 | Baseline specification

To guide our analysis, we use a simple demand function where exports of a French firm f in product p to a destination d at time t can be written as $X_{fpdt} = A_{pdt}(\mathcal{P}_{fpdt})^{-\eta_{fpd}}$. In this expression, buyers in d face the price \mathcal{P}_{fpdt} ; A_{pdt} is a demand shifter that is common across firms but varies across products, destinations and time and; η_{fpd} is the demand elasticity which we take as time-invariant but specific to the destination and the firm-product combination.

Reflecting firm heterogeneity, the consumer price depends on the factor price p_{fpt} , on tariffs and on NTBs such that $\mathcal{P}_{fpdt} = p_{fpt}\tau_{fpdt}t_{pdt}$ where $\tau_{fpdt} \geq 1$ is an iceberg factor that captures NTBs and $t_{pdt} \geq 1$ is an ad valorem tariff factor which does not vary across firms.¹⁹ Following the gravity literature (see, e.g., Head & Thierry, 2014), we assume that NTBs are affected by FTAs such that $\tau_{fpdt} = \tau_{fpdt}^0 \exp(-\zeta_{fpd}FTA_{dt})$, where τ_{fpdt}^0 corresponds to the base level of NTBs; FTA_{dt} is a dummy variable taking the value one if France has a free trade agreement with country d at time t , and ζ_{fpd} is the associated coefficient. Substituting and taking logs, we obtain the following:

$$\ln X_{fpdt} = \ln A_{pdt} - \eta_{fpd} \ln t_{pdt} - \eta_{fpd} \ln p_{fpt} - \eta_{fpd} \ln \tau_{fpdt}^0 + \eta_{fpd} \zeta_{fpd} FTA_{dt}. \quad (1)$$

The EUKFTA would affect this expression through changes in tariffs (t_{pdt}) and through NTBs as captured by FTA_{dt} . In this framework, the tariff elasticity η_{fpd} measures the effect of changes in trade costs (i.e., of tariffs and non-tariff barriers) whereas ζ_{fpd} measures the change in trade costs following the entry into force of an FTA. Provided with a sound estimate of η_{fpd} , it would be possible to back out ζ_{fpd} . Note, however, that clean identification is difficult, because components

of Equation (1) such as A_{pdt} , p_{fpt} , or τ_{fpdt}^0 are not readily observable. Including appropriate fixed effects is helpful, but risks making identification of ζ_{fpd} impossible.

In this paper, we are interested in the size-specific effects of trade policy. Focusing on the interaction between firm size measures and trade policy variables, we gain degrees of freedom in dealing with unobserved determinants of X_{fpdt} . Following our simple theoretical framework, we adopt a difference-in-differences approach that introduces high dimensional fixed effects that can control for demand shocks A_{pdt} , the producing firm's costs (as reflected by the factory-gate price P_{fpt}) and non-actionable NTBs. Our corresponding specification is as follows:

$$\ln X_{fpdt} = \sum_{k=1}^{K-1} \beta^k (\mathcal{I}_{dt} \times \text{Size}_{fp}^k) + \sum_{k=1}^{K-1} \gamma^k (\ln t_{pdt} \times \text{Size}_{fp}^k) + \sum_{k=1}^{K-1} \delta^k (\mathcal{I}_{dt} \times \ln t_{pdt} \times \text{Size}_{fp}^k) + \mathbf{Z}_{fpdt} \Gamma + \theta_{fpd} + \theta_{fpt} + \theta_{pdt} + \varepsilon_{fpdt}. \quad (2)$$

The dependent variable corresponds to firm exports, aggregated to two periods—a control period (2000–2006) and an FTA period (2011–2016).²⁰ The treatment dummy for the agreement \mathcal{I}_{dt} takes the value of one for South Korea in the FTA period and zero otherwise.²¹ All remaining countries in the data form the control group. Our choice of the control group is hence both expansive and agnostic.

In the baseline, we allocate exporters into K size bins (in robustness checks we also work with a continuous size measure). We interact these size bins with the dummy \mathcal{I}_{dt} , taking the category of the smallest exporters as the base category.²² The associated series of coefficients β^k captures $\eta_{fpd}^k \zeta_{fpd}$ for the k th size category relative to the base category. Hence, we cannot equate size-specific effects $\eta_{fpd}^k \zeta_{fpd}^k$ to β^k .²³ However, it is clear that potential heterogeneity in estimated β^k coefficients can be due to η_{fpd}^k , ζ_{fpd}^k , or both.

We also add size bin interactions with the applied tariff factor t_{pdt} , distinguishing between an average base effect (applying to any change in tariffs) and EUKFTA-specific tariff changes. With the inclusion of tariff controls in the specification and assuming that our fixed effects capture possible changes in preferences and supply-side determinants, the β^k coefficients provide a clean identification of NTB reductions by construction; that is, they capture all effects of the FTA on firm exports across the size distribution net of tariffs. This allows us to interpret the β^k coefficients as the “catch-all” effect of NTB reductions for a size class. In robustness checks, we additionally control for MFN tariffs at the destination (as a proxy for preference margins) to account for potential heterogeneity in preference utilization along the firm size distribution.

Therefore, our empirical methodology as outlined above departs from prior literature by circumventing the need to define and construct proxies for the wide variety of horizontal and sector-specific NTBs that restrict cross-border trade. This is particularly relevant in the case of deep agreements such as the EUKFTA, whose provisions span a large number of behind-the-border issues. This approach also aligns with our main focus—that of examining size heterogeneity from NTB reductions and not on the narrower issue of the agreement's implementation, which requires computing the precise cuts in different NTBs such as SPS, TBT, or red tape that were achieved by the FTA. Moreover, the β^k coefficients in this specification extend beyond policy-driven NTBs as, amongst other things, they also capture the trade effects of reductions in uncertainty.

Given that the control group includes all destinations except South Korea, we additionally control for other agreements signed by the EU in Equation (2). This is incorporated in \mathbf{Z} which is a vector of interactions between the various size bins and a dummy variable that takes the value

of one in the second period for all other countries with which the EU implemented FTAs after the control period.²⁴ Moreover, \mathbf{Z} includes interactions between these other FTAs, tariffs and size bins to account for any changes in tariff elasticities brought about by other agreements along the firm size distribution. Together, these terms account for any firm-specific demand or supply shocks affecting exports in the control group of countries. We prefer this specification over excluding the EU's new FTA partners from the control group as the latter approach may bias the estimates of fixed effects and thus, contaminate the estimation of main effects as well. However, we also test the sensitivity of our results to dropping these other FTA partners.

Our preferred specification includes the richest possible set of fixed effects (firm-product-destination, firm-product-time, and product-destination-time) such that the β^k coefficients can still be identified. These fixed effects control for variation in trade margins that could stem from factors other than the FTA such as demand-side shocks, changes in distribution networks, management practices or firm abilities amongst other influences. A causal interpretation of β^k coefficients therefore relies on the relatively weak assumption that θ_{pdt} and θ_{fpt} fixed effects capture any omitted variables relating to demand-side and supply-side shocks, respectively. Moreover, the inclusion of firm-product-destination fixed effects addresses potential concerns regarding the endogeneity of tariff reductions, similar to the Baier and Bergstrand (2007) solution of including country-pair fixed effects in structural gravity estimations.

Given the two-period structure and set of fixed effects in the model, our underlying sample for the intensive margin comprises of continuous exporters—that is, firm-product-destination triplets that appear at least once in both the control and FTA periods. As such, identification is based purely on variation over time in the intensive margin of firms' exports. However, when analyzing the extensive margin, we do enlarge the estimation sample by including firm-product combinations that either entered or exited a given destination during the sample period. In all, the sample comprises of 8,143,349 firm-product-destination triplets, of which 11.8% are continuously exported, 38.7% are entrants and 49.4% are exiters.²⁵

Looking at continuous exporters in Table 2, we find that these occupy the upper tail of the size distribution being more than four times larger than either entrants or exiters (at the mean). The picture is more pronounced when looking at median values, with continuous exporters being 13 times larger than entrants and 20 times larger than exiters. However, even within this set, there is considerable heterogeneity, as can be observed with cutoff values of size across quartiles. It is this variation that we exploit for our baseline specification concerning the intensive margin. These continuous exporters are also key drivers of France's exports to South Korea, accounting for nearly 60% and 80% of total exports to that market in the control and FTA period, respectively.

An important aspect of our econometric strategy is that the estimated coefficients only indicate the *relative* effects of NTB liberalization, that is, relative to the chosen reference category.

TABLE 2 Summary statistics on size (in million €).

Variable	Mean	p25	cp50	p75	Mean/p50
Continuous	90.525	0.392	3.145	21.462	28.78
Entrant	17.118	0.029	0.237	2.086	72.22
Exiter	21.239	0.016	0.153	1.696	138.93

Note: Summary statistics are grouped by type of exporter: those that are present in a given destination in both periods (control and post-FTA), those that enter only in the post-FTA period and those that are present in the control but exited in the post-FTA period. Size is measured based on global trade of a firm (excluding South Korea) within HS-6 digit product over the control period (2000–2006). The 25th, 50th, and 75th percentile of the size distribution are denoted as $p25$, $p50$, and $p75$, respectively.

They do not reflect the aggregate impact of the agreement on French exports, for which one would need a structurally estimated model and which has already been examined in previous literature (see Jung, 2022; Lakatos & Nilsson, 2017). Instead, our focus is on the *differential* impact of NTB reductions on firms' intensive margin along the size distribution.²⁶ Moreover, any unobservable variables relating to incumbent exporters to South Korea are captured by including firm-product-destination fixed effects. This fixed effect also reduces endogeneity risks by dropping firms that may have lobbied for the FTA and then entered the South Korean market in the post-FTA period. Moreover, by measuring size using trade flows (excluding trade with South Korea) in the control period, we also shut down another potential channel for reverse causality.

3.2 | Baseline results for the intensive margin

We report results on the intensive margin in Table 3. In both these estimations, we compare exporters belonging to different quartiles of the size distribution to those in the bottom quartile (Q1, the excluded category). Estimates of size-specific β , γ , and δ coefficients are shown in the upper, middle, and lower sections of Table 3, respectively. Standard errors are clustered by firm, product, and destination.²⁷

The most rigorous and our preferred specification following Equation (2) is reported in column (1). The estimates of β coefficients show that the increase in exports due to the FTA is greatest for exporters in the top quartile (Q4) of the size distribution. In fact, Q4 exporters grew their sales to South Korea by approximately 67% points more relative to those in the bottom quartile. Since we net out the effects of tariffs, we attribute this change to reductions in the costs of NTBs. This higher export growth due to NTB reductions is observed to operate through the quantity channel rather than prices, as can be seen in Table B3 of Appendix B. The regression result also reveals a monotonic pattern: the relative increase in exports due to the NTB reductions continuously falls as size shrinks. These coefficients are not only statistically significant from zero but differ from each other based on Wald tests as well.²⁸

Moreover, column (1) reveals that Q4 exporters also react more strongly to tariff reductions (γ coefficients). For exporters belonging to the top size category, the absolute value of the tariff elasticity is by the amount 1.1 larger than for exporters in the bottom size bin. Exporters in other size categories do not appear to react differently to the smallest exporters to tariff cuts. The final three lines in Table 3 show estimates of δ coefficients. There is no strong evidence that changes of tariffs in the EUKFTA produced any different size-specific effects than changes of tariffs arising in other contexts.²⁹ Overall, the results in column (1) indicate that larger French exporters have increased exports to South Korea by more than smaller exporters along the intensive margin, with the boost from lower NTBs declining with size. Only the largest firms exhibit higher tariff elasticities, so that, relative to small exporters, the stronger responses of exporters in the second and third quartiles of the size distribution can be attributed to NTB reductions. This pattern holds even when we restrict the control group by excluding all other countries with which the EU signed FTAs after 2006 (see column (1) in Table B5 in Appendix B).

In column (2) of Table 3, we drop tariffs in order to examine the combined effect of the FTA (tariffs and NTBs) on incumbent exporters of differing sizes. As before, the positive impact of the FTA on the intensive margin is magnified for larger incumbents, with sales of top quartile exporters in South Korea growing by 71.5% points more than of those of bottom quartile exporters. Comparing to column (1), we conclude that more than 90% of the size advantage of top quartile exporters is due to NTBs; their stronger reaction to tariff cuts playing only a minor role.³⁰

TABLE 3 Impact of EUKFTA on firm-level outcomes by size quartiles.

Dependent variable	ln(exports)	
Model	(1)	(2)
$I \times Q2$	0.370** (0.154)	0.377** (0.155)
$I \times Q3$	0.564*** (0.138)	0.561*** (0.143)
$I \times Q4$	0.670*** (0.144)	0.715*** (0.149)
$\ln t \times Q2$	0.171 (0.339)	
$\ln t \times Q3$	-0.276 (0.318)	
$\ln t \times Q4$	-1.096*** (0.412)	
$I \times \ln t \times Q2$	0.702 (0.869)	
$I \times \ln t \times Q3$	-1.671* (0.859)	
$I \times \ln t \times Q4$	-1.271 (0.980)	
Observations	1,758,070	1,758,070
R^2	0.919	0.919

Note: The table above reports regression results for the impact of the EUKFTA along the intensive margin. I is a dummy variable that takes the value of one for French exports to South Korea from 2011 onward and the value of zero otherwise. Here t denotes product-level ad valorem tariff factors. Column (1) contains our baseline results for the intensive margin following the specification in Equation (2). In column (2), we drop the interaction terms with tariffs. The estimations rely on our baseline size measure while tariffs are defined at the product-destination-time level. To focus on the intensive margin, only continuous exporters are retained that is, firm-product combinations that report positive exports to a given destination in both the control period (2000–2006) and the FTA (2011–2016) period. Standard errors are clustered by firm, product, and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

Our baseline result on the FTA's intensive margin effects is at odds with the workhorse Melitz (2003) model which implies that larger incumbent exports react with similar rates to trade cost changes than smaller ones. This result emerges from the assumption of identical trade cost structures for small and large firms, and/or identical reductions in trade costs, and/or identical elasticities of demand. Our result not only suggests that these assumptions may be problematic but that popular frameworks which depart from the Melitz (2003) assumptions, such as the one by Melitz and Ottaviano (2008) or Edmond et al. (2015) which allow for variable elasticities of demand, or by Arkolakis (2010) which endogenizes foreign market access costs have counterfactual implications, too, since they predict advantages for smaller incumbent exporters. Before

discussing possible model modifications, however, we first examine the effect of the EUKFTA along the extensive margins.

3.3 | Market entry and product diversification

Although our focus is on the impact of NTB reductions on the intensive margin of exports, our data does permit us to examine two additional margins—firm entry into exporting and the diversification of export baskets following the agreement. We do so by retaining the two-period structure of our baseline model but moving the analysis to the firm-destination-time dimension as shown by Equation (3) below.

Now, the dependent variable Y_{fdt} corresponds to either a dummy variable for a firm's exporting status or the number of products exported to a given destination d at time t . Correspondingly, we move our size measure from the firm-product to the firm-wide level by aggregating imports and exports across all products traded by a firm in the control period with all countries except South Korea. In this case, tariffs are averaged across products at the destination-time level and interacted with size bins. The vector of controls \mathbf{Z} includes interaction terms between size bins and a dummy that takes the value of one in the second period for all other countries with which the EU signed FTAs after 2006.³¹

$$Y_{fdt} = \sum_{k=1}^{K-1} \beta^k (\mathcal{I}_{dt} \times \text{Size}_f^k) + \sum_{k=1}^{K-1} \gamma^k (\ln t_{dt} \times \text{Size}_f^k) + \mathbf{Z}_{fdt} \Gamma + \theta_{fd} + \theta_{ft} + \theta_{dt} + \varepsilon_{fdt}. \quad (3)$$

These regressions include all possible fixed effects such that the β^k coefficients can still be estimated. The results are reported in Table 4. In the case of firm entry, identification is based only on entrants and exiters as the dependent variable does not vary for continuous exporters to a given destination. In contrast, when examining adjustments to the product basket, only those firms are retained which exported in both periods to a given destination.

To allow for better comparison across margins when using the same firm-wide measure of size, we also report estimates for export revenues in column (1) of Table 4. These align with baseline results indicating higher β coefficients for larger exporters. Interestingly, size heterogeneity in tariffs disappears when we employ a firm-wide measure that aggregates over all the products. This indicates that the proper estimation of size-specific tariff elasticities requires size to vary at the product level. For larger exporters to benefit more from tariff cuts, it is crucial that they are large in the product categories affected by the cuts and hence, the size obtained from selling other goods does not help. One conclusion from this result is that it may well be costs associated with abiding by product-specific rules of origin that drive the size patterns observed in column (1).

Focusing on the product margin in column (2), we observe that NTB reductions under the EUKFTA did not generate any discernible size effects although higher quartile firms do respond more to tariff cuts. Finally, in the case of firm entry in column (3), we find a negative β^k coefficient for the largest firms. This implies that NTB reductions induced new firms into exporting to South Korea which tended to be smaller than firms exiting the market following liberalization. This can also be seen when comparing density plots of firm sizes between continuously exporting firms to South Korea, entrants, and exiters (see Figure A4 in Appendix A). We also find that the intermediately sized exporters had higher tariff elasticities for the entry margin than smaller firms, confirming the predictions of the Melitz (2003) model on selection into exporting from the middle of the size distribution.

TABLE 4 Export revenues, product diversification and market entry.

Dependent variables	ln(exports)	ln(products)	Exporter(0,1)
Model	(1)	(2)	(3)
$I \times Q2$	0.232 (0.142)	0.064 (0.941)	0.032* (0.016)
$I \times Q3$	0.450*** (0.136)	0.073 (0.180)	-0.004 (0.036)
$I \times Q4$	0.523*** (0.139)	0.062 (0.067)	-0.037** (0.014)
$\ln t \times Q2$	0.119 (0.204)	-0.496 (0.368)	-0.401*** (0.104)
$\ln t \times Q3$	-0.173 (0.233)	-1.089*** (0.360)	-0.466*** (0.104)
$\ln t \times Q4$	-0.092 (0.204)	-0.951** (0.421)	0.043 (0.151)
Observations	1,758,070	798,129	2,381,415
R^2	0.919	0.865	0.654

Note: The table reports results for the impact of the EUKFTA on export revenues, size of the product basket, and market entry. I is a dummy variable that takes the value of one for French exports to South Korea from 2011 onward and zero otherwise. Column (1) provides results following the specification in Equation (2) while (2)–(3) follow Equation (3). Across these regressions, size is computed at the firm-wide level (aggregating across products). In columns (2) and (3), tariffs are averaged across products within a given destination and time period. Standard errors are clustered by firm, product, and destination in column (1) and by firm and destination in columns (2) and (3).

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

To summarize our results across these margins, we find that NTB reductions strongly favor large firms along the intensive margin, whereas the effect is absent for the product margin. In the case of the firm entry margin, our findings closely follow the patterns of Melitz (2003) models. One approach to reconciling theory with data would be to allow for a correlation between exogenous cuts in variable trade costs and firm size. Another approach would be to assume the opposite as Arkolakis (2010), namely, that the marginal foreign market access costs are declining in market share and that the FTA lowers the level of entry costs for all firms. Such a structure could generate firm entry from the middle of the size distribution and, at the same time, higher growth rates by the largest firms.³² Such assumptions may be rationalized by the fact that larger firms have the capacity to plan and invest toward better leveraging of the benefits of the agreement for example, by hiring specialized consultants and lawyers to meet testing, certification and complex rules of origin requirements.

4 | ROBUSTNESS CHECKS AND ADDITIONAL RESULTS

In this section, we describe several robustness checks to our key result: that larger incumbent exporters gained more from NTB reductions under the EUKFTA than smaller exporters along the intensive margin. As there is no statistically significant change in tariff elasticities following

TABLE 5 Impact of EUKFTA with varying definitions of size.

Dependent variable	ln(exports)				
	Trade			Exports	
Size measure	Global	Extra-EU	Intra-EU	Global	Neighbors
Model	(1)	(2)	(3)	(4)	(5)
$I \times Q2$	0.370** (0.154)	0.268* (0.139)	0.291*** (0.092)	0.806*** (0.164)	0.174*** (0.066)
$I \times Q3$	0.564*** (0.138)	0.536*** (0.131)	0.257*** (0.086)	0.906*** (0.161)	0.208*** (0.078)
$I \times Q4$	0.670*** (0.144)	0.644*** (0.135)	0.384*** (0.093)	1.140*** (0.159)	0.307*** (0.099)
$\ln t \times Q2$	0.171 (0.339)	0.444 (0.355)	-0.179 (0.234)	0.068 (0.333)	-0.105 (0.267)
$\ln t \times Q3$	-0.276 (0.318)	0.511* (0.299)	-0.859*** (0.263)	-0.198 (0.316)	-0.415 (0.338)
$\ln t \times Q4$	-1.096*** (0.412)	0.254 (0.326)	-1.824*** (0.410)	-1.239*** (0.433)	-0.696* (0.391)
Observations	1,758,070	1,652,294	1,564,004	1,758,022	873,420
R^2	0.919	0.917	0.918	0.919	0.920

Note: Regression results are based on Equation (2) where the dependent variable is exports at the firm-product-destination level aggregated to two periods: 2000–2006 and 2011–2016. I is a dummy variable that takes the value of one for French exports to Korea from 2011 onwards and the value of zero otherwise. Variable t denotes product-level ad valorem tariff factors. In each column, size is defined differently within a given firm and HS-6 digit product combination. Using data only from the control period (2000–2006) and excluding trade with South Korea, these size measures are: global trade within the firm-product pair (column (1), baseline measure); extra-EU trade in column (2); intra-EU trade in column (3); global exports in column (4); and exports to the neighboring economies of Japan and Taiwan in column (5). Since regressions include firm-product-destination fixed effects, only continuously exported varieties are retained that is, varieties that have positive exports in a given destination for each of the two periods. Standard errors are clustered by firm, product, and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

the EUKFTA, we report only the general tariff elasticities (while the regressions do include FTA-specific terms).

4.1 | Alternative size measures

One concern may be that our findings depend on the definition of “size”. We investigate this in Table 5 where each column corresponds to a different proxy of size. For reasons of comparison, column (1) replicates column (1) of Table 3 using our baseline measure; see Section 2.3. Column (2) defines size based on extra-EU trade only to capture the advantage obtained by selling overseas. Column (3) defines size based on intra-EU trade as this provides us with a proxy of the domestic performance of French exporters. In the final two columns, we define size based only on exports of a firm within a product, either to all destinations excluding South Korea or to the neighboring

TABLE 6 Interactions with exporting experience over 2000–2006.

Dependent variable	ln(exports)		
Experience	>1 year	>3 years	7 years
Model	(1)	(2)	(3)
$I \times experience$	0.436** (0.180)	0.171** (0.080)	0.115** (0.051)
$\ln t \times experience$	−0.911 (0.612)	−1.12*** (0.329)	−1.11*** (0.237)
Observations	1,758,070	1,758,070	1,758,070
R^2	0.918	0.918	0.918

Note: Regressions are based on Equation (2), where the dependent variable denotes exports at the firm-product and destination level aggregated to two periods: 2000–2006 and 2011–2016. Experience is a dummy that takes the value of one for firm-product combinations that were exported more than once (column 1), more than three years (column 2), and in all years (column 3) in the control period (2000–2006). Standard errors are clustered by firm, product, and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

economies of Japan and Taiwan. In constructing these various size measures, we therefore additionally account for the potential geographical specialization of firms that may sell to customers that are closer to their existing partners following Chaney (2014).³³

We observe that across these various proxies, the size hierarchies in β coefficients are confirmed, indicating that experience in both domestic and foreign markets is relevant for leveraging NTB reductions. Note that the magnitude of the coefficients declines in some cases, for example when using the measure based on exports to neighboring partners (Japan and Taiwan). In this case, we find that the top quartile exporters increase sales to South Korea by approximately 30.7% points more than the bottom quartile due to NTB cuts. This is a lower premium compared to column (1), since the sample and skewness of the size distribution reduce substantially with this measure.

Finally, we also consider the length of exporters' experience as a relevant proxy for their productivity. To test this, we replace size bins in Equation (2) with *experience*, a dummy based on the number of years the exporter was active in foreign markets over the control period (2000–2006). Table 6 reports the results of this robustness check. The positive and statistically significant coefficients on $I \times experience$ confirm our prior that experienced exporters gained more from NTB cuts delivered by the EUKFTA. Consistent exporters with more than three years of experience also react more to tariff reductions more generally.

4.2 | Alternative binning strategies

We also test the sensitivity of our results to the choice of the reference group. Therefore in Table 7, we split the size distribution into terciles instead of quartiles and take intermediate-sized exporters as the reference category. Across various size measures, we find positive and statistically significant β coefficients for exporters belonging to the highest tercile ($bin = 3$). Thus, large firms experience higher export growth from NTB reductions relative to not only the smallest firms but also relative to exporters in the middle of the size distribution. Results are similar if we split the

TABLE 7 Intermediate exporters as base category

Dependent variable	ln(exports)				
	Trade			Exports	
	Global	Extra-EU	Intra-EU	Global	Neighbors
Size measure					
Model	(1)	(2)	(3)	(4)	(5)
$I \times \text{bin} = 1$	−0.302** (0.120)	−0.144 (0.113)	−0.148** (0.068)	−0.556*** (0.136)	0.001 (0.057)
$I \times \text{bin} = 3$	0.223*** (0.051)	0.306*** (0.050)	0.082* (0.045)	0.236*** (0.057)	0.184*** (0.052)
$\ln t \times \text{bin} = 1$	0.082 (0.242)	−0.197 (0.239)	0.581** (0.241)	−0.124 (0.263)	−0.030 (0.242)
$\ln t \times \text{bin} = 3$	−0.961*** (0.269)	−0.166 (0.247)	−1.228*** (0.311)	−0.908*** (0.295)	−0.497*** (0.188)
Observations	1,758,070	1,652,294	1,564,004	1,758,022	873,420
R^2	0.919	0.917	0.918	0.919	0.920

Note: The table above reports regression results for the impact of the EUKFTA along the intensive margin following the specification in Equation (2). Firm size is defined within the HS-6 digit product class and split into terciles, where the median ($\text{bin} = 2$) is taken as the base category. Across columns, size is defined alternatively as global trade, extra-EU trade, intra-EU trade, global exports, and neighboring market (Japan/Taiwan) exports of the firm-product pair in the control period (2000–2006). Standard errors are clustered by firm, product and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

size distribution into quintiles instead and take the median as the reference group (see Table B7 in Appendix B).

A second concern may be that our results are affected by the level of product disaggregation. We examine this issue by measuring the size of a firm within a product class defined alternatively at the HS-4 digit or HS-2 digit levels instead of at the HS-6 digit level. Correspondingly, the new size bins are defined across exporters within the HS-4 digit or HS-2 digit category. Results are reported in Tables B8 and B9 in Appendix B. We find that our results largely hold despite these changes to the level of disaggregation.

So far, our regressions make use of size bins, such that we do not have to assume any functional form linking effects with firm size measures. One alternative would be a linear specification, where we interact the EUKFTA dummy with the log of a continuous measure of size. We report the results of this exercise in Table 8. The estimates reveal that increasing the size of an exporter by 1% increases additional exports to South Korea by 0.082%. Furthermore, tariff cuts continue to have a stronger effect for larger firms, but the relative relevance of NTBs still dominates.³⁴

Finally, we test whether our baseline results are driven by the presence of a few very large firms. To do so, we replicate our preferred specification in column (1) of Table 3 but drop the top 1%, 5%, and 10% of exporters and redefine size bins accordingly on the remaining sample (see Table B10 in Appendix B). Similar to our main result, we find that the advantage from size is consistently observed not only for NTB reductions but also for the average base effect of tariff cuts in the case of the top quartile firms. However, size-specific tariff elasticities diminish with the exclusion of an increasing number of large exporters.

TABLE 8 Interactions with log size measure.

Size measure	ln(exports)				
	Trade			Exports	
	Global	Extra-EU	Intra-EU	Global	Neighbors
Model	(1)	(2)	(3)	(4)	(5)
$I \times \ln(\text{size})$	0.082*** (0.009)	0.087*** (0.016)	0.048*** (0.011)	0.092*** (0.009)	0.045* (0.026)
$\ln t \times \ln(\text{size})$	-0.231*** (0.063)	-0.070 (0.083)	-0.315*** (0.070)	-0.258*** (0.066)	-0.116 (0.083)
Observations	1,758,070	1,652,294	1,564,004	1,758,022	873,420
R^2	0.919	0.917	0.918	0.919	0.920

Note: The table above reports regression results for the impact of the EUKFTA along the intensive margin following the specification in Equation (2). Firm size is defined within a product class and tariffs at the product-destination-time level. Columns report results when using the log value of our default size measure. Standard errors are clustered by firm, product, and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

4.3 | Additional tariff controls

By explicitly controlling for product-specific tariffs in our specifications, we argue that the EUKFTA dummy captures the effect of all NTB cuts generated by the agreement. However, the dummy may also reflect potential heterogeneity in the utilization of preferential tariffs along the firm size distribution as in Krishna et al. (2021). To control for this channel, we now introduce another set of interaction terms between the EUKFTA dummy, MFN tariffs, and size bins.³⁵ The results are reported in Table 9. The size hierarchies in β coefficients remain largely robust to this change and even become pronounced in columns (1)–(4) when compared to estimates without MFN tariff interactions (Table 5).

An alternative approach to examining the impact of NTB reductions on the intensive margin of exports is shown in Table 10. By exploiting the tariff schedule of South Korea under the FTA, we split the sample into exports of goods that were already duty-free in South Korea in 2010 (MFN = 0), those that became duty-free upon entry into force of the agreement (EIF), and goods whose tariffs were set to be gradually phased out by South Korea over three, ten or more than ten years.³⁶ In the particular case of goods that were already duty-free in the control period, we can then attribute the estimated FTA effects to NTB reductions.³⁷

Looking at the first column in Table 10, we observe that the exports of already duty-free goods grew more for larger firms than smaller firms following the FTA. Since South Korea applied no tariffs on these products prior to the agreement, we can be certain that the β^k coefficients capture size-specific elasticities from NTB reductions. The effect is particularly strong for the top quartile firms. The size premium in export growth from NTB cuts is also present for goods with short tariff phase-outs as seen in columns (2) and (3) and only disappears for sensitive agri-foods where tariffs (and potentially NTBs) are cut only over ten years or longer. The lower panel of Table 10 reports general (i.e., not EUKFTA-specific) size-dependent tariff elasticities. The results confirm that larger firms tend to react more strongly to changes in trade costs.³⁸

TABLE 9 Introducing triple interactions with MFN tariffs.

Dependent variable	ln(exports)				
	Trade			Exports	
	Global	Extra-EU	Intra-EU	Global	Neighbors
Model	(1)	(2)	(3)	(4)	(5)
$I \times Q2$	0.476* (0.248)	0.327 (0.278)	0.146 (0.172)	0.880*** (0.287)	-0.175 (0.150)
$I \times Q3$	0.670*** (0.218)	0.570** (0.261)	0.260* (0.149)	1.054*** (0.253)	0.081 (0.116)
$I \times Q4$	0.934*** (0.218)	0.817*** (0.258)	0.454*** (0.141)	1.449*** (0.256)	0.206 (0.125)
$\ln t \times Q2$	0.165 (0.341)	0.442 (0.356)	-0.171 (0.235)	0.070 (0.334)	-0.061 (0.265)
$\ln t \times Q3$	-0.284 (0.320)	0.512* (0.299)	-0.861*** (0.262)	-0.206 (0.321)	-0.401 (0.337)
$\ln t \times Q4$	-1.117*** (0.416)	0.242 (0.328)	-1.832*** (0.410)	-1.259*** (0.438)	-0.685* (0.391)
$I \times \ln t \times Q2$	2.406 (3.066)	0.041 (3.700)	-3.787 (2.508)	-0.051 (3.565)	-7.548*** (2.694)
$I \times \ln t \times Q3$	-0.009 (2.954)	-1.570 (3.982)	-2.157 (1.993)	1.341 (3.441)	-3.188* (1.733)
$I \times \ln t \times Q4$	3.094 (2.976)	0.879 (3.903)	-1.018 (2.018)	3.757 (3.328)	-3.490** (1.696)
$I \times \ln t_{mfn} \times Q2$	-1.584 (2.851)	-0.999 (3.351)	2.328 (2.068)	-1.178 (3.416)	5.643** (2.386)
$I \times \ln t_{mfn} \times Q3$	-1.587 (2.758)	-0.673 (3.172)	-0.062 (1.696)	-2.330 (3.274)	2.122 (1.556)
$I \times \ln t_{mfn} \times Q4$	-4.103 (2.700)	-2.836 (3.077)	-1.096 (1.534)	-4.844 (3.188)	1.721 (1.450)
Observations	1,758,070	1,652,294	1,564,004	1,758,022	873,420
R^2	0.919	0.917	0.918	0.919	0.920

Note: Regression results build on Equation (2) by introducing additional interaction terms between the EUKFTA dummy (I_{dt}), MFN tariffs at the export destination ($\ln t_{mfn}$) and size quartiles. Standard errors are clustered by firm, product and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE 10 Impact of EUKFTA across tariff staging categories

Dependent variable	ln(exports)				
Category	MFN = 0	EIF	3 years	10 years	11+ years
Model	(1)	(2)	(3)	(4)	(5)
$I \times Q2$	0.974** (0.400)	0.296 (0.184)	0.281 (0.402)	-0.050 (0.261)	0.661 (0.699)
$I \times Q3$	1.005*** (0.346)	0.545*** (0.173)	0.740** (0.344)	-0.062 (0.202)	-0.075 (0.491)
$I \times Q4$	1.472*** (0.306)	0.654*** (0.175)	0.740** (0.336)	0.035 (0.241)	-0.467 (0.543)
$\ln t \times Q2$	-3.654** (1.419)	0.652 (0.552)	-1.940** (0.833)	0.954 (1.227)	0.181 (1.666)
$\ln t \times Q3$	-3.448** (1.419)	0.048 (0.414)	-1.592** (0.736)	0.364 (1.053)	0.526 (1.221)
$\ln t \times Q4$	-4.744*** (1.425)	-0.679 (0.477)	-2.801*** (0.754)	-0.265 (1.068)	-0.962 (1.062)
Observations	191,936	893,520	252,892	224,251	43,156
R^2	0.924	0.919	0.908	0.916	0.926

Note: Regression results are based on the specification provided by Equation (2). Using the tariff schedule of South Korea, the sample is split into exports of goods that were already duty-free in 2010 (MFN = 0), those that became duty-free upon entry into force of the agreement (EIF), and goods whose tariffs were set to be gradually phased out by South Korea over three, ten or more than ten years. I_{dt} is a dummy that takes the value one for South Korea in the FTA period (2011–2016) and zero otherwise. Standard errors are clustered by firm, product, and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

In an additional robustness exercise, we split the sample by levels of South Korean MFN tariffs in the control period to examine potential relationships between preference margins and heterogeneity in tariff elasticities (Table B11 in Appendix B). Interestingly, the strongest size advantage in tariff elasticities is observed for products with low and medium South Korean MFN tariffs, while there are no statistically significant inter-quartile differences for products with high MFN tariffs in South Korea. This suggests that in sectors with low or medium MFN tariffs, smaller firms don't find it advantageous to sink investment into rules of origin compliance.

4.4 | Dynamic impact of NTB reductions

Our two-period baseline model reveals that larger firms benefit substantially more from NTB reductions but cannot reveal whether this size advantage grows, diminishes, or remains stable over the FTA period. To address this issue, we exploit the long-time dimension of the French customs data. Correspondingly, the specification in Equation (2) is expanded by replacing the I_{dt} dummy with a South Korea dummy (Kor_d) and a series of year dummies which are further interacted with our baseline measure of size (in log form).³⁹ This modification allows us to examine the evolution of the impact of NTB reductions on the intensive margin along the size

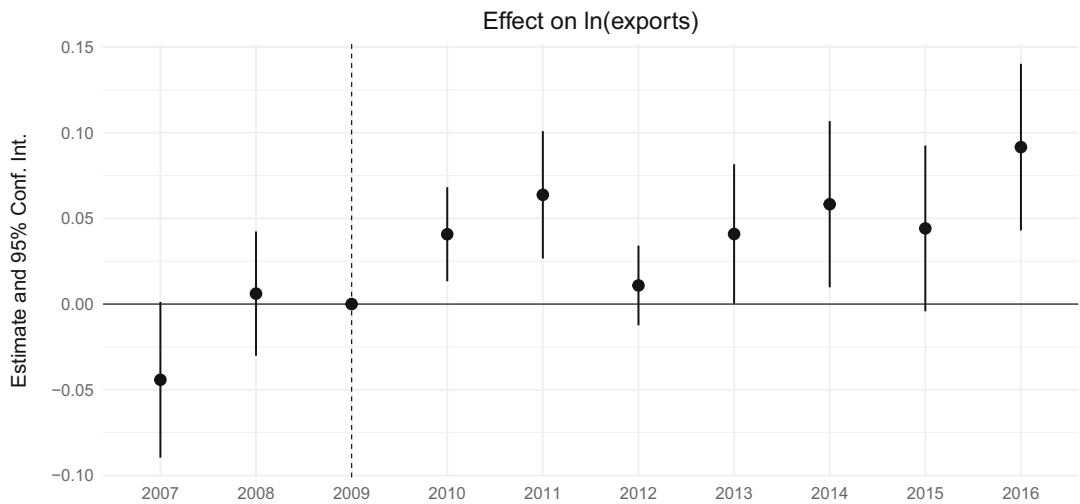


FIGURE 2 Dynamic impact of NTB reductions on exports (This graph shows the adjustment in exports from a reduction in NTBs under the EUKFTA. Following the specification provided by Equation (2), it plots coefficients and 95% confidence intervals on the interaction $Kor_d \times Year_t \times \ln(size)$, where Kor_d is a dummy for South Korea and $size$ corresponds to our baseline measure defined in Section 2.3. The chosen reference year is 2009, the year before the EUKFTA was signed. A set of firm-product-year, product-destination-year and firm-product-destination fixed effects are included).

distribution. As the agreement was signed in 2010 and implemented in 2011, we take 2009 as the reference year.

To ensure that our proxy for size (measured over 2000–2006) remains exogenous, we estimate the specification for data ranging from 2007 to 2016. As we are interested primarily in adjustments at the intensive margin, only those firm-product-destination triplets are retained that registered positive exports during 2007–2016. As before, we include interactions between tariffs and size as well as interactions between size, year dummies, and other countries with which the EU entered into FTAs over 2007–2016.

Figure 2 shows the resulting coefficient estimates and 95% confidence intervals for the adjustment in exports by size that stems from a reduction in NTBs under the EUKFTA. We observe a clear break following the signing of the agreement in 2010, with large firms posting substantially higher sales growth from NTB reductions compared to smaller firms. Therefore, this size advantage kicks in prior to entry into force of the agreement in 2011. The coefficient remains positive and statistically significant by the end of the sample period, indicating that the size advantage did not dissipate over time. This pattern holds when splitting exporters into quartiles or when using alternative measures of size (see Figures B1–B3 in Appendix B, respectively).

4.5 | Heterogeneity across sectors

Till now, our analysis has focused on identifying the treatment effects of NTB reductions averaged across products. However, the size differential from NTB reductions may be driven by certain sectors. Therefore as a robustness check, we examine this channel by splitting the sample and estimating our baseline regression separately for each goods sector.⁴⁰ Figure 3 shows the estimated values and 95% confidence intervals of the coefficients on interactions between the EUKFTA

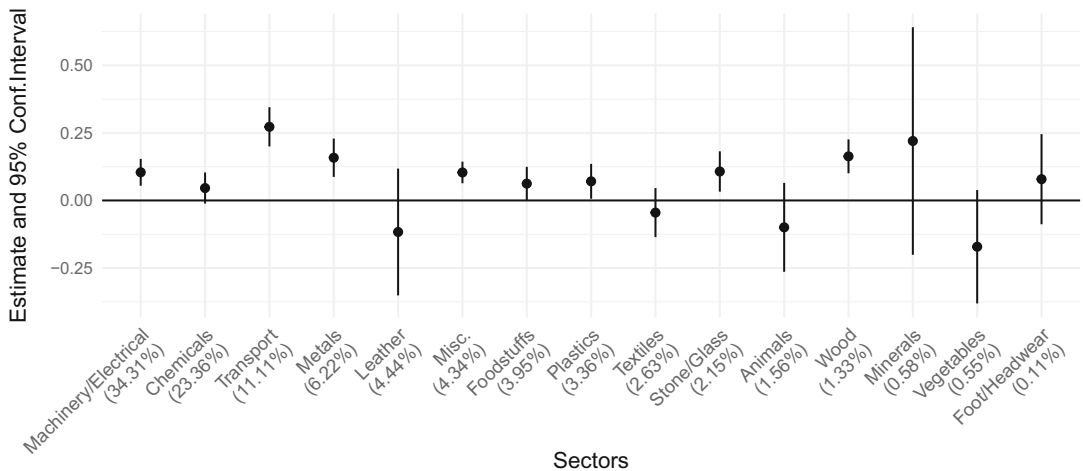


FIGURE 3 Heterogeneity across sectors (Following the specification provided by Equation (2), this graph plots coefficients and 95% confidence intervals on the interaction term $I_{di} \times \ln(\text{size})$ for every sector. Standard errors are clustered by firm, product and destination. Sectors are arranged from left to right by the decreasing order of their shares in France's exports to South Korea (in brackets) during the control period).

dummy and our baseline size measure (in log form) for each sector, where the sectors are arranged in decreasing order of their shares in France's exports to South Korea over the control period, 2000–2006.

We observe substantial heterogeneity in estimates across sectors that was masked by our earlier results. For several top sectors such as machinery/electrical goods, transport equipment, metals, miscellaneous goods and foodstuffs, which together account for nearly 60% of export sales to South Korea, we observe statistically significant size advantage from NTB reductions.⁴¹ The plastics, wood and stone/glass sectors, although small in France's export basket, behave similarly. Overall, Figure 3 confirms that the size advantage from NTB reductions is not driven by outlier sectors alone but emerges as a recurring feature in the data.⁴²

4.6 | Imports from South Korea

So far, we have studied the agreement's impact on France's exports to South Korea. However, our data allow us to check whether the size advantage from NTB reductions applies to France's imports from South Korea as well. To investigate this, we set the dependent variable as the log value of a firm's import purchases at the product-country-time level while tariffs correspond to duties applied by the EU on its trade partners. In Figure 4, we replicate the event study regression discussed in Section 4.4 for imports to examine the evolution of the size effect over time. Overall, the evidence for a size differential in import growth is less clear, and this differential is not observed to be statistically significant when looking at the yearly coefficients in Figure 4. Therefore, the advantage of large firms from NTB reductions under the EUKFTA appears to be driven via exports rather than imports. This is also in line with aggregate trade patterns reported in existing literature Jung (2022). For tariffs, this is not overly surprising as the EU's level of protection before the FTA was much lower than South Korea. Possibly, a similar pattern prevailed regarding NTBs. Also, note that the asymmetry between exports and imports is unlikely to be

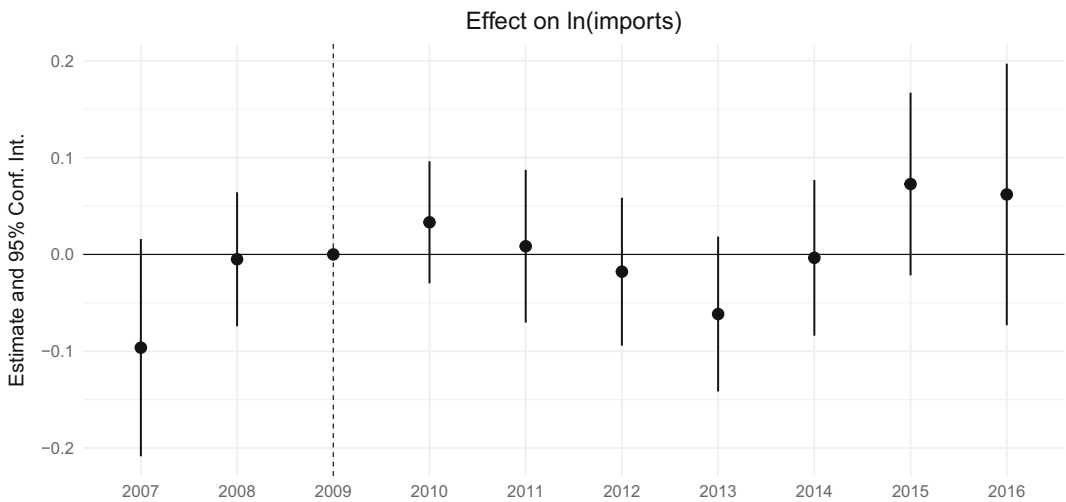


FIGURE 4 Dynamic impact of NTB reductions on imports (This graph shows the adjustment in imports of French firms from a reduction in NTBs under the EUKFTA. Following the specification provided by Equation (2), it plots coefficients and 95% confidence intervals on the interaction $Kor_d \times Year_t \times \ln(size)$, where Kor_d is a dummy for South Korea and $size$ corresponds to our baseline measure defined in Section 2.3. The chosen reference year is 2009, the year before the EUKFTA was signed. A set of firm-product-year, product-destination-year and firm-product-destination fixed effects are included).

driven by exchange rate movements as the inclusion of destination-time fixed effects into all our specifications effectively nets out the influence of currency revaluations.

5 | CONCLUSION

This paper sheds light on the effects of an important deep trade agreement along the firm size distribution. We exploit French firm-level customs data for the period 2000 to 2016 and employ a differences-in-differences strategy to identify treatment effects for different quartiles of the size distribution. We find a new and robust stylized fact—French exporters with larger pre-FTA sizes expand their exports to South Korea by larger rates than firms further down the size distribution.

This effect is driven chiefly by NTBs, that is, the summary effects of the FTA net of tariff concessions. It suggests that the NTB provisions of the FTA are not just about reducing the fixed costs of market access for firms, but also—and maybe predominantly—about lowering the variable trade costs for more efficient firms by more than for the less efficient ones. Interestingly, larger firms also seem to react more strongly to reductions in tariff reductions (which are independent of size), a result that is not specific to the EUKFTA and that only partly explains the overall advantage of large firms.

Our main finding confirms a widely held prior that FTAs benefit larger firms more than smaller ones. Based on this presumption, many deep FTAs include special provisions that aim to support small and medium-sized enterprises (SMEs). For example, since the release of the EU's "Trade for All" strategy in 2015, the EU has included such SME provisions in all new trade agreements. These typically include commitments for the EU and its partners to provide information on the contents of the trade agreement on a dedicated website that has a database searchable by tariff code, with information on tariffs, import requirements, rules of origin, etc. In addition, such

chapters provide for SME Contact Points on each side to facilitate bilateral cooperation between governments so that the specific needs of SMEs are addressed.

Such provisions can be readily justified on political economy and on equity grounds. They may be necessary to win the support of SMEs to conclude and ratify deep FTAs. Governments may also wish to spread the gains from trade more widely, as their incidence across firms affects the distribution of profits and wages. Whether SME chapters are required to enhance efficiency depends, however, on the details of the mechanism that gives rise to our empirical observation.

If for exogenous reasons, larger firms face lower iceberg trade costs and if those are complementary to politically induced variable trade costs, our result would simply reflect the technological superiority of larger firms without providing a rationale for policy intervention. Similarly, if higher sales in a foreign market require repeated lumpy payments—for example, as additional warehouses need be maintained or a bigger sales organization needs to be financed—larger firms have a natural advantage. The situation could be different if economies of scale or externalities are involved. This could be the case if learning-by-exporting externalities become stronger with size or if, contrary to Arkolakis (2010), marginal foreign market access costs are decreasing in market shares.

Whether such mechanisms are present and whether they justify political interventions on efficiency grounds depends on several factors. The case is clearest if the FTA itself contains elements that make it hard for small firms to benefit from the agreement. For example, it is known that rules of origin are costly to document and abide by. Simplifying them could benefit smaller exporters more than the usual SME chapters while also increasing overall efficiency. Similarly, if size differentials reflect lobbying activity by large firms, it would be advisable to install safeguards against such attempts during the negotiation process. To make further progress, one would need to develop and test structural models that embed such mechanisms.

Moreover, further empirical research should test the effectiveness of existing SME provisions exploiting the fact that an increasing share of FTAs contains such language. Also, it would be important to test for size-specific effects of NTBs and tariffs across the exporter size distribution in other trade agreements and in other countries. Our focus on a representative European agreement—the one between the EU and South Korea—and on French exporters could be the start for a broader and more comprehensive research agenda.

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DATA AVAILABILITY STATEMENT

The transaction-level customs data that support the findings of this study is covered by statistical secrecy and can be accessed only through a previous authorization of the French Custom Administration. The customs data is from the DGDDI (Direction Generale des Douanes et Droits Indirects—a directorate of the French Ministry of Finance). The authorization is granted by the

“Comite du secret” of the CNIS (Conseil National de l’Information Statistique). The link to procedures for getting access to the data is: <https://www.comite-du-secret.fr/>.

ORCID

Sonali Chowdhry  <https://orcid.org/0000-0002-0030-3840>

ENDNOTES

- ¹ The term “deep” is motivated by related literature which uses it to describe agreements that achieve closer market integration specifically through reductions in regulatory frictions and other nontariff barriers for example, Rodrik (2018) and Mattoo et al. (2020). The term is used to distinguish such FTAs from older treaties that focused primarily on tariff elimination in goods.
- ² In many models with rent-sharing, the wage distribution follows the size distribution (Helpman et al., 2010). Hence, our result suggests that the FTA may have increased wage inequality in France.
- ³ This could be the case for usually unobservable NTBs; tariffs, in contrast, do not vary across firms within products (but larger firms could cluster in product categories facing larger cuts).
- ⁴ Such investment could be related to proving rules of origin which require firms to furnish extensive documentation.
- ⁵ It remained the EU’s biggest FTA in terms of combined market size until 2017, when the EU-Canada Comprehensive Economic and Trade Agreement (CETA) began to be provisionally applied.
- ⁶ Our regressions allow for multiple three-way fixed effects such as firm-product-destination, firm-destination-time and firm-product-time fixed effects.
- ⁷ In robustness checks, we additionally control for MFN tariffs as a proxy for preference margins in order to net out the effects of potential heterogeneity in preference utilization across firms.
- ⁸ We also check the sensitivity of our results to dropping the EU’s other FTA partners from the sample.
- ⁹ Our work also relates to the extensive gravity literature on the trade effects of FTAs, which uses aggregate data; see Head and Thierry (2014) or Yotov et al. (2008).
- ¹⁰ Dedicated SME chapters have been introduced in EU or US FTAs such as the EU-Japan Economic Partnership Agreement (EUJEPa) or the US-Mexico-Canada-Agreement (USMCA).
- ¹¹ Figure A1 in Appendix A provides details. These tariff cuts are important for the EU-South Korea relationship, given the role of goods trade in overall trade between their economies. In 2010, the year before the FTA’s implementation, 79% of the EU’s total exports to and 89% of the EU’s total imports from South Korea comprised goods.
- ¹² With data on tariffs and tariff elasticities, European Commission (2017) computes reductions in NTBs that would explain changes in trade flows not accounted for by tariff cuts. They report the highest NTB reduction for EU exports in electronic equipment (25.3%), raw materials (13%), and machinery and equipment (9.3%) sectors. NTBs faced by South Korea’s exporters also fell significantly for metals (12.5%), raw materials (9.5%), and agricultural goods (7.8%). NTBs fell even for sectors that did not have dedicated provisions under the FTA. Therefore, their results highlight the role of “horizontal” clauses that reduce trade frictions more broadly across sectors. Such NTB reductions are crucial as they drive the overwhelming majority of welfare gains in CGE evaluations of deep FTAs—especially when the initial level of tariffs applied on manufactured goods is relatively low, as is the case for the EU and South Korea.
- ¹³ The Enquete Annuelle d’Enterprise (EAE) is a survey that provides balance sheet information of firms along with the SIREN identifier that enables matching.
- ¹⁴ Any size measure (whether based on trade flows or balance sheet data) is unlikely to be a perfect measure of productivity as in Melitz (2003) models. Hence, our econometric strategy includes firm-product-time fixed effects to capture any time-varying supply-side shocks such as to firms’ technologies and worker skills in a narrowly defined HS-6 digit product category.
- ¹⁵ Such size patterns arise in heterogeneous firms models with asymmetric countries where destinations with relatively high trading costs are served only by the most efficient firms which select into these markets (Chaney, 2008) and to which they export their best-performing products (Mayer et al., 2014). For additional summary statistics on these exporters with alternative size measures, see Table A1 in Appendix A.

- ¹⁶ As shown in Table B1 in Appendix B, there is a high degree of correlation between exporting to South Korea and exporting to either of these two countries prior to the adoption of the FTA.
- ¹⁷ This differential also exists for the simple average of growth rates.
- ¹⁸ The evidence is more mixed when weighting tariff cuts by the size measure or firm-level exports to South Korea. Compared to the bottom quartile, medium-sized exporters tend to face smaller tariff cuts while the top exporters enjoy either similar or larger cuts. A better understanding of the structure of tariff cuts as a function of the size distribution of firms is an avenue for further research.
- ¹⁹ If $\tilde{t} \in (0, 1)$ is the ad valorem tariff rate, then $t = 1 + \tilde{t}$ is the tariff factor.
- ²⁰ We use the French GDP deflator (base year as 2015) to account for changes in output prices within periods. We prefer this approach instead of working with yearly data which raises issues related to the volatility of firm-level data. However, we also estimate Equation (3) on yearly data as a robustness check in Section 4.
- ²¹ In fact, I_{dt} is the product of the more general indicator variable FTA_{dt} and a South Korea dummy.
- ²² These size bins are defined within HS-6 digit product in the baseline although we do test results under product classes defined at the HS-4 digit or HS-2 digit levels. Due to the array of fixed effects present in the model, only $\mathcal{K} - 1$ of the bin-specific interaction terms in our model are linearly independent, and so we can estimate bin-specific effects only for $\mathcal{K} - 1$ bins. As a default, we omit the category of smallest exporters. Consequently, the specification cannot inform us about the absolute change in exports within a size bin but only about the change relative to the base category.
- ²³ With a continuous size measure, interpretation is more straightforward; see Section 2.3.
- ²⁴ This list of FTAs is drawn from the Design of Trade Agreements (DESTA) database by Dür et al. (2014) and reported in Table A3 in Appendix A. In all, 16 agreements were implemented of which the deepest were the EUKFTA, as well as the EU-Georgia (2014) and EU-Moldova (2016) FTAs.
- ²⁵ See Figure A3 in Appendix A for a comparison of skewness in the distributions of export sales between the unrestricted and restricted (continuous exporters only) sample.
- ²⁶ An even stricter definition of the intensive margin would be at the 10-digit tariff line level, for sales by a given plant within a firm and to a given buyer in the foreign market. However, this is not feasible in our case due to limitations on the availability of plant and buyer-level information in the customs data as well as the level of aggregation of tariffs (HS 6-digit) in the database by Felbermayr et al. (2019).
- ²⁷ However, results do not change if standard errors are clustered by different dimensions of the data for example, firm-product, firm-destination, or product-destination. See Table B2 in Appendix B for further details.
- ²⁸ Wald test results on pair-wise equality of β coefficients are reported in Table B4 in Appendix B.
- ²⁹ Though the coefficient of -1.67 for firms in the Q3 bin is significant at the 90% confidence level, it is not robust to clustering choices. See Table B2 in Appendix B.
- ³⁰ Note that the policy interpretation of these relative effects would differ depending on whether small exporters are contracting or growing. Therefore, we provide indicative regression results on level effects in Table B6 in Appendix B. These feature fewer fixed effects and show that small (continuous) exporters do not experience statistically significant change in the intensive margin from the EUKFTA, relative to their exports in control destinations. However, since destination-time fixed effects cannot be included, these results are highly likely to be affected by omitted variable bias. As such, we continue with our baseline specification in Equation (2) as it aligns with the main innovation and focus of this paper that is, the *differential* impact of the EUKFTA along the firm size distribution.
- ³¹ Coefficients on the interaction between I_{dt} , $\ln t_{dt}$ and size bins cannot be identified due to multi-collinearity with γ^k coefficients.
- ³² Working out the precise conditions under which this can happen is an avenue for future research.
- ³³ Summary statistics on these various size measures are reported in Table A4 in Appendix A.
- ³⁴ As in the baseline, the main effects for size and tariffs cannot be estimated due to the presence of firm-product-time and product-destination-time fixed effects.
- ³⁵ Our empirical analysis on preference utilization is limited by data availability since the vintage of customs data we use does not report the tariff regime that the firm is exporting or importing under.
- ³⁶ Information on a given product's tariff staging category is drawn from the FTA tariff schedules, available through the WTO's RTA database.
- ³⁷ In this case, the interactions between the I_{dt} dummy, tariffs and size bins drop out due to multi-collinearity and are therefore excluded in the estimations reported in Table 10.

- ³⁸ Note that coefficients on the interactions between $\ln t_{pdt}$ and size quartiles can still be identified when restricting the sample to goods that have zero MFN tariffs in South Korea as in column (1) of Table 10. This is because the estimation sample includes other export destinations that impose nonzero MFN tariffs on those same products.
- ³⁹ We also repeat this exercise for various quartiles of the size distribution, see Figure B1 in Appendix B
- ⁴⁰ Based on the goods sector classification for the Harmonized System (HS) provided by WITS.
- ⁴¹ Size dispersion across exporters within these sectors is also high, as can be seen in Table A5 in Appendix A.
- ⁴² When looking at tariff elasticities (γ_k), coefficients are statistically different for larger exporters at the 95% confidence interval for some of the sectors, namely, chemicals, transport equipment, metals, miscellaneous goods and plastics.

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APPENDIX A. FURTHER DESCRIPTIVE STATISTICS

TABLE A1 Size distribution of exporters (in million €).

Size	Mean	p25	p50	p75	Mean/p50
Global trade	38.041	0.062	0.588	5.531	64.708
Extra-EU trade	15.702	0.028	0.243	2.056	64.61
Intra-EU trade	22.338	0	0.07	2.293	317.122
Global exports	27.692	0.028	0.306	3.237	90.504
Neighbor exports	1.231	0	0.001	0.062	932.765

Note: This table reports summary statistics for multiple size measures as defined in Section 4.1 for firm-product combinations that are exported to South Korea. The 25th, 50th, and 75th percentile of the size distribution are denoted as p25, p50, and p75, respectively.

TABLE A2 Percentage point reductions in tariffs for French exporters to South Korea.

Weights	Simple average	Weighted average	Weighted average
	-	Exporter size	South Korea sales
Q4	7.79	6.26	6.18
Q3	7.47	1.78	3.46
Q2	9.00	1.84	1.70
Q1	6.68	3.27	6.63

Note: This table provides the percentage point change in the simple average and weighted average tariffs faced by continuous French exporters to South Korea, between the control (2000–2006) and FTA period (2011–2016). The averages are computed within quartiles of the size measure as defined in Section 2.3. The weights are taken as the exporter size or the sales of the exporter to South Korea in the control period.

TABLE A3 EU FTAs entering into force over 2006–2016.

Agreement	EIF	Depth index	Rasch depth
EU Enlargement	2007	5	0.85
CARIFORUM EU EPA	2008	7	1.58
Albania EU SAA	2009	7	1.26
Cote d'Ivoire EU EPA	2009	3	0.26
EU Montenegro SAA	2010	6	1.37
European Economic Area (EEA)	2011	5	0.67
EU Korea	2011	7	2.03
EU Enlargement	2013	5	0.90
EU Serbia SAA	2013	7	1.42
Central America EC	2013	6	1.76
Colombia EC Peru	2013	7	1.89
EU Georgia	2014	7	2.03
Bosnia and Herzegovina EC SAA	2015	4	1.06
EU Kosovo SAA	2015	5	1.18
EU Moldova	2016	7	2.11
EU SADC EPA	2016	4	0.54

Note: This table lists trade agreements between the EU and other trade partners that entered into force over 2006–2011. Their respective depth indices are drawn from Dür et al. (2014).

TABLE A4 Alternative size measures (million €).

Size	Mean	<i>p</i> 25	<i>p</i> 50	<i>p</i> 75	Max
Global trade	14.485	0.069	0.396	2.458	32915.434
Extra-EU trade	4.833	0.011	0.082	0.546	23955.902
Intra-EU trade	9.652	0	0.104	1.253	29675.928
Global exports	8.617	0.031	0.149	0.888	28870.273
Neighbor exports	0.451	0	0	0	1676.343

Note: Table above reports summary statistics on size measures defined in Section 4.1 for continuously exported firm-product combinations. The 25th, 50th, and 75th percentiles of the size distribution are denoted by *p*25, *p*50, and *p*75.

TABLE A5 Size dispersion across sectors in the estimation sample.

Sector	C.V.
Transport	12.72
Foodstuffs	11.82
Machinery/electrical	11.55
Minerals	10.73
Leather	9.92
Misc.	8.61
Chemicals	8.50
Metals	8.01
Plastics	7.79
Wood	6.68
Stone/Glass	6.49
Vegetables	5.56
Foot/Headwear	5.25
Textiles	4.96
Animals	3.87

Note: This table reports the coefficient of variation (C.V.) for the baseline size measure across goods sectors. The coefficient of variation for a sector is calculated as the ratio of standard deviation to the mean of size for all continuous exporters within that goods sector.

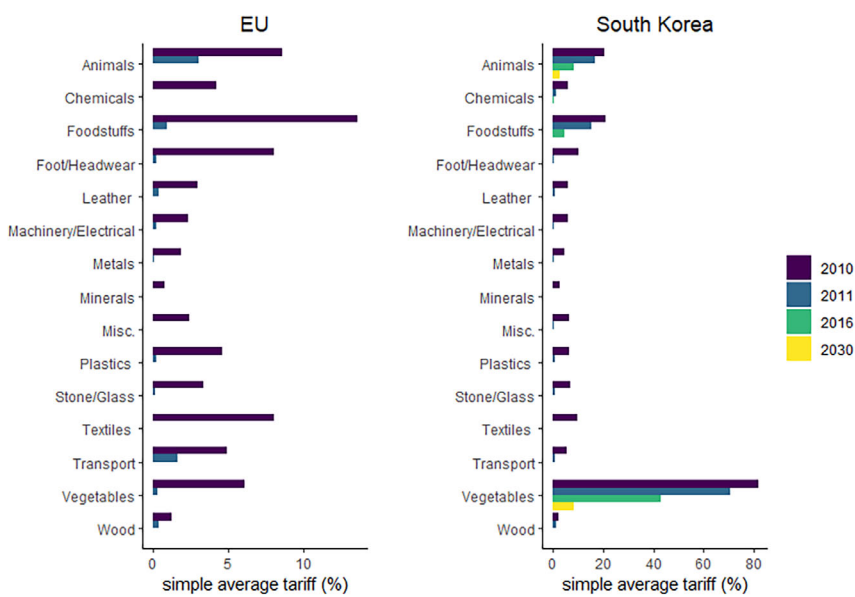


FIGURE A1 Tariff schedules of the EU and South Korea (The graph depicts changes in average applied tariffs imposed by the EU on South Korean products (left) and by South Korea on EU products (right). These changes are examined over the course of the agreement's transition period, from 2011 to 2030. In 2010, prior to the entry into force of the FTA, applied tariffs corresponded to MFN duties. Considering the differences in tariff levels between the EU and South Korea, the horizontal axes have different scales). [Colour figure can be viewed at [wileyonlinelibrary.com](#)]

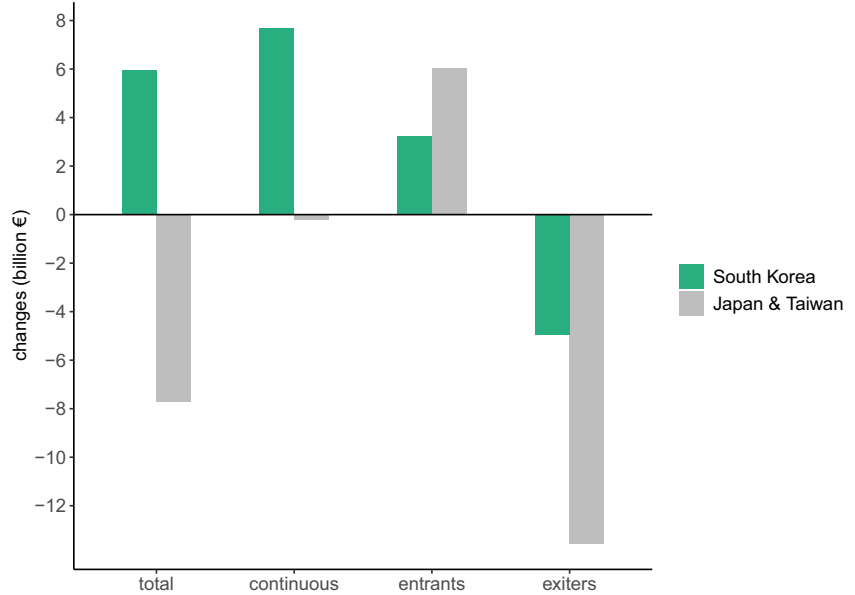


FIGURE A2 Change in exports by type of firm and destination (billion €) (Note: The figure above shows the absolute change in France's exports between the control (2000–2006) and post-FTA period (2011–2016) and compares this change for South Korea (in green) with that of Japan and Taiwan. Changes are further decomposed into changes in sales of continuous, entrants and exiting firms to that destination. Export values are adjusted by France's GDP deflator drawn from the World Bank Database). [Colour figure can be viewed at [wileyonlinelibrary.com](#)]

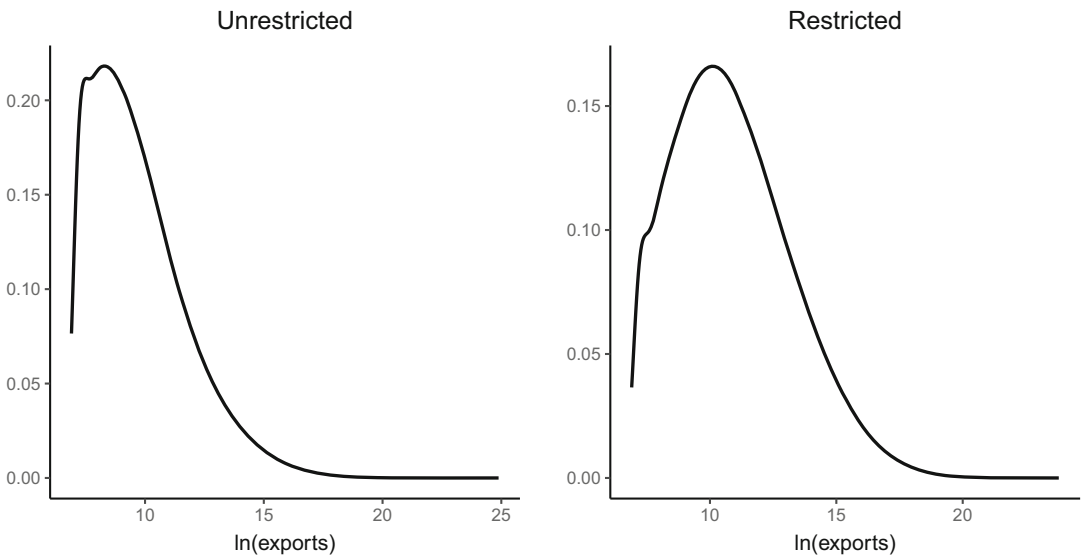


FIGURE A3 Skewness in exports under unrestricted and restricted samples (*Note:* Unrestricted sample covers continuously exported firm-product-destination triplets, entrants and exiters. Restricted sample includes only continuous exported only firm-product-destination triplets).

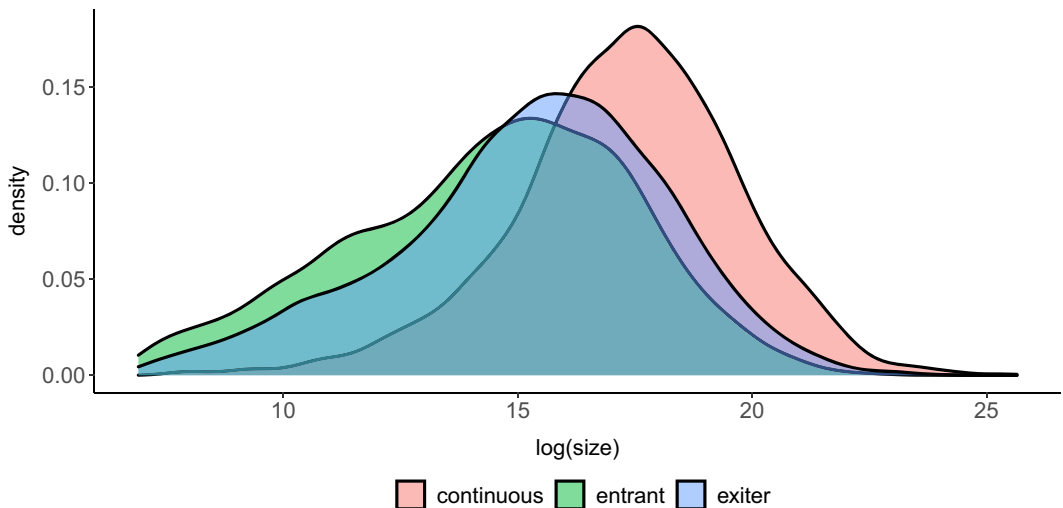


FIGURE A4 Size distributions by type of firm (*Note:* This graph plots the kernel densities of size defined at the firm level for firms that (i) exported to South Korea in both periods (continuous); (ii) that began exporting to South Korea during the post-FTA period (entrant) and; (iii) that exited South Korea in the post-FTA period (exiter)). [Colour figure can be viewed at wileyonlinelibrary.com]

APPENDIX B. FURTHER ROBUSTNESS CHECKS

TABLE B1 Characteristics of firms exporting to South Korea.

Dependent variable Model	Exporter to Korea (0,1)		
	(1)	(2)	(3)
Multiproduct	0.018*** (0.0007)		
Multiproduct \times FTA	0.006** (0.002)		
Multidestination		0.011*** (0.0007)	
Multidestination \times FTA		0.010*** (0.003)	
Exporter to Japan/Taiwan			0.074*** (0.003)
Exporter to Japan/Taiwan \times FTA			0.025*** (0.008)
Observations	1,685,204	1,685,204	1,685,204
R^2	0.576	0.576	0.581

Note: Number of observations $N = 1,685,204$. This table reports coefficients from linear probability models. The dependent variable is set equal to 1 if the firm exported to South Korea in the given year and 0 otherwise. To compare the coefficients between the control and post-FTA periods, we interact the explanatory variables with an FTA dummy that equals 1 over 2011–2016. Multi-product and multi-destination are dummy variables at the firm-year level. In column (3), the explanatory variable is a dummy taking the value of 1 if the firm exported to Japan or Taiwan in the given year. All regressions include firm and year fixed effects. Standard errors are clustered by firm and year.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE B2 Impact of EUKFTA: Different clustering methods.

Dependent variable Model	ln(exports)			
	(1)	(2)	(3)	(4)
$I \times Q2$	0.370** (0.154)	0.370** (0.152)	0.370** (0.151)	0.370** (0.181)
$I \times Q3$	0.564*** (0.138)	0.564*** (0.136)	0.564*** (0.134)	0.564*** (0.172)
$I \times Q4$	0.670*** (0.144)	0.670*** (0.141)	0.670*** (0.137)	0.670*** (0.172)

TABLE B2 (Continued)

Dependent variable	ln(exports)			
Model	(1)	(2)	(3)	(4)
$\ln t \times Q2$	0.171 (0.339)	0.171 (0.337)	0.171 (0.331)	0.171 (0.347)
$\ln t \times Q3$	-0.276 (0.318)	-0.276 (0.312)	-0.276 (0.322)	-0.276 (0.326)
$\ln t \times Q4$	-1.096*** (0.412)	-1.096*** (0.405)	-1.096*** (0.394)	-1.096*** (0.361)
$I \times \ln t \times Q2$	0.702 (0.869)	0.702 (0.892)	0.702 (1.466)	0.702 (1.276)
$I \times \ln t \times Q3$	-1.671* (0.859)	-1.671* (0.909)	-1.671* (0.903)	-1.671 (1.377)
$I \times \ln t \times Q4$	-1.271 (0.980)	-1.271 (0.999)	-1.271 (0.808)	-1.271 (1.469)
Clustering	f-p-d	p-d	f-d	f-p
Observations	1,758,070	1,758,070	1,758,070	1,758,070
R^2	0.919	0.919	0.919	0.919

Note: Regressions are estimated for exports at the firm-product-destination level aggregated to two periods: control (2000–2006) and post-FTA (2011–2016). I is a dummy that takes the value of 1 for South Korea in the 2011–2016 period. Regressions include firm-product-time, product-destination-time and firm-product-destination fixed effects. Only continuous exporters are retained that is, firms that have positive exports in a given product-destination for each of the two periods. Standard errors are clustered by firm, product and destination in column (1), product and destination in column (2), firm and destination in column (3) and firm and product in column (4).

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE B3 Decomposition of export revenues.

Dependent variables	ln(exports)	ln(quantity)	ln(price)
Model	(1)	(2)	(3)
$I \times Q2$	0.370** (0.154)	0.423*** (0.162)	-0.053 (0.102)
$I \times Q3$	0.564*** (0.138)	0.684*** (0.155)	-0.120 (0.088)
$I \times Q4$	0.670*** (0.144)	0.686*** (0.153)	-0.016 (0.085)
$\ln t \times Q2$	0.171 (0.339)	0.413 (0.411)	-0.242 (0.208)

TABLE B3 (Continued)

Dependent variables	ln(exports)	ln(quantity)	ln(price)
Model	(1)	(2)	(3)
$\ln t \times Q3$	-0.276 (0.318)	0.138 (0.337)	-0.414** (0.182)
$\ln t \times Q4$	-1.096*** (0.412)	-0.792* (0.434)	-0.304* (0.163)
$I \times \ln t \times Q2$	0.702 (0.869)	0.706 (0.641)	-0.004 (0.601)
$I \times \ln t \times Q3$	-1.671* (0.859)	-1.140 (0.715)	-0.531 (0.440)
$I \times \ln t \times Q4$	-1.271 (0.980)	-1.001 (0.683)	-0.270 (0.544)
Observations	1,758,070	1,758,070	1,758,070
R^2	0.919	0.945	0.967

Note: Regressions are estimated for the logs of export revenues, export quantity and export prices (calculated as the ratio of revenue to quantity) at the firm-product-destination level aggregated to two periods: control (2000–2006) and post-FTA (2011–2016). Standard-errors are clustered three-way by firm, product and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE B4 Wald test on equality of coefficients.

Test	Test stat	p-value
$Q2 = Q3$	-2.653	.008
$Q3 = Q4$	-2.160	.031
$Q2 = Q4$	-4.094	.000

Note: The table reports results from Wald tests on equality of β coefficients from column (1) of Table 3.

TABLE B5 Impact of EUKFTA: Restricting control group of destinations

Dependent variable	ln(exports)	
Model	(1)	(2)
$I \times Q2$	0.343** (0.157)	0.355** (0.157)
$I \times Q3$	0.576*** (0.139)	0.584*** (0.143)
$I \times Q4$	0.668*** (0.142)	0.723*** (0.147)

TABLE B5 (Continued)

Dependent variable	ln(exports)	
Model	(1)	(2)
$\ln t \times Q2$	0.037 (0.339)	
$\ln t \times Q3$	-0.437 (0.333)	
$\ln t \times Q4$	-1.253*** (0.438)	
$I \times \ln t \times Q2$	0.467 (0.980)	
$I \times \ln t \times Q3$	-1.533* (0.795)	
$I \times \ln t \times Q4$	-1.220 (0.943)	
Observations	1,688,927	1,688,927
R^2	0.919	0.919

Note: Regressions are estimated for exports at the firm-product-destination level aggregated to two periods: control (2000–2006) and post-FTA (2011–2016). I is a dummy that takes the value of 1 for South Korea in the 2011–2016 period. Control group drops destinations that signed FTAs with the EU after 2006. Regressions include firm-product-time, product-destination-time and firm-product-destination fixed effects. Standard errors are clustered by firm, product and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE B6 Level effects of the EUKFTA.

Dependent variable	ln(exports)	
Model	(1)	(2)
I	-0.142 (0.101)	-0.131 (0.097)
$I \times Q2$	0.194* (0.101)	0.203** (0.098)
$I \times Q3$	0.147 (0.094)	0.149 (0.090)
$I \times Q4$	0.189** (0.091)	0.249*** (0.088)
$\ln t$	0.821*** (0.239)	
$\ln t \times Q2$	-0.204 (0.171)	

TABLE B6 (Continued)

Dependent variable	ln(exports)	
Model	(1)	(2)
$\ln t \times Q3$	-0.794*** (0.227)	
$\ln t \times Q4$	-2.212*** (0.363)	
Observations	1,738,129	1,738,129
R^2	0.802	0.801

Note: The table above reports regression results for the impact of the EUKFTA along the intensive margin. I is a dummy variable that takes the value of one for French exports to South Korea from 2011 onward and the value of zero otherwise. Here t denotes product-level ad valorem tariff factors. Both regressions include firm-product-time and firm-destination fixed effects alongside controls for destination-time varying characteristics (GDP and population). Standard errors are clustered by firm, product and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE B7 Quintiles with median as base category

Dependent variable	ln(exports)				
	Trade			Exports	
Size measure	Global	Extra-EU	Intra-EU	Global	Neighbors
Model	(1)	(2)	(3)	(4)	(5)
$I \times \text{bin} = 1$	-0.571*** (0.165)	-0.544*** (0.173)	-0.283*** (0.101)	-1.102*** (0.204)	-0.119 (0.078)
$I \times \text{bin} = 2$	-0.153 (0.099)	0.178 (0.113)	-0.074 (0.073)	0.108 (0.126)	0.120** (0.058)
$I \times \text{bin} = 4$	0.220*** (0.066)	0.313*** (0.058)	-0.078 (0.056)	0.217*** (0.075)	0.156*** (0.051)
$I \times \text{bin} = 5$	0.197*** (0.063)	0.337*** (0.066)	0.033 (0.057)	0.375*** (0.075)	0.236*** (0.064)
$\ln t \times \text{bin} = 1$	0.154 (0.391)	-1.054** (0.443)	0.751*** (0.254)	0.126 (0.359)	0.510 (0.339)
$\ln t \times \text{bin} = 2$	0.280 (0.311)	-0.200 (0.248)	0.523** (0.223)	0.065 (0.276)	-0.106 (0.285)
$\ln t \times \text{bin} = 4$	-0.362* (0.205)	-0.322 (0.217)	-0.501** (0.250)	-0.210 (0.183)	-0.102 (0.187)
$\ln t \times \text{bin} = 5$	-1.042*** (0.286)	-0.481 (0.317)	-1.380*** (0.353)	-1.200*** (0.369)	-0.466* (0.239)
Observations	1,758,070	1,652,294	1,564,004	1,758,022	873,420
R^2	0.919	0.917	0.918	0.919	0.920

Note: The table above reports regression results for the impact of the EUKFTA along the intensive margin following the specification in Equation (2). Firm size is defined within the HS-6 digit product class and split into quintiles, where the median group ($\text{bin} = 3$) is taken as the base category. Across columns, size is defined alternatively as global trade, extra-EU trade, intra-EU trade, global exports and neighboring market (Japan/Taiwan) exports of the firm-product pair in the control period (2000–2006). Standard errors are clustered by firm, product and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE B8 Firm-product size at HS-4 digit level.

Dependent variable	ln(exports)				
	Trade			Exports	
	Global	Extra-EU	Intra-EU	Global	Neighbors
Model	(1)	(2)	(3)	(4)	(5)
$I \times Q2$	0.394** (0.162)	0.240 (0.157)	0.313*** (0.104)	0.563*** (0.187)	0.000 (0.086)
$I \times Q3$	0.556*** (0.153)	0.426*** (0.140)	0.232** (0.096)	0.846*** (0.178)	0.179** (0.081)
$I \times Q4$	0.690*** (0.152)	0.598*** (0.138)	0.399*** (0.095)	1.019*** (0.179)	0.264*** (0.095)
$\ln t \times Q2$	0.425 (0.359)	0.294 (0.380)	-0.227 (0.230)	0.186 (0.362)	-0.167 (0.227)
$\ln t \times Q3$	-0.062 (0.310)	0.203 (0.324)	-0.886*** (0.244)	-0.157 (0.356)	-0.200 (0.222)
$\ln t \times Q4$	-0.716** (0.348)	0.089 (0.344)	-1.622*** (0.292)	-0.902** (0.435)	-0.483* (0.284)
$I \times \ln t \times Q2$	0.376 (1.006)	8.195*** (2.817)	-3.228*** (0.439)	-9.427 (6.628)	-2.927*** (0.670)
$I \times \ln t \times Q3$	-1.574 (1.035)	0.545 (0.511)	-4.268*** (0.456)	-9.492 (6.545)	-2.867*** (0.675)
$I \times \ln t \times Q4$	-1.751 (1.227)	0.136 (0.473)	-4.462*** (0.272)	-10.040 (6.537)	-4.093*** (0.830)
Observations	1,758,070	1,691,016	1,625,502	1,758,053	1,035,677
R^2	0.919	0.917	0.918	0.919	0.919

Note: Regression results are based on Equation (2) where the dependent variable is exports at the firm-product-destination level aggregated to two periods: 2000–2006 and 2011–2016. The variable I is a dummy that takes the value of one for French exports to Korea from 2011 onwards and the value of zero otherwise. Variable t denotes product-level ad valorem tariff factors. In each column, size is defined differently within a given firm and HS-4 digit product combination. Using data only from the control period (2000–2006) and excluding trade with South Korea, these size measures are: column (1) global trade within the firm-product pair (baseline measure); column (2) extra-EU trade; column (3) intra-EU trade; column (4) global exports and; column (5) exports to neighboring economies of Japan and Taiwan. Since regressions include firm-product-destination fixed effects, only continuously exported varieties are retained that is, varieties that have positive exports in a given destination for each of the two periods. Standard errors are clustered by firm, product and destination. ***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE B9 Firm-product size at HS-2 digit level.

Dependent variable	ln(exports)				
Size measure	Trade			Exports	
Dependent variable	Global	Extra-EU	Intra-EU	Global	Neighbors
Model	(1)	(2)	(3)	(4)	(5)
$I \times Q2$	0.328** (0.134)	0.217* (0.130)	0.319*** (0.100)	0.957*** (0.197)	−0.041 (0.119)
$I \times Q3$	0.592*** (0.121)	0.434*** (0.115)	0.341*** (0.100)	1.037*** (0.166)	−0.097 (0.100)
$I \times Q4$	0.640*** (0.122)	0.565*** (0.122)	0.447*** (0.105)	1.251*** (0.172)	0.118 (0.108)
$\ln t \times Q2$	−0.405 (0.340)	0.483 (0.651)	−0.703*** (0.206)	−0.093 (0.412)	−0.053 (0.232)
$\ln t \times Q3$	−0.581 (0.371)	0.736 (0.542)	−0.868*** (0.273)	−0.162 (0.422)	−0.065 (0.191)
$\ln t \times Q4$	−0.923** (0.411)	0.770 (0.636)	−1.365*** (0.249)	−0.550 (0.444)	−0.303 (0.252)
$I \times \ln t \times Q2$	0.226 (1.061)	−0.291 (2.304)	−3.607*** (0.727)	−7.452 (6.912)	−1.727*** (0.380)
$I \times \ln t \times Q3$	−1.614 (1.011)	0.328 (0.243)	−3.150*** (0.515)	−6.014 (6.844)	−0.771*** (0.208)
$I \times \ln t \times Q4$	−1.578 (1.169)	0.153 (0.205)	−4.214*** (0.345)	−7.109 (6.860)	−2.643*** (0.338)
Observations	1,758,070	1,723,862	1,681,247	1,758,068	1,234,528
R^2	0.919	0.918	0.918	0.919	0.919

Note: Regression results are based on Equation (2) where the dependent variable is exports at the firm-product-destination level aggregated to two periods: 2000–2006 and 2011–2016. I is a dummy variable that takes the value of one for French exports to Korea from 2011 onwards and the value of zero otherwise. Variable t denotes product-level ad valorem tariff factors. In each column, size is defined differently within a given firm and HS-2 digit product combination. Using data only from the control period (2000–2006) and excluding trade with South Korea, these size measures are: column (1) global trade within the firm-product pair (baseline measure); column (2) extra-EU trade; column (3) intra-EU trade; column (4) global exports and; column (5) exports to neighboring economies of Japan and Taiwan. Since regressions include firm-product-destination fixed effects, only continuously exported varieties are retained that is, varieties that have positive exports in a given destination for each of the two periods. Standard errors are clustered by firm, product and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE B10 Impact of NTB reductions and tariff cuts after excluding the largest firms.

Sample Model	ln(exports)			
	All (1)	Drop top 1% (2)	Drop top 5% (3)	Drop top 10% (4)
$I \times Q2$	0.370** (0.154)	0.365** (0.155)	0.352** (0.156)	0.365** (0.163)
$I \times Q3$	0.564*** (0.138)	0.559*** (0.140)	0.494*** (0.156)	0.421*** (0.161)
$I \times Q4$	0.670*** (0.144)	0.645*** (0.142)	0.601*** (0.153)	0.606*** (0.160)
$\ln t \times Q2$	0.171 (0.339)	0.239 (0.356)	0.268 (0.397)	0.282 (0.460)
$\ln t \times Q3$	-0.276 (0.318)	-0.199 (0.332)	-0.286 (0.343)	-0.153 (0.360)
$\ln t \times Q4$	-1.10*** (0.412)	-0.948** (0.409)	-0.777** (0.389)	-0.741* (0.407)
Observations	1,758,070	1,696,706	1,516,379	1,390,912
R^2	0.919	0.918	0.920	0.924

Note: Regression results are based on Equation (2), where the dependent variable is exports at the firm-product-destination level aggregated to two periods: 2000–2006 and 2011–2016. I is a dummy variable that takes the value of one for French exports to South Korea from 2011 onward and the value of zero otherwise. Product-level ad-valorem tariff factors are denoted by t . In each column, size bins are recalculated after dropping the top 1%, 5% and 10% of varieties from the sample. Additional controls include interactions between a I_{dt} , tariffs and size bins as well as interactions between size bins and a dummy variable that takes the value of one for all other countries with which the EU implemented FTAs after 2006. All regressions include firm-product-time, product-destination-time and firm-product-destination fixed effects. Only continuous exporters are retained that is, those firm-product combinations that have positive exports in a given destination for each of the two periods. Standard errors are clustered by firm, product and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

TABLE B11 Impact of EUKFTA by levels of South Korean MFN tariffs

Dependent Variable MFN Model	ln(exports)		
	Low (1)	Medium (2)	High (3)
$I \times Q2$	0.367 (0.271)	0.556* (0.298)	0.444* (0.238)
$I \times Q3$	0.733*** (0.248)	0.663** (0.273)	0.358 (0.233)

TABLE B11 (Continued)

Dependent Variable	ln(exports)		
MFN	Low	Medium	High
Model	(1)	(2)	(3)
$I \times Q4$	0.783*** (0.240)	1.070*** (0.248)	0.551** (0.233)
$\ln t \times Q2$	-1.541* (0.839)	0.272 (0.609)	0.427 (0.434)
$\ln t \times Q3$	-2.298*** (0.730)	0.355 (0.512)	-0.224 (0.407)
$\ln t \times Q4$	-3.427*** (0.880)	-1.082* (0.562)	-0.668 (0.460)
Observations	520,937	439,499	738,121
R^2	0.918	0.921	0.915

Note: Regression results are based on the specification provided by Equation (2). Using the tariff schedule of South Korea, the sample is split into exports of goods that were already duty-free in 2010 (MFN = 0), those that became duty-free upon entry into force of the agreement (EIF), and goods whose tariffs were set to be gradually phased out by South Korea over three, ten or more than ten years. I_{dt} is a dummy that takes the value one for South Korea in the FTA period (2011–2016) and zero otherwise. Standard errors are clustered by firm, product and destination.

***, **, and * denote statistical significance at the .01, .05, and .1 levels, respectively.

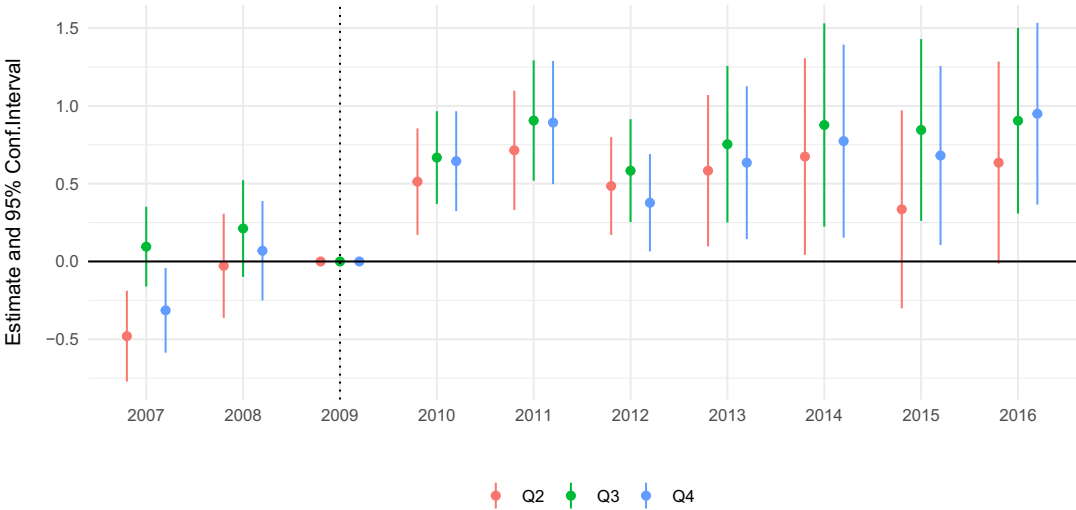


FIGURE B1 Dynamic impact of NTB reductions on exports (Note: This graph shows the adjustment in exports from a reduction in NTBs under the EUKFTA. Following the specification provided by Equation (2), it plots coefficients and 95% confidence intervals on the interaction $Kor_d \times Year_t \times Quartile$, where Kor_d is a dummy for South Korea and quartiles are based on our baseline measure defined in Section 2.3. The chosen reference year is 2009, the year before the EUKFTA was signed. A set of firm-product-year, product-destination-year and firm-product-destination fixed effects are included). [Colour figure can be viewed at [wileyonlinelibrary.com](#)]

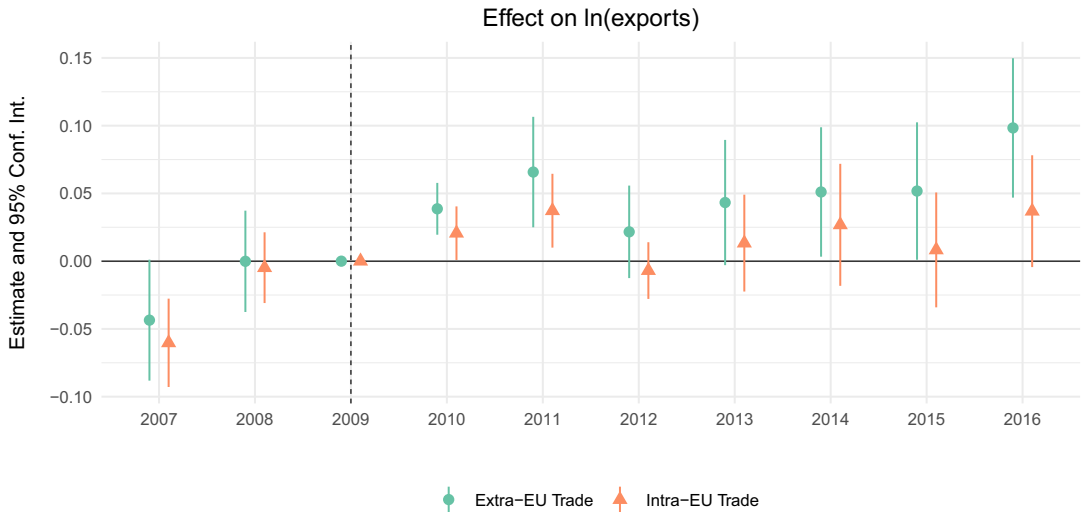


FIGURE B2 Event study using alternative size measures (Note: This graph shows the adjustment in exports from a reduction in NTBs under the EUKFTA. Following the specification provided by Equation (2), it plots coefficients and 95% confidence intervals on the interaction $Kor_d \times Year_t \times \ln(size)$, where Kor_d is a dummy for South Korea and $size$ corresponds to either extra-EU or intra-EU trade within a firm-product combination over the control period (see Section 4.1). The chosen reference year is 2009, the year before the EUKFTA was signed. A set of firm-product-year, product-destination-year and firm-product-destination fixed effects). [Colour figure can be viewed at wileyonlinelibrary.com]

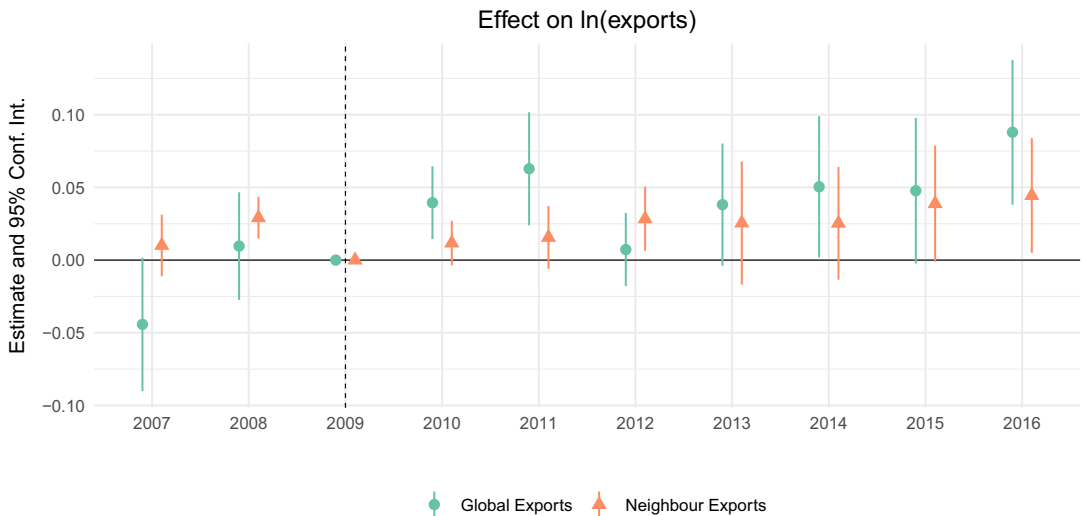


FIGURE B3 Event study using exports-only size measures (Note: This graph shows the adjustment in exports from a reduction in NTBs under the EUKFTA. Following the specification provided by Equation (2), it plots coefficients and 95% confidence intervals on the interaction $Kor_d \times Year_t \times \ln(size)$, where Kor_d is a dummy for South Korea and $size$ corresponds to either global exports or exports to neighboring economies of Japan and Taiwan within a firm-product combination over the control period (see Section 4.1). The chosen reference year is 2009, the year before the EUKFTA was signed. A set of firm-product-year, product-destination-year and firm-product-destination fixed effects). [Colour figure can be viewed at wileyonlinelibrary.com]