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## Trade Liberalization along the Firm Size Distribution: The Case of the EU-South Korea FTA

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# Trade Liberalization along the Firm Size Distribution: The Case of the EU-South Korea FTA

## Abstract

In 2011, the EU-South Korea Free Trade Agreement (EUKFTA) entered into force. With its focus on non-tariff barriers (NTBs), it is a leading example of a deep new generation agreement. Using detailed French customs data for the period 2000 to 2016, we investigate how exporters of different size have benefitted from the agreement. Applying a diff-in-diff strategy that makes use of the rich dimensionality of the data, we find that firms with larger pre-FTA sizes benefit more from the FTA than firms at the lower end of the size distribution, both at the extensive (product) and the intensive margins of trade. The latter finding is in surprising contrast to leading theories of firm-level behavior. Moreover, we find that our main result is driven by NTB reductions rather than tariff cuts. In shedding light on the distributional effects of trade agreements within exporters, our findings highlight the need for effective SME-chapters in FTAs.

JEL-Codes: F130, F140.

Keywords: trade policy, firm heterogeneity, firm size distribution, non-tariff barriers.

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# 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 trade agreements such as the Transatlantic Trade and Investment Partnership, negotiated between the US and the European Union (EU) from 2013 to 2016. Since then, trade policy-makers have worked to include chapters dedicated to supporting small and medium enterprises (SMEs). Interestingly, so far, there is little empirical evidence on the existence and magnitude of size-specific trade effects of FTAs and whether they are driven by tariff cuts or lower non-tariff barriers (NTBs). The present paper searches for size-specific effects of the EU-South Korea FTA (EUKFTA) on exports of French firms. It finds robust evidence for such size effects on the intensive and to an extent, the product margin.

Theoretical models based on Melitz (2003) imply that FTAs favor medium-sized firms. If an FTA lowers variable trade costs, holding aggregate variables constant, incumbent exporters' sales increase with proportional rates independent of size. By contrast, firms from the middle of the size distribution start exporting to the foreign market as lower variable trade costs lead to higher sales and to the necessary margins to cover fixed market access costs. If an FTA lowers fixed entry costs, mid-size firms appear even more as the main winners, since there is no direct effect on the sales of incumbent exporters at all. There is ample empirical support for these selection effects of trade liberalization, see, e.g., the survey by Melitz and Redding (2014). In contrast, evidence on the specific effects of FTAs along the size distribution of continuous exporters has remained scarce.

One reason for this may be that NTBs, commonly believed to be at least as important as tariffs, are hard to conceptualize and to measure accurately. Moreover, the long negotiation, anticipation, and phase-in periods of trade agreements make the use of long panels of firm-level trade data necessary, and such panels are scarce. In this paper, we are able to address these issues.

The EUKFTA is an excellent case to study. First, the agreement concerns two sizeable advanced economies. When it entered into force in 2011, it was the largest EU FTA in terms of joint market size.<sup>1</sup> 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 largely determined by the pre-existing level of MFN tariffs and not by other shocks, alleviating concerns regarding endogeneity. Third, the EUKFTA is still considered the prototype of a deep new-generation trade agreement with ambitious language on NTBs, both at the sectoral (vertical) and the cross-sectoral (horizontal) level.

French customs data is well-suited for our purposes since it contains a panel of firm-level trade

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<sup>1</sup>It remained the biggest EU FTA until 2017 when the EU-Canada Comprehensive Economic and Trade Agreement (CETA) began to be provisionally applied.

flows covering the years 2000 to 2016. Official negotiations over an FTA between the EU and South Korea began in 2007, with the FTA entering into force in July 2011. By comparing the period prior to negotiations (2000-2006) with the period after inception of the FTA (2011-2016), we can deal with anticipation effects. Moreover, the customs data allows the construction of a very general control group. Since we are interested in size-specific effects, we complement this diff-in-diff approach with the largest possible set of three-way fixed effects that diminish issues relating to omitted variable bias and other sources of possible endogeneity.<sup>2</sup>

Compared to papers that used specific proxies of NTBs (such as concerns raised by countries about technical barriers to trade (TBT) or sanitary and phytosanitary (SPS) measures), we employ an ‘umbrella’ approach inspired by the gravity literature (Baier and Bergstrand, 2007). Essentially, this amounts to an events-study technique where the FTA is summarized by an indicator variable. By definition, the indicator variable captures *all* trade effects attributable to NTBs, since tariff cuts are precisely observable and can be controlled for.

Our main result is that the agreement has boosted sales of incumbent exporters in the top quartile of the size distribution by about 94 percentage points more than firms in the bottom quartile. This result is mostly driven by lower NTBs, but larger firms appear to benefit more strongly from lower tariffs, too. While this result on the intensive margin is at odds with the standard Melitz (2003) model, our findings on the extensive margin are in line with theory: the FTA does indeed increase the export participation rate of medium-sized firms.<sup>3</sup>

Our main result 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 such as Melitz and Ottaviano (2008) imply that more productive (and, hence, larger) exporters do not benefit as much as their less productive peers when trade costs fall, as they face less elastic demand curves. Arkolakis (2010) predicts that trade liberalization boosts the sales of larger exporters by smaller rates than those of smaller firms because of convexly increasing marginal penetration costs.

In comparison, our intensive margin result would be consistent with a configuration where the FTA lowers effective trade barriers more strongly for larger firms. For instance, it is conceivable that detailed provisions of the FTAs such as the 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

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<sup>2</sup>Our regressions allow for multiple three-way fixed effects such as firm-product-destination, firm-destination-time and firm-product-time fixed effects, thereby eliminating many possible sources of endogeneity.

<sup>3</sup>This has important labor market consequences. In many models with rent-sharing, the wage distribution follows the size distribution Helpman, Itskhoki, and Steven Redding (2010). Hence, our result suggests that the FTA may have increased wage inequality.

requires some fixed investment that firms with larger sales find easier to undertake.<sup>4</sup>

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 reduction 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 reduction 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, Orefice, Piermartini, and Rocha (2015) on sanitary and phytosanitary (SPS) measures.<sup>5</sup> Much of this literature has focused on the selection effect (i.e., the extensive margin of trade liberalization) while we have special interest in *differential* size-effects along the intensive margin.

Second, a small literature reports advantages of large firms in trade liberalization episodes; see Fontagné, Orefice, and Piermartini (2020) on border formalities, Carballo et al. (2016) on border entry timings, and Karpaty and Tingvall (2015) on corruption. Our paper broadens this analysis to the wide range of NTBs that are addressed by a deep FTA, studies the evolution over time and sectors, compares NTBs to tariffs, and extends the investigation to imports.

Third, a few papers have studied the trade effects of the EUKFTA. Lakatos and Nilsson (2017) use monthly EU-wide trade data at the 8-digit product level in a gravity-type model. They report an increase of 11.2% in the probability to export and a 10.7% increase in the value of EU exports. The only other study that uses firm-level data to evaluate EUKFTA is Kasteng and Tingvall (2019). The authors use transactions-level import data for Swedish firms for one month (November 2016) to examine preference utilisation rates (PUR).<sup>6</sup>

The rest of the paper is structured as follows. Section 2 provides the necessary background for the EUKFTA and discusses the tariff liberalisation and NTB reductions envisioned by the agreement. It describes the customs database used and our measure of firm size. It provides a first glance at the data by showing the characteristics of firms exporting to South Korea and the changes in composition of French exports to South Korea before and after the FTA. Section 3 sets out the empirical methodology for examining the firm-level impact of the agreement and shows baseline results. Section 4 proposes two extensions of our baseline model to examine the differential impact of NTB reductions over time and the impact of the agreement on firms' entry and product margins. A range of robustness checks are reported in Section 5. Finally, concluding remarks and policy implications are presented in Section 6.

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<sup>4</sup>Such investment could be related to rules of origin which require firms to provide documentation and, possible, also to restructure their supply chains.

<sup>5</sup>Our work also relates to the large gravity literature on the trade effects of FTAs, which uses aggregate data; see Head and Mayer (2014) or Yotov et al. (2008).

<sup>6</sup>Using a New Quantitative Trade Theory (NQTT) model 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 upto 2014. They find that the agreement boosted the EU's GDP by approximately € 4.4 billion and increased EU exports to South Korea by 42% relative to the benchmark scenario with no FTA.

## 2 The EU-South Korea FTA: Overview and a First Glance at the Data

### 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 on this FTA were launched in 2007 and following eight official rounds of talks, the agreement was signed in 2010. After ratification in parliaments, the FTA was provisionally applied from July 2011 onwards. Since then, the agreement has become a model for other ‘new generation’ EU FTAs, because of its unprecedented scope, depth and speed of liberalisation. The commitments under EUKFTA extend beyond tariff reductions to so called WTO-X provisions covering competition policy, intellectual property rights and the movement of capital. It was also the first EU FTA to include a dedicated chapter on sustainable development. The EUKFTA does not feature a special SME-chapter. However, its provisions on transparency and regulatory stability have the intention of supporting SMEs.<sup>7</sup> Nevertheless, the EUKFTA is different from earlier agreements in being what the literature refers to as a ‘deep’ trade agreement (see, e.g., Dür, Baccini, and Elsig (2014) or Mattoo, Rocha, and Ruta (2020)).

The agreement features deep tariff cuts across the board. In 2010, the simple average of the EU’s applied MFN tariffs faced by South Korean exporters stood at 5.1%. With the FTA’s implementation, this was reduced drastically to approximately 0.5% in 2011. For EU exporters, the simple average of South Korean duties reduced from 12.1% to 6.2% upon entry in force. Within five years, the agreement eliminated 98.7% of duties in trade value for both agricultural and industrial goods (European Commission, 2010). In 2010, South Korea’s MFN rates were higher than the EU’s with greater protection provided to industries such as animal and vegetable products, foodstuffs and textiles. When the agreement entered into force in 2011, most industries experienced rapid liberalisation 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 10 years and longer, largely for relatively sensitive products in the agri-food sector.<sup>8</sup>

In our analysis, we will use a complete global matrix of applied bilateral tariffs at the HS 6-digit product level that is drawn from Felbermayr, Teti, and Yalcin (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. Information on a given product’s tariff staging category is drawn from the FTA tariff schedules, available through the WTO’s RTA database.

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<sup>7</sup>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). They also feature in all agreements currently under negotiation.

<sup>8</sup>Figure 5 in the 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 EU’s total exports to and 89% of EU’s total imports from South Korea comprised of goods.



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, recognised UNECE as the relevant standard-setting body for motor vehicles and agreed to policy coordination in SPS and TBT measures. The agreement also eliminated quantitative import restrictions and featured several ‘horizontal’ clauses that would benefit all sectors eg. improving transparency, availability of information and customs facilitation.<sup>9</sup> In our analysis, we work with an event studies approach to capture all NTBs.

## 2.2 Customs Data

To examine the impact of the agreement on firms, we use customs data from France over the period of 2000-2016 (dataset DGDDI, 2018). This data provides information on export sales and import purchases of the universe of French trading firms ( $f$ ), disaggregated by destination or source country ( $d$ ) and product ( $p$ ) over time ( $t$ ).<sup>10</sup> Services trade is not included. Since each firm is assigned a time-invariant unique identifier (“SIREN”), it is possible to follow its export and import trajectory 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. Due to changes in the reporting threshold in 2011, we follow Bergounhon, Lenoir, and Mejean (2018) by dropping observations where a firm’s annual exports or imports amount to less than € 1000. In all, the customs data cover approximately 390,000 exporting firms and 413,500 importing firms that trade in nearly 5000 products and with 194 countries.

<sup>9</sup>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 EU and South Korea.

<sup>10</sup>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 Générale des Douanes et Droits Indirects – a directorate of the French Ministry of Finance). The authorization is granted by the “Comité 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/>.

## 2.3 Measuring Size

We use the customs data described above to proxy a firm's size by the total of its trade with markets other than South Korea. 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.<sup>11</sup> 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, Orefice, and Piermartini, 2020). Retaining these firms is important to our analysis since we're interested in the differential impact of the FTA along the full size distribution.

Furthermore, using customs data instead of balance sheet information allows us to define size at the firm-product (variety) 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 robustness checks to investigate this choice.

Our size measure is therefore measured as the total trade (exports and imports) of a firm across destinations within a HS-6 digit product over the control period (2000-2006), excluding any trade with South Korea.<sup>12</sup> This definition is based on a time window that ends five years before entry into force of the EUKFTA and even before negotiations on the agreement began, thereby taking 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 (Melitz and Redding, 2014; Fontagné, Orefice, and Piermartini, 2020).<sup>13</sup>

## 2.4 Characteristics of firms trading with South Korea

Our data includes firms that either export to South Korea or import from it or trade both ways with the country. The data also features firms that never trade with South Korea. Of all French exporters in the data, 4.87% exported to South Korea during the control period (2000 to 2006). That share stands at 2.16% when looking at all firm-product combinations. How different are these firms from each other in terms of our size measure? To examine this, we report summary

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<sup>11</sup>The Enquete Annuelle d'Enterprise (EAE) is a survey that provides balance sheet information of firms along with the SIREN identifier that enables matching.

<sup>12</sup>With some abuse of terminology, we refer to our preferred size measure as a measure of firm size rather than as to a measure of size based on a firm's product. Over the control period (2000-2006), 56.6% of all exporting firms sold more than one product internationally. Amongst those firms that exported to South Korea in this period, 93.6% were multi-product exporters and 50.6% sold more than one product to South Korea.

<sup>13</sup>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.

statistics in Table 1. Within product classes, firms trading both ways with South Korea are (on average) more than 200 times larger than firms not trading with South Korea. Firms that export (but not import) to South Korea are still more than 35 times as large, with an average size of € 32 million. This picture becomes even more pronounced when looking at median values instead of means, with the median size of exporters to South Korea being more than 50 times larger than firms that do not trade with South Korea at all. Within those groups there is a substantial degree of skewness which tends to increase in the size of the groups and is thus smaller amongst firms trading with South Korea than in the full sample.<sup>14</sup> Against the backdrop of existing literature, these results are as expected.<sup>15</sup>

**Table 1:** Size distribution and trade with South Korea (in million €)

	Number	Mean $\bar{\mu}$	p25	p50	p75	$\bar{\mu}/p50$
Two-way trade w/Korea	3105	200.875	1.107	8.349	51.513	24.060
Exported to Korea	31,712	32.149	0.077	0.737	6.426	43.624
Imported from Korea	19,362	10.163	0.035	0.249	1.845	40.815
No trade w/Korea	4,385,575	0.859	0.004	0.013	0.064	66.077
All firm-product pairs	4,439,754	1.263	0.004	0.013	0.067	97.154

*Note:* This table reports summary statistics for our size measure calculated as the total exports and imports of a firm in a given HS-6 digit product (excluding trade with South Korea) over the period 2000 to 2006 i.e. before negotiations for the EUKFTA began. It describes the size distribution of firms (defined at the firm-product level) which i) exported to and imported from South Korea at least once over 2000-2006; ii) exported to but never imported from South Korea; iii) imported from but never exported to South Korea; iv) did not trade with South Korea and; v) traded with any destination over 2000-2006.

French firms exporting to South Korea also tend to be diversified across destinations as well as 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%). 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 these 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 expectations and prior research, we find that multi-product firms, firms serving multiple destinations, and firms serving neighbouring markets like Japan, Taiwan or

<sup>14</sup>Amongst the two-way traders, 60% fall within 3 HS chapters - i) 84 (Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof); ii) 85 (Electrical machinery and equipment and parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles) and; iii) 90 (Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof).

<sup>15</sup>It arises in heterogeneous firms models with asymmetric countries. Given comparable high trading costs (both fixed and variable) resulting from geographical and cultural distance to France, only the most efficient firms select into the Korean market (Chaney, 2008), and they tend to export their best performing products (Mayer, Melitz, and Ottaviano, 2014). Similarly, the productivity (and size) premium of two-way traders over one-way traders has also been reported in prior literature such as Kasahara and Lapham (2013) which posits the role of import-export complementarities in driving this gap.

both are significantly more likely to export to South Korea in the control period (2000 to 2006). Using simple two-period linear probability panel models, Table 8 in the Appendix 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 interesting alternative destinations for French exporters to South Korea. After the entry into force of the EUKFTA the likelihood to export to South Korea appears significantly higher for all those firms, with a particularly strong effect amongst firms exporting to Japan and/or Taiwan. These findings reaffirm core predictions in the Melitz (2003) models regarding selection effects.

## 2.5 Effect of the FTA – First Glance at the Data

Within the EU, France is amongst the top trade partners of South Korea. In 2016, it accounted for approximately 8.85% of 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.

To examine the contributions of various margins to overall growth in trade, we follow Bernard et al. (2009) and decompose exports to South Korea into i) unique number of firms; ii) unique number of products; iii) average exports per firm-product pair (variety) and; iv) density i.e. the fraction of all possible firm-product pairs for which exports are positive. We compute changes in these margins, where the margins are first averaged across years within two periods (2000-2006 and 2011-2016) and then differenced. Furthermore, 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. Moreover, there is a high degree of correlation between exporting to South Korea and exporting to either of these two countries prior to adoption of the FTA (Table 8 in Appendix B).

Panel A in Figure 1 depicts changes for these various margins between the control and FTA period. 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 percentage points, driven by increases in the number of exported varieties

and in the average exports per variety. In subsequent regressions, we expand the control group to include all other countries in the customs data set and introduce high dimensional product-destination-time and firm-product-destination 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 continuous exporters, entrants and exiting firms. We find that exports to South Korea in the post-FTA period were approximately €6 billion higher compared to the control period. This is largely driven by a €7.7 billion increase in the sales of continuous exporters. In comparison, firms that newly entered the South Korean market contributed €3.2 billion in additional exports whereas firms that exited the market led to a decline in sales of €4.9 billion. In Japan and Taiwan, total goods exports of French firms shrank as many firms exited over 2011-2016.

These preliminary findings from the data 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 i.e. firms that had already exported to South Korea in the period before the start of the EUKFTA negotiations. Amongst the set of continuously exported varieties, the top quartile of the size distribution saw an increase in exports to South Korea by 38% (at the median) whereas the bottom quartile firms grew by approximately 26% (see panel B of Figure 1). 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.

### 3 Empirical Methodology

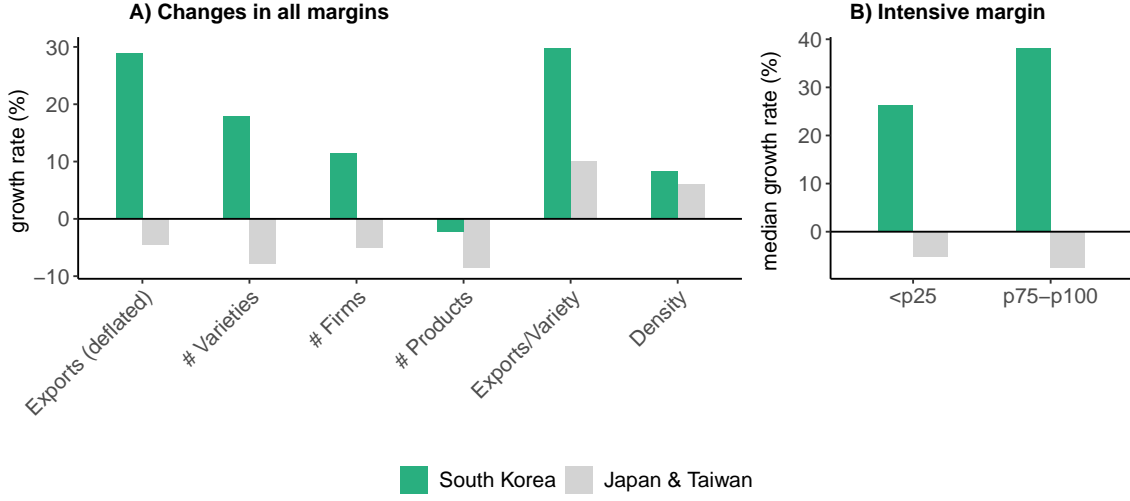
#### 3.1 Baseline Specification

We build on the evidence provided in Section 2 by adopting a difference-in-differences approach that expands the control group beyond Japan and Taiwan to include all other countries in the customs dataset and introduces high dimensional fixed effects that control for firm, product and destination characteristics. Our baseline specification for the intensive margin is as follows:

$$\ln X_{fpt} = \sum_k \beta^k (\mathcal{I}_{dt} \times Size_{fp}^k) + \sum_k \gamma^k (\ln \tau_{pdt} \times Size_{fp}^k) + \sum_k \delta^k (\mathcal{I}_{dt} \times \ln \tau_{pdt} \times Size_{fp}^k) + \mathbf{Z} + \theta_{fpt} + \theta_{pdt} + \varepsilon_{fpt} \quad (1)$$

The dependent variable is the log of export revenue  $X_{fpt}$  of a firm  $f$  in a given product  $p$ , to

**Figure 1: Change in exports from France**



*Note:* Panel A of the figure above 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 of growth rates in sales of varieties 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 varieties within the top quartile (p75-p100) and the bottom quartile of the size distribution (<p25). In both panels, export values are first adjusted by France's GDP deflator drawn from the World Bank Database. Exports to South Korea are shown in green, Japan and Taiwan are plotted in grey.

country  $d$  at time  $t$ .<sup>16</sup> We aggregate exports to two periods – a control period (2000-2006) and an FTA-period (2011-2016) – instead of working with yearly data, which raises issues related to the volatility of firm-level data.<sup>17</sup> Furthermore, this specification is easily augmented by introducing multiple years which we do in the next section (Section 4).

The treated country is South Korea with all remaining countries in the data forming the control group. Our choice of the control group of countries is hence both expansive and agnostic. The treatment dummy for the agreement  $\mathcal{I}_{dt}$  takes the value of 1 for South Korea in the post-FTA period and 0 otherwise. We further interact this dummy with  $k + 1$  firm size bins, taking smaller firms as the base category. The associated series of coefficients  $\beta^k$  then capture firm heterogeneity in liberalisation effects, relative to the smallest firms. By varying the definitions of these bins, we are able to distinguish how firms at the top behave differently from firms in the chosen reference category. We also add size-bin interactions with the applied tariff factor  $\tau_{pdt}$ , defined as  $1 + \text{tariff rate}$ , distinguishing between an average base effect (applying to any change in tariffs) and EUKFTA-specific tariff changes.

With the presence of tariffs in the specification, the  $\beta^k$  coefficients provide a clean identification of NTB reductions by construction i.e. they capture all effects of the FTA on firm exports net

<sup>16</sup>In principle, we could collapse the data over the product dimension and study changes in exports at the firm-destination-time level. We do so as a robustness check in Table 12 in Appendix B.

<sup>17</sup>We use the French GDP deflator to account for changes in output prices within periods.

of tariffs. Accordingly, these  $\beta^k$  coefficients can be interpreted as a ‘catch-all’ for the impact of NTB reductions, allowing for heterogeneity across firms. Therefore, our empirical methodology departs from prior literature by circumventing the need to define and measure the wide variety of horizontal and sector-specific NTBs that restrict cross-border trade.

The vector  $\mathbf{Z}$  includes interactions between the various size bins and a dummy variable that takes the value of 1 in the second period for all other countries with which the EU implemented FTAs after the control period.<sup>18</sup> 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 approach over excluding the EU’s new FTA partners from the control group as the latter may bias fixed effects estimations, particularly for products that may be heavily traded with those countries.

Finally, the specification includes a rich set of fixed effects (firm-product-destination, firm-product-time and product-destination-time) such that the  $\beta^k$  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, distribution networks, management practices and firm abilities amongst others. Given the two period structure of the model and the set of fixed effects included, the underlying sample is a strongly balanced panel of firm-product-destination triplets. Hence, identification is based purely on variation over time in the intensive margin of firms’ exports.

Any unobservable variables relating to incumbent exporters to South Korea are captured by including firm-product-destination fixed effects. This fixed effect also drops firms which may have lobbied for the FTA but which did not export to South Korea in the control period. 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. Finally, the error term is clustered by firm, product and destination.

An important aspect of our econometric strategy is that the estimated coefficients only indicate the *relative* effects of NTB and tariff liberalisation, i.e. relative to the chosen reference category. They do not reflect the aggregate impact of the agreement on French exports, for which CGE methods are better suited. Instead, our focus is on the *differential* impact of NTB reductions and tariff cuts on firms’ intensive margins along the size distribution.

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<sup>18</sup>This list of FTAs is drawn from the Design of Trade Agreements (DESTA) database by Dür, Baccini, and Elsig (2014) and reported in Table 7 in Appendix A. In all, 16 agreements were implemented of which the deepest were the EUKFTA, EU-Georgia (2014) and EU-Moldova (2016).

### 3.2 Baseline Results

Regression results based on equation (1) are reported in the first column of Table 2. In this column, we compare firms belonging to different quartiles of the size distribution to those in the bottom quartile. The positive and statistically significant  $\beta^k$  coefficients indicate that larger firms exhibited a stronger response to NTB reductions. This response is greatest for firms in the top quartile, for which exports to South Korea grew by approximately 94 percentage points more relative to firms in the bottom quartile.<sup>19</sup> In fact, the regression reveals a monotonic pattern: the relative increase in exports due to the NTB reductions continuously falls as size shrinks.<sup>20</sup> The size advantage holds even if we interact the EUKFTA dummy with a continuous measure of size or with a dummy for firms in the top half of the size distribution (see Tables 10 and 11 in Appendix B). Comparing firms above and below the median size, we observe that NTB reductions boosted exports by approximately 40 percentage points more in the upper half of the size distribution relative to the lower half.

This pattern of monotonicity is approximately maintained when the effects of NTB reductions under the agreement are estimated at every decile of the size distribution, relative to firms in the bottom decile (see Figure 9 in Appendix B). The steepest gains are accrued by the top 10% of firms whose export growth is 300 percentage points higher in comparison to the lowest decile.<sup>21</sup> This baseline result provides further evidence of firm heterogeneity i.e. firms differ in the extent to which they benefit from NTB reductions and complements existing studies that show heterogeneity in elasticities across firms from reductions in specific types of NTBs.

Besides NTB reductions, our results also shed light on the impact of tariff cuts along the size distribution. The average base effect of tariff cuts ( $\gamma^k$  coefficients) indicates that it is only the top quartile firms that have tariff elasticities significantly higher than the bottom quartile firms. When looking at the EUKFTA-specific tariff cuts ( $\delta^k$  coefficients), we do not find any statistically significant hierarchy in tariff elasticities across size bins.<sup>22</sup> Overall, the baseline results in Table 2 give us an insight into the mechanisms underpinning the size advantage in FTA effects. They show that the gap in export growth between large and small firms is driven by the reduction in NTBs due to the EUKFTA and tariff cuts more generally.

These findings may stem from the fact that larger firms have the capacity to plan towards and invest in better leveraging the benefits of the agreement eg. by hiring specialised consultants and lawyers to meet testing, certification and complex rules of origin requirements. Alternatively,

<sup>19</sup>This is calculated as  $(\exp(0.664) - 1) \times 100 = 94.25$ .

<sup>20</sup>Here, standard errors are clustered by firm, product and destination. However, the results do not change if standard errors are clustered by different dimensions of the data eg. firm-product, firm-destination or product-destination. See Table 9 in Appendix B for further details.

<sup>21</sup>Note that estimates are less precisely estimated as standard errors grow when the distribution is split into more bins. Therefore, we prefer the comparison across quartiles in the baseline model.

<sup>22</sup>Though the coefficient of -1.67 for firms in the ( $p50 - p74$ ) bin is significant at the 90% confidence level, it is not robust to clustering choices. See Table 9 in Appendix B.



large firms may be lobbying for favourable rules and consequently receiving larger NTB cuts than smaller firms. The latter channel has been examined by recent work such as Blanga-Gubbay, Conconi, and Parenti (2020) who use detailed information from lobbying reports and develop a model where only large pro-FTA firms select into lobbying.<sup>23</sup> Overall, our results hold significant implications for the design of deep trade agreements. If NTB and tariff reductions disproportionately benefit larger firms, then it becomes critical to include provisions supporting SMEs to ensure broad-based gains from trade. These provisions must be effective in reducing trade costs for SMEs in order to promote more equitable export growth.

## 4 Extensions

### 4.1 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 time. To address this issue, we exploit the long time dimension of the French customs data that spans 17 years from 2000-2016. Correspondingly, the specification in equation (1) is expanded by replacing the  $\mathcal{I}_{dt}$  dummy with a South Korea dummy ( $Kor_d$ ) and a series of year dummies. This modification allows us to examine the evolution of the impact of NTB reductions in South Korea on large firms relative to smaller ones. As the agreement was implemented in 2011, we take 2010 as the reference year.

To ensure that our proxy for size remains exogenous, we measure size based on the total trade within firm-product (excluding South Korea) in the first available year (2000) and then drop data from 2000 from the sample. As we're interested primarily in adjustments to the intensive margin, only those firm-product-destination triplets are retained that registered positive exports throughout 2001-2016.<sup>24</sup> As before, we include interactions between tariffs and size bins as well as interactions between size bins, year dummies and other countries with which the EU entered into FTAs over the sample period.

Figure 2 shows the resulting estimates and 95% confidence intervals for the adjustment in exports of the top quartile of varieties relative to the bottom quartile stemming from a reduction in NTBs under the EUKFTA. We observe a clear break following the implementation of the agreement in 2011, with large firms posting substantially higher growth in sales from NTB reductions in comparison to smaller firms. Surprisingly, this size advantage kicks in immediately

<sup>23</sup>Given that firm identifiers are anonymised in the French customs data, a similar exercise of linking lobbying efforts to size and trade flows is not feasible in our case.

<sup>24</sup>Doing so significantly restricts our sample from approximately 227,000 varieties under the two-period model to 24,000 varieties under the dynamic model.

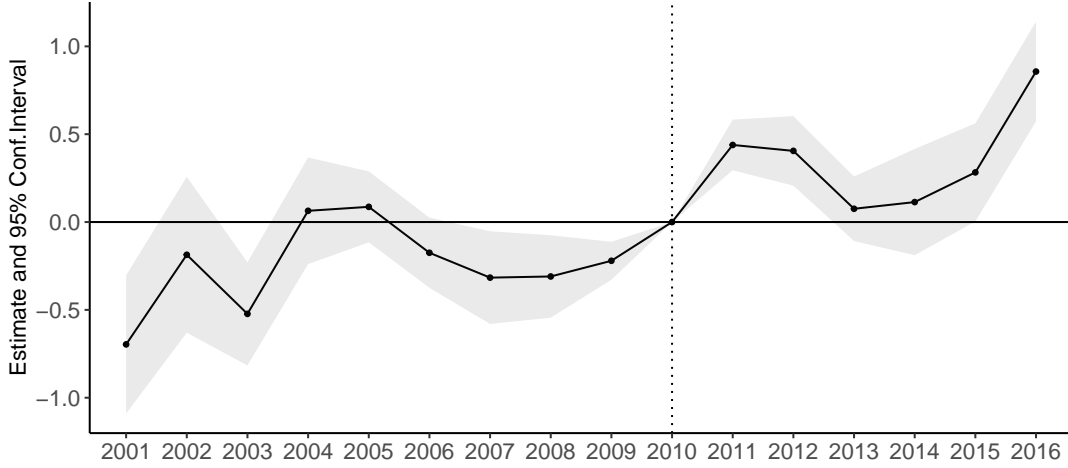
**Table 2:** Differential impact of tariff and NTB reductions on export margins

Model:	Baseline	Extensions	
Dependent variable:	ln(exports)	Exporter (0,1)	ln(products)
$\mathcal{I} \times$			
p75-p100	0.664*** (0.144)	-0.050*** (0.014)	0.055 (0.059)
p50-p74	0.564*** (0.138)	-0.005 (0.014)	0.031 (0.063)
p25-p49	0.373** (0.154)	0.025 (0.016)	0.079 (0.065)
$\ln \tau \times$			
p75-p100	-1.13*** (0.413)	-0.039 (0.145)	-0.682* (0.351)
p50-p74	-0.280 (0.314)	-0.488*** (0.102)	-1.003*** (0.309)
p25-p49	0.181 (0.337)	-0.386*** (0.105)	-0.590* (0.340)
$\mathcal{I} \times \ln \tau \times$			
p75-p100	-1.27 (0.979)		
p50-p74	-1.67* (0.858)		
p25-p49	0.704 (0.868)		
Fixed effects	$\theta_{fpt}, \theta_{fpt}, \theta_{pdt}$	$\theta_{fd}, \theta_{ft}, \theta_{dt}$	$\theta_{fd}, \theta_{ft}, \theta_{dt}$
Clustering	$f - p - d$	$f - d$	$f - d$
Observations	1,758,070	2,381,415	3,196,118
R <sup>2</sup>	0.918	0.653	0.887

*Note:* The table above reports regression results for the impact of the EUKFTA along different export margins. Column (1) contains baseline results for the intensive margin following the specification in equation (1). Size is defined at the firm-product level and tariffs at the product-destination-time level. Only continuous exporters are retained i.e. firm-product-destination triplets with positive exports in both control (2000-2006) and FTA (2011-2016) periods. Columns (2) and (3) provide results for extensive margins of exporting following the specification in equation (2). Since the dependent variables here are defined at the firm-destination-time level, size is correspondingly computed at the firm level (aggregating across products) and tariffs are averaged across products within a given destination and time period. Significance codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1

upon entry into force of the agreement, as the coefficient turns positive. The coefficient is even higher Closer to the end of the sample period, indicating that the size advantage is magnified. Therefore, our results shed light on the dynamics of firms' size advantage from NTB reductions - a finding that has not been examined in prior empirical literature and is not reproduced by leading heterogeneous firm trade models.

**Figure 2:** Export growth from NTB reductions - Top 25% relative to bottom 25%



*Note:* This graph shows the adjustment in exports of the top quartile of varieties relative to the bottom quartile, from a reduction in NTBs under the EUKFTA. Following the specification provided by equation (1), it plots coefficients and 95% confidence intervals on the triple interaction  $Kor_d \times Year_t \times (p75 - p100)$ , where  $Kor_d$  is a dummy for South Korea and  $(p75 - p100)$  is a dummy variable that takes the value of 1 for varieties in the top quartile of the size distribution and 0 otherwise. The chosen reference year is 2010, the year before the EUKFTA entered into force. The regression also includes similar triple interaction terms for the second and third quartiles of the size distribution. A set of firm-product-year, product-destination-year and firm-product-destination fixed effects are included. Additional controls include interactions between tariffs and firm size bins as well as interactions between size bins, year dummies and other countries with which the EU entered into FTAs over the sample period. Two-way (destination & year) clustered standard-errors in parentheses.

## 4.2 Market Entry and Product Diversification

Although our focus is on the impact of NTB and tariff 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. 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 (2) below. Now, the dependent variable corresponds to either a dummy variable for a firm's exporting status or the log number of products exported to a given destination  $d$  at time  $t$ . Correspondingly, we move our measure of size 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 their log values interacted with size bins.<sup>25</sup> The vector of controls  $\mathbf{Z}$  includes interaction terms between size bins and a dummy that takes the value of 1 in the second period for all other countries with which the EU signed FTAs after 2006.

$$Y_{fdt} = \sum_k \beta^k (\mathcal{I}_{dt} \times Size_f^k) + \sum_k \gamma^k (\ln \tau_{dt} \times Size_f^k) + \mathbf{Z} + \theta_{fd} + \theta_{ft} + \theta_{dt} + \varepsilon_{fdt} \quad (2)$$

These regressions include all possible fixed effects (firm-destination, firm-time and destination-time) such that the  $\beta^k$  coefficients can still be estimated. The results are reported in Table 2. In the case of firm entry, identification is based 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.

For firm entry in column (2), we find the  $\beta^k$  coefficients to be negative. This implies that NTB reductions induced new firms into exporting to South Korea and these firms 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 8 in Appendix A). We also find that the top quartile firms had lower tariff elasticities for the entry margin than intermediate-sized firms, confirming the predictions of the Melitz (2003) model on selection into exporting from the middle of the size distribution. In the case of the product margin reported in column (3), NTB reductions do not generate discernible size effects although the effect is clearly observed when comparing the top decile to the bottom decile firms (see Figure 10 in Appendix B).

## 5 Further Robustness Checks

In this section we describe additional robustness checks to our key result that exports of large firms grew more due to NTB reductions under the EUKFTA. As there is no statistically significant change in tariff elasticities following the entry into force of the EUKFTA, the tables report only the general tariff elasticities across size bins.

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<sup>25</sup> Coefficients on the triple interaction between  $\mathcal{I}_{dt}$ ,  $\ln \tau_{dt}$  and size bins cannot be identified due to multi-collinearity with  $\gamma^k$  coefficients.

## 5.1 Truncating the Size Distribution

First, our baseline results may be affected by the presence of outliers. To address this concern, we replicate the specification in column (1) of Table 2 after dropping the top 1%, 5% and 10% of firms and redefining size bins on the remaining sample. This allows us to test whether the size effect from NTB reductions disappears as the size distribution is modified. As Table 3 shows, this is not the case. NTB reductions continue to favour the largest firms. Similar to our main result, the advantage from size is consistently observed not only for NTB reductions but also for tariff cuts though tariff elasticities gradually diminish with the exclusion of an increasing number of large firms.

**Table 3:** Impact of NTB reductions and tariff cuts after excluding large firms

Dependent Variable:	ln(exports)		
	Drop top 1%	Drop top 5%	Drop top 10%
$\mathcal{I} \times$			
p75-p100	0.639*** (0.142)	0.628*** (0.154)	0.601*** (0.160)
p50-p74	0.558*** (0.140)	0.504*** (0.154)	0.420*** (0.161)
p25-p49	0.367** (0.155)	0.397** (0.162)	0.369** (0.162)
$\ln \tau \times$			
p75-p100	-0.987** (0.410)	-0.851** (0.394)	-0.773* (0.404)
p50-p74	-0.207 (0.327)	-0.281 (0.347)	-0.161 (0.354)
p25-p49	0.245 (0.353)	0.224 (0.392)	0.289 (0.451)
Observations	1,696,706	1,545,340	1,390,912
R <sup>2</sup>	0.917	0.919	0.924

*Note:* Regression results are based on equation (1), where the dependent variable is exports at the firm-product-destination level aggregated to two periods: 2000-2006 and 2011-2016. In each of the columns, size bins are recalculated after dropping the top 1%, 5% and 10% of varieties from the sample. Additional controls include interactions between a  $\mathcal{I}_{dt}$ , tariffs and size bins as well as interactions between size bins and a dummy variable that takes the value of 1 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 i.e. firms that have positive exports in a given product-destination for each of the two periods. Three-way (firm-product-destination) clustered standard-errors in parentheses. Significance codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1

## 5.2 Alternative Size Measures

Our findings may differ based on how firm size is computed. Therefore, we estimate equation (1) with different measures of firm size in order to check the sensitivity of our results to the chosen proxy. Besides our standard size measure defined in Section 2.3, we construct two alternative size measures, again using data only from the control period spanning 2000-2006 and excluding trade with South Korea. These are intra-EU trade of the firm (within a product class) and global trade of the firm across all products. Table 4 reports our results. We find that the size advantage of large firms relative to those in the bottom quartile persists across the various size measures. This gives us greater confidence in our key result.

Similar to our baseline result, there is a size hierarchy in  $\beta^k$  coefficients across all regressions. Thus, being a large firm within the EU in a given product or being large overall (across products) conferred advantages in export growth from NTB reductions under the EUKFTA. Looking at tariffs, when size is defined at the firm-wide level rather than the firm-product level, we don't observe any statistically significant difference in elasticities across the size bins. This indicates that the proper estimation of size-specific tariff elasticities may require firm size to vary at the product-level just as tariffs do.

## 5.3 Heterogeneity across Sectors

Till now, we've examined 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 attempt to examine this channel by splitting the sample and estimating our baseline regression for each sector.<sup>26</sup> Figure 3 shows the estimated values and 95% confidence intervals of the coefficients on  $\mathcal{I}_{dt} \times p75 - p100$  interactions 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 sectors, the size effect is positive and statistically significant, particularly in the case of France's top export categories such as machinery, electrical, chemicals, transport goods and foodstuffs. We observe no statistically significant size advantage in other sectors such as plastics, textiles and leather products and an advantage of small firms in animal products. However, these account for very minor shares in France's export basket to South Korea and therefore, coefficients for sectors such as vegetable products are also estimated with higher standard errors due to fewer available observations. Overall, the size advantage from NTB reductions is not driven by outlier sectors alone but emerges as a systematic feature in the data.

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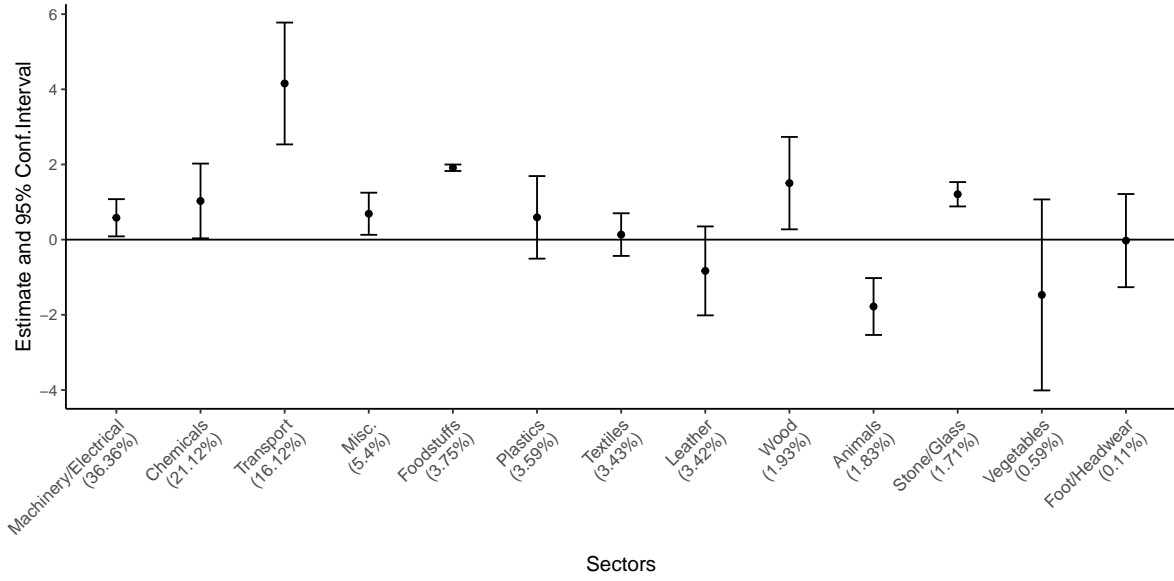
<sup>26</sup>Based on sector classification for the Harmonized System (HS) nomenclature provided by WITS.

**Table 4:** Heterogeneous impact of FTA with varying definitions of firm size

Dependent Variable:	ln(exports)		
	Trade	Intra-EU	Firm-wide
$\mathcal{I} \times$			
p75-p100	0.664*** (0.144)	0.291*** (0.058)	0.505*** (0.137)
p50-p74	0.564*** (0.138)	0.185*** (0.062)	0.437*** (0.134)
p25-p49	0.373** (0.154)	0.170* (0.091)	0.212 (0.141)
$\ln \tau \times$			
p75-p100	-1.13*** (0.413)	-0.786*** (0.283)	-0.129 (0.199)
p50-p74	-0.280 (0.314)	0.355 (0.275)	-0.160 (0.217)
p25-p49	0.181 (0.337)	1.14*** (0.386)	0.091 (0.202)
R <sup>2</sup>	0.918	0.918	0.918

*Note:*  $N = 1,758,070$ . Regression results are based on equation (1) where the dependent variable is exports at the firm-product-destination level aggregated to two periods: 2000-2006 and 2011-2016. In each column, firm size is defined differently. Using data only from the control period (2000-2006) and excluding trade with South Korea, these size measures are i) global trade within the firm-product pair (our baseline measure); ii) intra-EU trade in the firm-product and; iii) global trade of the firm across products. Since regressions include firm-product-destination fixed effects, only continuously exported varieties are retained i.e. firm-product pairs that have positive exports in a given destination for each of the two periods. Three-way (firm-product-destination) clustered standard-errors in parentheses. Significance codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1

**Figure 3:** Variation across sectors: Top 25% relative to bottom 25%



*Note:* Following the specification provided by equation (1), this graph plots coefficients on the triple interaction  $\mathcal{I}_{dt} \times p75 - p100$  for every sector. The regressions include similar triple interaction terms for the second and third quartiles. The sectors are arranged from left to right by the decreasing order of their shares in France's exports to South Korea in the control period.

## 5.4 Tariff Staging

An alternative approach to examining the impact of NTB reductions on the intensive margin of exports is shown in Table 5. Using 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. By estimating equation (1) for these categories, we can ascertain whether the FTA had a differential impact depending on the length of phasing out periods.<sup>27</sup>

Looking at the first column in Table 5, we observe that the exports of already duty-free goods grow more for larger firms than smaller firms following the FTA. Since South Korea applied no tariffs on these products, we can be certain that the  $\beta^k$  coefficients capture size-specific elasticities from NTB reductions. The effect is particularly strong for the top quartile firms. Moreover, these goods also tend to be highly sensitive to tariff cuts, more generally. The size advantage in NTB reductions is smaller in magnitude but remains salient in the case of goods with short phasing-out periods and disappears for goods where tariffs were set to be eliminated over a ten year horizon or longer.

<sup>27</sup>In this case, the triple interactions between the  $\mathcal{I}_{dt}$  dummy, tariffs and size bins tend to drop out due to multi-collinearity and are therefore excluded in the estimations reported in Table 5.



**Table 5:** Effect of NTB reductions across tariff staging categories

Dependent Variable:	ln(exports)				
	MFN=0	EIF	3 years	10 years	11+ years
$\mathcal{I} \times$					
p75-p100	1.48*** (0.304)	0.644*** (0.176)	0.741** (0.333)	0.041 (0.240)	-0.410 (0.546)
p50-p74	1.02*** (0.346)	0.539*** (0.174)	0.745** (0.341)	-0.048 (0.207)	-0.022 (0.498)
p25-p49	1.01** (0.397)	0.292 (0.185)	0.284 (0.399)	-0.036 (0.262)	0.678 (0.670)
$\ln \tau \times$					
p75-p100	-4.6*** (1.430)	-0.708 (0.482)	-2.78*** (0.777)	-0.137 (1.030)	-0.933 (1.070)
p50-p74	-3.29** (1.430)	0.033 (0.414)	-1.52** (0.752)	0.542 (1.010)	0.583 (1.230)
p25-p49	-3.42** (1.420)	0.648 (0.550)	-1.89** (0.867)	1.13 (1.190)	0.171 (1.670)
Observations	191,936	893,520	252,892	224,251	43,156
R <sup>2</sup>	0.92407	0.91928	0.90826	0.91623	0.92594

*Note:* Regression results are based on equation (1) where the dependent variable is exports at the firm-product-destination level aggregated to two periods:2000-2006 and 2011-2016. 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.  $\mathcal{I}_{dt}$  is a dummy that takes the value 1 for South Korea in the the post-treatment window (2011-2016) and 0 otherwise. All regressions include firm-product-time, product-destination-time and firm-product-destination fixed effects. Only continuous exporters are retained i.e. firms that have positive exports in a given product-destination for each of the two periods. Tariffs are averaged across years within each of the two periods and the logged values are further interacted with size bins. Additional controls include interactions between size bins and a dummy variable that takes the value of 1 in the second period for all other countries with which the EU implemented FTAs after 2006. Three-way (firm, product & destination) clustered standard-errors in parentheses. Significance codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1

## 5.5 Anticipation Effects

Our two-period baseline model drops those years during which firms may have anticipated the trade cost reductions from EUKFTA. To investigate such anticipation effects, we now split our sample into three periods: control (2000-2006); negotiation (2007-2010) and post-FTA (2011-2016). Our specification is then modified by introducing another time dummy,  $Neg_t$ , for the negotiation period. This  $Neg_t$  dummy enables us to study anticipation effects of the agreement in South Korea relative to the control period and control group of countries. This is distinct from the post-FTA liberalisation effects which would be captured as before by coefficients on the FTA dummy.

Table 6 shows results for the intensive, product and extensive margins, when the negotiation period is added to the sample. The estimated coefficients indicate the treatment effect, averaged across firms in the sample. We find no statistically significant anticipation by firms on the intensive and product margins i.e. firms that continuously exported to South Korea in all three periods did not expand their sales in existing products or introduce new products during the negotiation phase of the agreement. In contrast to the intensive and product margins, we do find strong evidence of anticipation in the entry margin as the number of firms and varieties exported to South Korea increased by 0.176% and 0.075% respectively. This may be driven by reduced trade policy uncertainty and complements the findings from Handley and Limão (2015) who show increased entry of Portuguese exporters as previous tariff reductions were secured and risks decreased following the country's accession into the European Community in 1986. The EUKFTA therefore provides an additional policy setting within which to examine firm anticipation of trade cost reductions.

## 5.6 Imports from South Korea

So far, we have studied the impact of the agreement on France's exports to South Korea. However, our data allows us to check whether the size advantage from NTB reductions applies to the France's imports from South Korea as well. Now, the dependent variable is the log value of a firm's import purchases at the product-country-time level and tariffs correspond to duties applied by the EU on its trade partners. In Figure 4, we replicate the dynamic diff-in-diff regression 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, 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.

**Table 6:** Anticipation by firms across margins

Dependent Variables:	ln(exports)	# products	# firms	# varieties
Model:	(1)	(2)	(3)	(4)
Family	OLS	Neg. Bin.	Neg. Bin.	Neg. Bin.
Kor $\times$ Neg	-0.015 (0.045)	-0.009 (0.022)	0.176*** (0.022)	0.075*** (0.016)
Kor $\times$ FTA	0.044 (0.029)	-0.011 (0.018)	0.161*** (0.025)	0.073*** (0.022)
Fixed effects	$\theta_{fpd}, \theta_{fpt}$	$\theta_{fd}, \theta_{ft}$	$\theta_d, \theta_t$	$\theta_d, \theta_t$
Overdispersion	–	19.03	89.64	78.47
Observations	1,880,337	892,762	403	403
(Pseudo) R <sup>2</sup>	0.893	0.324	0.274	0.256

*Note:* Regressions are estimated for firm exports, products, number of firms and number of varieties aggregated to three periods: 2000-2006 (reference period), 2007-2010 (negotiation period) and 20011-2016 (FTA period).  $Kor_d$  is a dummy for South Korea whereas  $Neg_t$  and  $FTA_t$  are time dummies for the negotiation and FTA periods respectively. To disentangle the intensive from the extensive margin, only those firms are retained which have positive exports in a given product-destination for each of the three periods in column (1). In column (2), only those firms are retained which exported in all three periods to a given destination. All columns control for destination-time factors such as GDP per capita, nominal exchange rates, capital stocks as well as dummies for WTO membership and other FTAs. Significance codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1

## 6 Conclusion

In this paper, we shed light on the effects of an important new generation agreement along the firm size distribution. We exploit the French firm-level customs data for the period 2000 to 2016 and employ a differences-in-differences strategy to identify treatment effects for different percentiles of the size distribution. We find that French firms with larger pre-FTA size see their exports to South Korea increase by considerably more than firms further down the size distribution. This effect is most strongly driven by NTBs, i.e., the summary effects of the FTA net of tariff concessions. The fact that the intensive margin – exports of a given product by continuing firms – contribute a large fraction of this effect suggests that the NTB provisions of the FTA are not just about reducing the fixed costs of market access for firms, but also – and predominantly – about lowering the variable trade costs for more efficient firms by more than for the less efficient ones.

In this context, the expansion of SME-related provisions in the EU’s trade agreements is welcome. 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 and in certain cases, a dedicated SME chapter. These SME chapters 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

**Figure 4:** Import growth from NTB reductions: Top 25% relative to bottom 25%



*Note:* This graph shows the adjustment in import purchases of the top quartile of firms relative to the bottom quartile, from a reduction in NTBs under the EUKFTA. Following the specification provided by equation (1), it plots coefficients and 95% confidence intervals on the triple interaction  $Kor_d \times Year_t \times (p75 - p100)$ , where  $(p75 - p100)$  is a dummy variable that takes the value of 1 for firms in the top quartile and 0 otherwise. The regression also includes similar triple interaction terms for the second and third quartiles of the size distribution. The chosen reference year is 2010, the year before the EUKFTA entered into force. A set of firm-product-year, product-destination-year and firm-product-destination fixed effects are included. Additional controls include interactions between tariffs and firm size bins as well as interactions between size bins, year dummies and other countries with which the EU entered into FTAs over the sample period. Two-way (destination & year) clustered standard-errors in parentheses.

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 adequately addressed. Moreover, the European Commission is negotiating simplified rules in new trade agreements and those in the process of modernisation, for example in the area of rules of origin. Recent US agreements, such the United States-Mexico-Canada Agreement (USMCA) also contain such provisions. The political insistence on SME-related provisions therefore reflects a growing popular perception that trade liberalization helps larger firms further leverage their size advantages while putting smaller firms under increased competitive pressure.

Our research shows that policy makers and negotiators are justified in pushing for such SME-friendly provisions so that smaller firms can benefit equally from the market access offered by deep FTAs. However, there is limited empirical evidence on the impact of these novel SME chapters on the ability of medium and smaller firms to export. Future research can therefore evaluate the effects of such dedicated chapters and study the precise mechanisms underpinning the size bias of FTAs. Identifying the channels through which the size effect plays out would require a structural approach that is beyond the scope of this paper.

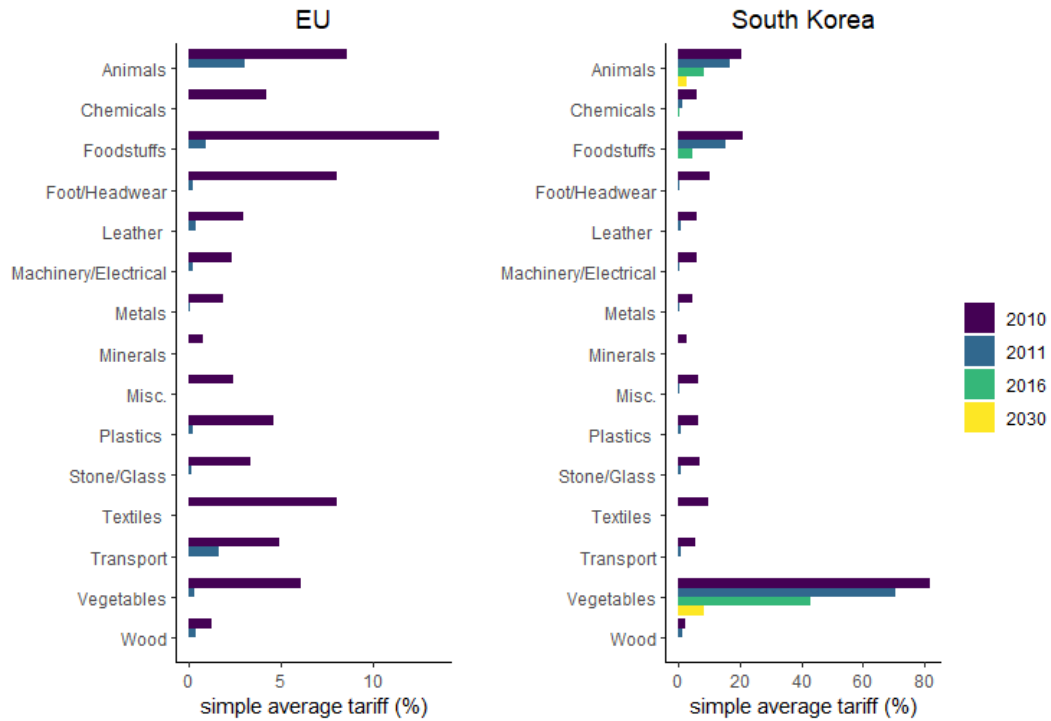
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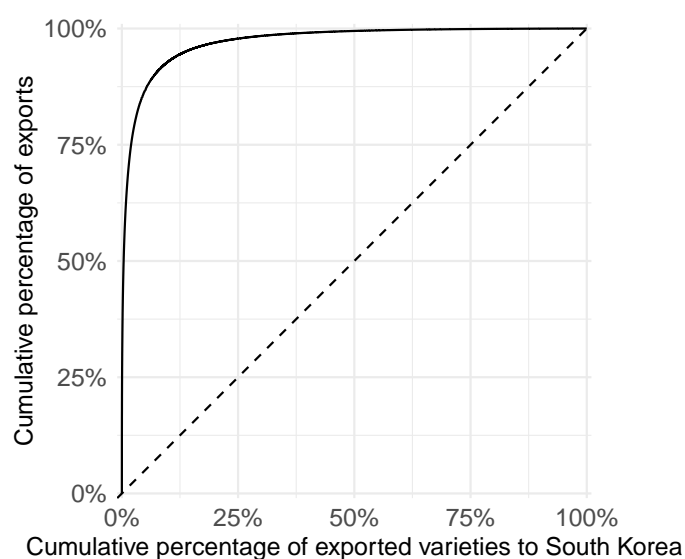
## A Further Descriptive Statistics

Figure 5: Phasing out tariffs



*Note:* The graphs depicts changes in average applied tariffs imposed by the EU on South Korean products and by South Korea on EU products respectively. These changes are examined over the course of the agreement's transition period, from 2011 to 2030. In 2010, prior to 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.

**Figure 6: Lorenz Curve**



*Note:* This figure above shows the skewness in French exports to South Korea over the control period (2000-2006) with the help of a Lorenz curve. The exported varieties are arranged in descending order from left to right on the horizontal axis. Export values are adjusted with France's GDP deflator drawn from the World Bank Database.

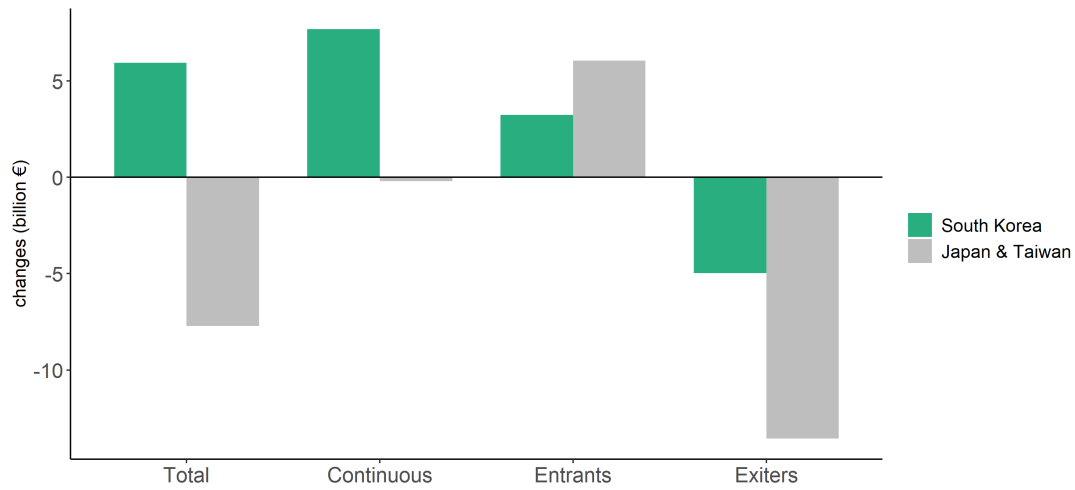
**Table 7: EU FTAs entering into force over 2006-2016**

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, Baccini, and Elsig (2014).

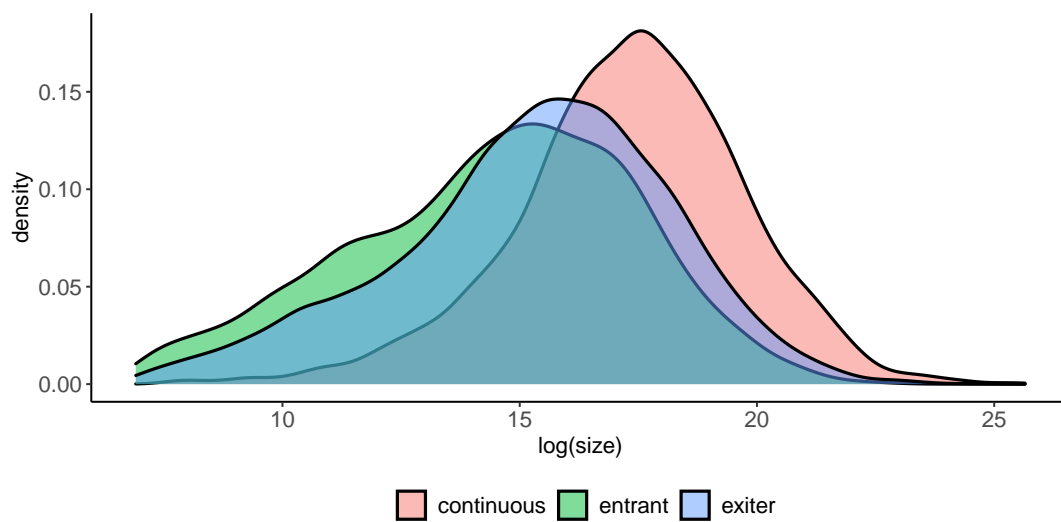


**Figure 7: Change in exports by firm type (billion €)**



*Note:* The figure above shows the absolute change in France's export sales between the control and post-FTA periods 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 exporters, entrants and exiting firms. Export values are adjusted by France's GDP deflator drawn from the World Bank Database.

**Figure 8: Size distributions by type of exporter**



*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).

## B Additional Robustness Checks

**Table 8:** Characteristics of firms exporting to South Korea

Dependent Variable: Model:	Exporter to Korea (0,1)		
	(1)	(2)	(3)
multi-product	0.018*** (0.0007)		
multi-product $\times$ FTA	0.006** (0.002)		
multi-destination		0.011*** (0.0007)	
multi-destination $\times$ FTA		0.010*** (0.003)	
exporter to Japan/Taiwan			0.074*** (0.003)
exporter to Japan/Taiwan $\times$ FTA			0.025*** (0.008)
R <sup>2</sup>	0.57678	0.57643	0.58142

*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 a 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. Significance codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1

**Table 9:** Impact of NTB reductions with different clustering methods

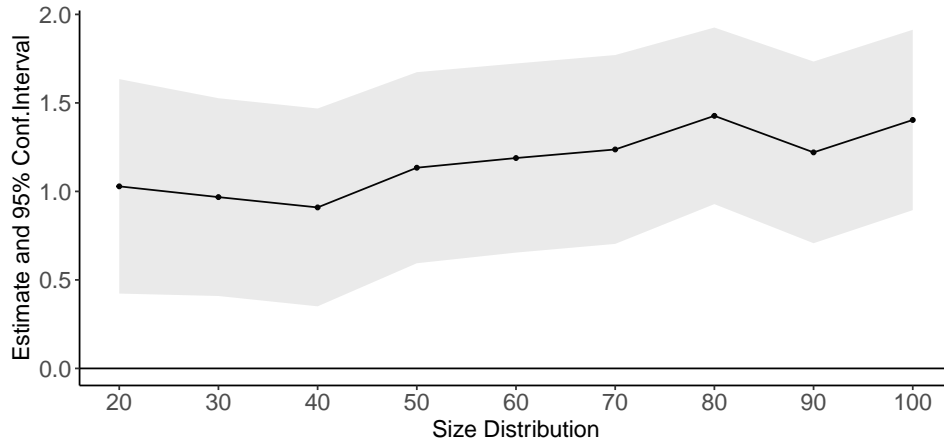
Dependent Variable: Model:	ln(exports)			
	(1)	(2)	(3)	(4)
$\mathcal{I} \times$				
p75-p100	0.664*** (0.141)	0.664*** (0.137)	0.664*** (0.172)	0.664*** (0.144)
p50-p74	0.564*** (0.136)	0.564*** (0.134)	0.564*** (0.172)	0.564*** (0.138)
p25-p49	0.373** (0.152)	0.373** (0.151)	0.373** (0.181)	0.373** (0.154)
$\ln \tau \times$				
p75-p100	-1.13*** (0.405)	-1.13*** (0.393)	-1.13*** (0.364)	-1.13*** (0.413)
p50-p74	-0.280 (0.308)	-0.280 (0.318)	-0.280 (0.325)	-0.280 (0.314)
p25-p49	0.181 (0.335)	0.181 (0.329)	0.181 (0.346)	0.181 (0.337)
$\mathcal{I} \times \ln \tau \times$				
p75-p100	-1.27 (0.998)	-1.27 (0.808)	-1.27 (1.47)	-1.27 (0.979)
p50-p74	-1.67* (0.908)	-1.67* (0.903)	-1.67 (1.38)	-1.67* (0.858)
p25-p49	0.704 (0.891)	0.704 (1.47)	0.704 (1.28)	0.704 (0.868)
Clustering	$p - d$	$f - d$	$f - p$	$f - p - d$
Observations	1,758,070	1,758,070	1,758,070	1,758,070
R <sup>2</sup>	0.91854	0.91854	0.91854	0.91854

*Note:* Regressions are estimated for exports at the firm-product-destination level aggregated to two periods: control (2000-2006) and post-FTA (2011-2016). EUKFTA is a dummy that takes the value of 1 for South Korea in the 2011-2016 period. Tariffs are averaged across years within each of the two periods and the logged values are further interacted with size bins. Regressions include firm-product-time, product-destination-time and firm-product-destination fixed effects. Only continuous exporters are retained i.e. firms that have positive exports in a given product-destination for each of the two periods. Additional controls include interactions between size bins and a dummy variable that takes the value of 1 in the second period for all other countries with which the EU implemented FTAs after 2006 and interactions between tariffs, size bins and these other FTAs. Standard-errors are clustered by destination and product in column (1), firm and destination in column (2), firm and product in column (3) and firm, product and destination in column (4). Significance codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1

**Table 10:** Impact of NTB reductions on the intensive margin: Continuous size measure

Model:	Baseline	Extensions	
Dependent variable:	ln(exports)	Exporter (0,1)	ln(products)
$\mathcal{I} \times \ln(\text{size})$	0.079*** (0.009)	-0.006*** (0.002)	0.016*** (0.004)
$\ln \tau \times \ln(\text{size})$	-0.243*** (0.065)	0.034 (0.023)	0.017 (0.055)
$\mathcal{I} \times \ln \tau \times \ln(\text{size})$	-0.206** (0.090)		
Fixed effects	$\theta_{fpt}, \theta_{fpt}, \theta_{pdt}$	$\theta_{fd}, \theta_{ft}, \theta_{dt}$	$\theta_{fd}, \theta_{ft}, \theta_{dt}$
Clustering	$f - p - d$	$f - d$	$f - d$
Observations	1,758,070	2,381,415	3,196,118
R <sup>2</sup>	0.91855	0.65374	0.88742

*Note:* The table above reports regression results for the impact of the EUKFTA along different export margins. Column (1) contains baseline results for the intensive margin following the specification in equation (1). Size is defined at the firm-product level and tariffs at the product-destination-time level. Only continuous exporters are retained i.e. firm-product-destination triplets with positive exports in both control (2000-2006) and FTA (2011-2016) periods. Columns (2) and (3) provide results for extensive margins of exporting following the specification in equation (2). Since the dependent variables here are defined at the firm-destination-time level, size is correspondingly computed at the firm level (aggregating across products) and tariffs are averaged across products within a given destination and time period. Significance codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1

**Figure 9:** Impact of NTB reductions on intensive margin: Comparison across deciles

*Note:* Following the specification provided by equation (1), this graph plots coefficients on the interaction between the  $\mathcal{I}_{dt}$  (EUKFTA dummy) with size deciles. The base category comprises of varieties (firm-product pairs) in the bottom decile of the size distribution. The 95% confidence intervals are constructed using three-way clustered (firm, product & destination) standard errors.

**Table 11:** Impact of NTB reductions on the intensive margin: Above vs. below median

Model:	Baseline	Extensions	
Dependent variable:	ln(exports)	Exporter (0,1)	ln(products)
$\mathcal{I} \times p50-p100$	0.339*** (0.123)	-0.049*** (0.010)	-0.002 (0.024)
$\ln \tau \times p50-p100$	-1.05 (0.677)	0.032 (0.108)	-0.297 (0.184)
$\mathcal{I} \times \ln \tau \times p50-p100$	-1.25*** (0.347)		
Fixed effects	$\theta_{fpd}, \theta_{fpt}, \theta_{pdt}$	$\theta_{fd}, \theta_{ft}, \theta_{dt}$	$\theta_{fd}, \theta_{ft}, \theta_{dt}$
Clustering	$f - p - d$	$f - d$	$f - d$
Observations	1,758,070	2,381,415	3,196,118
Observations	1,758,070	2,381,415	3,196,118
R <sup>2</sup>	0.918	0.653	0.887

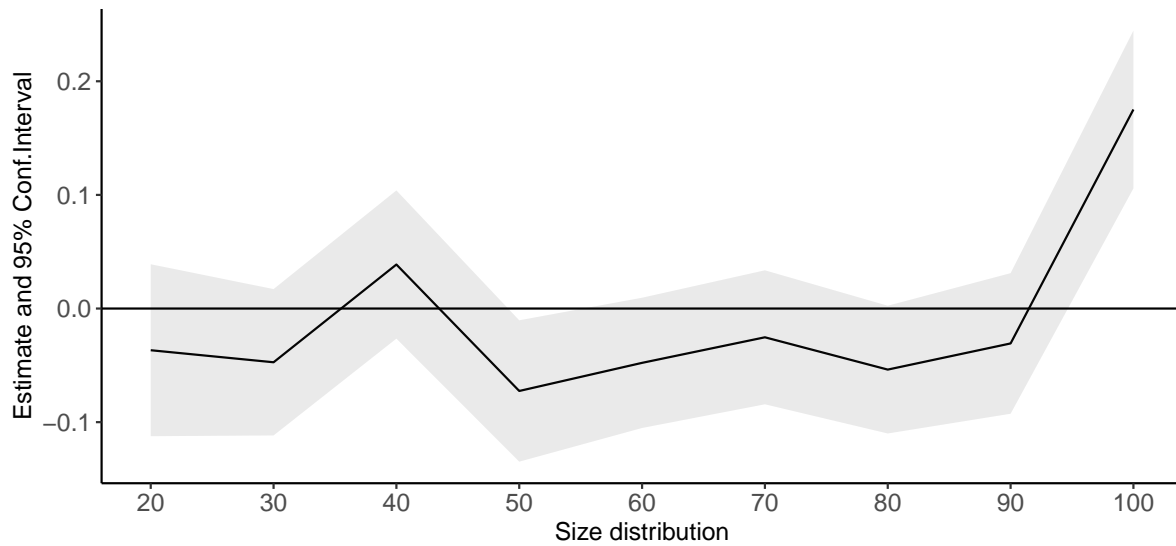
*Note:* The table above reports regression results for the impact of the EUKFTA along different export margins. Column (1) contains baseline results for the intensive margin following the specification in equation (1). Firm size is defined within a product class and tariffs at the product-destination-time level. The dummy  $p50 - p100$  takes the value of 1 for firm sizes above the median and 0 otherwise. Only continuous exporters are retained i.e. firm-product-destination triplets with positive exports in both control (2000-2006) and FTA (2011-2016) periods. Columns (2) and (3) provide results for extensive margins of exporting following the specification in equation (2). Since the dependent variables here are defined at the firm-destination-time level,  $p50 - p100$  dummy is defined based on size computed at the firm level (aggregating across products) and tariffs are averaged across products within a given destination and time period. Significance codes: \*\*\*: 0.01, \*\*: 0.05, \*: 0.1

**Table 12:** Impact of NTB reductions: Aggregating exports to the firm-destination-time level

Dependent Variable:	ln(exports)		
Model:	(1)	(2)	(3)
$\mathcal{I} \times$			
ln(size)	0.046*** (0.008)		
p50-p100		0.103** (0.050)	
p75-p100			0.240** (0.101)
p50-p74			0.233** (0.106)
p25-p49			0.185* (0.106)
$\ln \tau \times$			
ln(size)	-0.302*** (0.094)		
p50-p100		-1.84*** (0.385)	
p75-p100			-2.62*** (0.768)
p50-p74			-1.91*** (0.581)
p25-p49			-0.724 (0.598)
Base category		<p50	<p25
R <sup>2</sup>	0.879	0.879	0.879

*Note:*  $N = 798,129$ . This table examines the differential impact of NTB reductions on exports at the firm-destination-time level. It plots coefficients on the interaction between the EUKFTA dummy with various size bins. The regressions include firm-time, destination-time and firm-destination fixed effects. Only continuous exporters are retained i.e. firms that have positive exports in a given destination for each of the two periods. Additional controls interactions between size deciles and a dummy variable that takes the value of 1 in the second period for all other countries with which the EU implemented FTAs after 2006. The 95% confidence intervals are constructed using two-way clustered (firm & destination) standard errors.

**Figure 10:** Impact of NTB reductions on the product margin: Comparison across deciles



*Note:* This graph shows regression results from estimating equation (2) for the product margin, where the dependent variable is the log number of products exported by a firm in a given destination and time period. It plots coefficients on the interaction between the  $\mathcal{I}_{dt}$  (EUKFTA dummy) with various size deciles where the base category comprises of firms in the bottom decile of the size distribution. The 95% confidence intervals are constructed using two-way clustered (firm & destination) standard errors.