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2018

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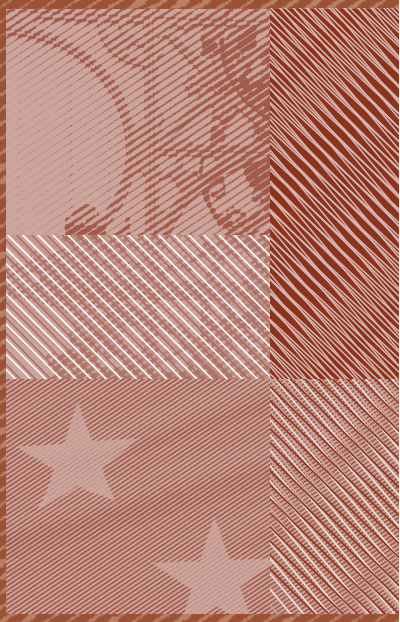

Documentos de Trabajo
N.º 1814

BANCO DE **ESPAÑA**
Eurosistema

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(*) We thank, for comments and suggestions, Pol Antrás, Jacopo Timini, Carolina Villegas-Sánchez and participants in the Banco de España internal seminar. We also thank Johannes Fritz for helpful assistance with the GTA dataset and María Jesús González, Eduardo Gutiérrez and Elvira Prades for their work with the Balance of Payments data. The opinions and analyses are the responsibility of the authors and, therefore, do not necessarily coincide with those of the Banco de España or the Eurosystem.

Documentos de Trabajo. N.º 1814

2018

ISSN: 1579-8666 (on line)

Abstract

The rise in non-tariff protectionist measures has been associated to the weakness in global trade over the last few years. We investigate the effect of non-tariff barriers (NTBs) on exports growth over the period 2009-2013 using administrative data at the firm-product-destination level in Spain. According to our findings, non-tariff protectionist measures significantly reduce exports growth at the product-destination level. Moreover, NTBs also hinder exports growth at the firm level and negatively affect other firm outcomes such as productivity growth. In contrast, the impact of liberalizing non-tariff measures is not statistically significant.

Keywords: protectionism, non-tariff measures, firm level data.

JEL classification: F10, F30, F40, G15, G21, G32.

Resumen

La implantación de medidas proteccionistas no arancelarias se ha asociado a la debilidad del comercio mundial en los últimos años. En este trabajo investigamos los efectos que dichas barreras comerciales no arancelarias pueden haber tenido en el crecimiento de las exportaciones españolas durante el período 2009-2013 utilizando datos administrativos a nivel de empresa-producto-destino. De acuerdo con nuestros resultados, las medidas proteccionistas no arancelarias reducen significativamente el crecimiento de las exportaciones a nivel de empresa-producto-destino. Además, estas barreras no arancelarias también reducen el crecimiento de las exportaciones a nivel de empresa y afectan negativamente a otras variables como el crecimiento de la productividad. Por el contrario, el impacto positivo de la eliminación de algunas de estas barreras no arancelarias no resulta estadísticamente significativo.

Palabras clave: proteccionismo, barreras no arancelarias, datos a nivel de empresa.

Códigos JEL: F10, F30, F40, G15, G21, G32.

1 Introduction

This paper investigates the consequences of trade protectionism in the form of non-tariff barriers over the period 2009-2013. Periods of trade liberalization have been widely studied in the literature (Lileeva and Trefler, 2010; Topalova and Khandelwal, 2011; Pavcnik, 2002; Amiti and Konings, 2007) but protectionist episodes have been paid much less attention until now. However, protective policies are playing an increasingly important role that goes hand in hand with the rise of anti-globalization episodes like Trump's election or Brexit.

Given the little maneuver that developed countries have to raise tariff rates due to the existence of the WTO and other trade agreements, post-crisis economies have decided to implement a 'murkier' protectionism in the form of non-tariff measures (Datt et al. 2011; Baldwin and Evenett, 2009). Non-tariff measures (NTMs) are harder to discover and many of them are only detected some time after they have been implemented, but undeniably there has been an increase in the use of NTMs since the Global Financial Crisis. Many developed economies opted for subsidizing their national industries and financing bailouts which in turn distorted international trade. Also, NTMs are adopted in the form of trade volume restrictions, which limits quantities and hence are much more distortive than usual tariff measures.[1]

The recent increase in non-tariff protectionism measures is a reason of concern for economists and international organizations. According to WTO (WTO, 2009), 1,243 new trade measures were uncovered over the last years being the majority non-tariff protectionist measures. In the case of trade policies affecting Spanish exports, NTMs outnumbered tariff changes and they were clearly biased towards protectionist policies (see Table 4). Since the positive relationship between trade openness and consumer welfare has been widely documented in the literature, the concern now is whether the rise in non-tariff protectionism might have consequences as strong as the effects from trade liberalizations but with opposite sign.

In order to shed light on this issue, we combine non-tariff measures at the product-country level over the years 2009-2013 from the Global Trade Alert project with firm-product-country information on exports from the Banco de España's Balance of Payments as well as firm Balance Sheet information from the Spanish Mercantile Register. In particular, we consider all NTMs implemented by the rest of the world and potentially affecting Spanish exporters. Armed with this database, we regress export growth at the firm-product-destination level on the non-tariff measures affecting Spain by product-destination. To enhance identification, we compare exports growth of the same product to the same country and by the same firm before and after a NTM is implemented (i.e. we include firm-product-country fixed effects). Alternatively, we compare exports growth of the same product

[1]Despite not being that constrained to tariff bounds imposed by the WTO as developed economies, developing countries have also broadly used NTMs since they are limited by tariffs of regional trade agreements and the increasing interest for health and environmentally friendly products. For instance, the members of MERCOSUR have been active users of non-tariff measures.

by the same firm in the same year to countries in which the product is differentially affected by NTMs (i.e. firm-product-year fixed effects).[2]

According to our results, non-tariff protectionist measures significantly reduce export growth. The estimated reduction in exports due to these trade barriers is sizable. It ranges between 37 and 74% of the average export growth by firm-product-destination in our sample. In contrast, the impact of liberalizing measures is not statistically significant. Turning to the firm-level analysis, we find that non-tariff protectionist measures significantly reduce overall export growth implying that firms are not able to undo the negative shock induced by the NTMs by resorting to other product-destination markets. Moreover, firms more exposed to NTMs present significantly lower productivity growth, which points to the presence of important aggregate costs of NTMs in terms of consumer welfare.

The present paper contributes to the literature in three dimensions. First, the combination of non-tariff barriers to trade with firm-product-destination data allows estimating the effects of trade protectionism on exports and productivity at a very granular level.[3] Second, the use of non-tariff measures in the post-crisis period 2009-2013 allows us to explore potential non-linearities by comparing the effects of protectionism and liberalizing policies. Third, we analyze Spain as a 'passive' country, that is, how Spanish exporters are affected when other countries change their trade policies. Thus, we do not analyze the effects of a trade liberalization of a specific country and its consequences on that particular country.[4]

The remainder of the paper is organized as follows. Section 2 describes the data. Section 3 presents the empirical strategy together with the baseline results at the product-destination level. Section 4 explores additional exercises as well as robustness checks. Section 5 discusses the analysis at the firm level considering not only export growth but also other firm outcomes. Finally, Section 6 concludes.

1.1 Related literature

Our paper is related to two different strands of the literature. On the one hand, there is a vast empirical literature about the effects of tariff cuts on trade and other economic outcomes using firm-level data. On the other hand, there is a more recent and scarce literature about the consequences of non-tariff measures (NTMs) using more aggregated data.

The literature on NTMs suggests, in general, that non-tariff barries harm international trade. Theoretical papers on the effects of distinct NTMs predict negative effects on trade. For instance,

[2]It is worth highlighting three caveats of our analysis from the onset. First, we rely in the protectionist versus liberalizing labeling conducted by the GTA experts, which is not officially validated by the World Trade Organization. Second, in spite of the granularity of our approach, there are threats to identification since NTBs might be implemented to those product-country pairs in which Spanish exports perform better. Third, due to data limitations we consider only the intensive margin of trade, while some of the effects of NTMs may operate through the extensive margin. We discuss these issue in more detail below.

[3]Given the nature of our NTMs data, we focus on changes in protectionism policies and trade flows rather than stocks.

[4]Some recent papers investigate the effects of China's adhesion to the WTO on the United States (Amiti et al., 2017; Bai and Stumpner, 2017; Handley and Limao, 2013).

Bagwatti (1968) and Shibata (1968) debate on the equivalence between the protective effect from tariffs to that of quotas. Moreover, recent empirical evidence has been provided on the issue as well. Murina and Nicita (2017) test the effect of sanitary and phitosanitary measures (henceforth SPS) on European agriculture from low income economies, showing a negative effect in EU's imports. Kee et al. (2009) show that NTMs add an 87% of trade restrictiveness (defined as the tariff that should be applied instead of all the trade protection mechanism to leave exports/imports at their current level) to that imposed by tariffs. Kee et al. (2013) show that tariffs and antidumping duties explain only a small fraction of the 2008-2009 collapse in world trade. Conesa and Timini (2018) distinguish between technical and non-technical trade barriers, showing a positive effect of the former and a negative effect of the latter.

Turning to the literature about the effects of tariff cuts, research regarding the relationship between productivity and trade liberalization has also been vastly developed using micro-data. Along these lines, the empirical analysis of the welfare benefits of tariff cuts is typically based on firm-level productivity measures due to the difficulty to quantify consumer welfare.[5] A reduction in tariffs decreases the threshold marginal costs for which it is worth to enter the market. Thus, when trade liberalization happens, the most unproductive firms are forced to leave the market due to the presence of foreign competitors, while the best firms can take advantage of the increased size of the market (Melitz, 2003; Melitz and Trefler, 2012). Also, recent work by Bustos (2011) and subsequent applications (e.g. Wagner, 2014) show the relationship between technological spending, productivity and exports. Given all these positive effects from trade liberalizations on productivity and welfare, there are reasons of concern about the recent rise in protectionist measures.

However, not only positive consequences of trade liberalization have been documented in the literature. When analyzing the bilateral tariff cuts between the US and Canada, Trefler (2004) shows that trade liberalization led to the exit of the most unproductive firms. As these companies closed, substantial losses of employment took place in hand with considerable increases in labour productivity. This phenomenon reflects the conflict between the short-run adjustment costs for stakeholders of closing companies and displaced workers and the long-run gains from increased efficiency and consumer welfare improvement. Other papers find solid evidence that liberalizations reduced poverty for developing countries (Topalova, 2007, 2010), and that his effect was higher for regions with more flexible labour laws and the regions that were less exposed to tariff cuts.

2 Data

We combine non-tariff measures at the product-country level from the Global Trade Alert project with firm-product-country information from the Banco de España's Balance of Payments and firm Balance Sheet information from the Spanish Mercantile Register over the years 2009-2013.

[5] Melitz and Trefler (2012) summarize gains from trade openness through three different channels: i) gains from love for variety, ii) gains from increased productivity, and iii) increases in technology spending on behalf of firms.

2.1 Firm-level Balance of Payments database

We exploit a unique administrative database of Spanish exporters for the years 2009 to 2013. This dataset, provided by the Banco de España, contains the micro data information used to construct the official Spanish Balance of Payment Statistics. For each exporter we observe the fiscal id and the value of exports at the product-destination level. The dataset accounts for around 97% of aggregate Spanish exports, as we can see in Figure 1, and includes transactions with 242 partner countries and 119 types of products harmonized under the system HS-2.[6]

In table 1, we present the descriptive statistics for the Balance of Payments dataset. As shown, our sample includes data for more than 20,000 Spanish firms, whose average volume of exports revolves around two million euros in the covered sample. The destinations to which these exports were headed ranges from 1 to 7, with the average firm exporting to 3 different countries. Regarding the number of products, most firms focus their exporting activities on approximately 2 different products at the 2-digit HS level.

2.2 Quasi-census balance sheet data

In order to conduct the firm-level analysis in Section 5, we use administrative data taken from the Spanish Commercial Registry, which contains the balance sheets of the universe of Spanish companies given the firms' legal obligation to deposit their balance sheets on the Commercial Registry.[7] For each firm, among other variables, it includes information on: name, fiscal identifier; sector of activity (4-digit NACE Rev. 2 code); 5-digit zip code location; annual net operating revenue; material expenditures (cost of all raw materials and services purchased by the firm in the production process); number of employees, labor expenditures (total wage bill, including social security contributions); and total fixed assets.

Our final sample covers balance sheet information for a total of 1,801,955 firms with an average of 993,876 firms per year. The firm-level database covers around 85-90% of the firms in the non-financial market economy for all size categories in terms of both turnover and number of employees. Moreover, the correlation between micro-aggregated employment (and output) growth and the National Accounts counterparts is around 0.95 over the 2003-2013 period (see Figure 1). Almunia et al. (2018) describe this database in greater detail.

[6] To be more concrete, the database covers all transactions with foreign trade partners above 50,000 Euros. We start our analysis in 2009 using exports growth between 2008 and 2009 because the reporting threshold was lower (12,500 Euros) until 2008 making growth rates potentially misleading for some firms exporting around the thresholds in that year. Also, the high reporting threshold complicates the measurement of the extensive margin of trade (entry/exit) in our database.

[7] In particular, we combine two alternative databases independently constructed from the Commercial Registry, namely, Central de Balances Integrada (CBI) from the Banco de España and SABI from Bureau Van Dijk (used to construct the Spanish and Portuguese samples of AMADEUS). The resulting database includes around 1,000,000 firms in each year from 2000 to 2013 and it is only available for researchers undertaking projects for the Banco de España.

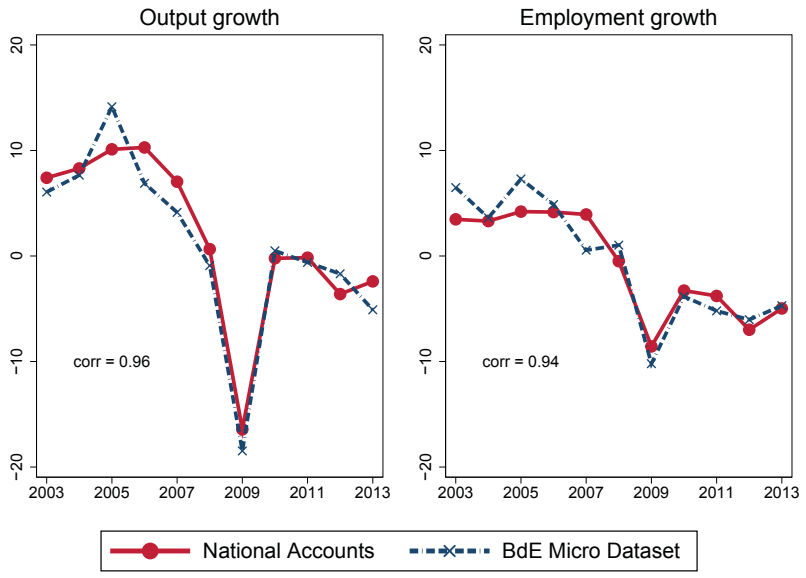
Table 1: Summary statistics from BP data.

	2009	2010	2011	2012	2013
Number of products					
p10	1	1	1	1	1
Mean	1.74	1.78	1.81	1.84	1.86
Median	1	1	1	1	1
p90	3	3	3	3	4
Number of destinations					
p10	1	1	1	1	1
Mean	2.91	3.01	3.11	3.23	3.29
Median	1	1	1	2	2
p90	6	7	7	7	7
Exports (EUR thousands)					
p10	61	63	65	68	70
Mean	1,734	1,931	2,070	2,199	2,256
Median	324	350	376	389	404
p90	4,687	5,200	5,454	5,726	5,884
Number of firms	22,543	22,524	23,442	23,619	23,496

2.3 Global Trade Alert (GTA) database

We use the Global Trade Alert (GTA) database for identifying the implementation of non-tariff measures affecting Spain. This new database gathers information about all protectionist policies taken around the globe beginning in 2008, as well as valuable information on these policies such as the affected and implementing countries, affected products (at 6-digit HS level), date of initiation and

Figure 1: Micro-aggregated output and employment growth



end of the policies as well as a classification according to whether the policy is harmful or liberalizing when it comes to international trade. An advantage of the GTA database over traditional sources of information like the WTO I-TIP database is that WTO only registers those measures explicitly announced to the WTO. In contrast, the GTA database is collected by a group of specialists in international trade and includes all measures and not only those officially recorded by the WTO.

The creation of this database was motivated by the increase in protectionist non-tariff measures during the last years. Since the inception of the World Trade Organization (WTO) and other international trade agreements, tariff barriers are now more difficult to implement than ever before. This is why countries have turned to non-tariff measures (NTMs) in order to protect their internal markets. According to recent GTA reports, most of these protectionist policies have been implemented by G20 economies, which make them even more relevant.

Table 2 shows the Spanish products at a 2-digit level disaggregation that have experienced most trade measures coming from the rest of the world during the period 2009-2013. We acknowledge that some policies are likely to be more influential than others, and thus, a product affected by less policies can be more harmed/benefited than one with more. However, it provides a good idea of which products are the protectionist targets of most countries. Some of these products like vehicles, pharmaceutical products, chemicals and basic metals have a big share on Spanish trade, both in imports and exports.

Table 3 shows that large trading partners have been very active when implementing non-tariff measures (NTMs). Countries like Germany, China, Russia, Brazil or France, who have important

Table 2: Spanish products more affected by foreign NTBs.

Product	Total NTB	Liberalizing	Protectionist	Indeterminate
Articles of iron or steel.	284	15	257	12
Iron and steel.	270	10	240	20
Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof.	201	29	154	18
Electrical machinery and equipment and parts thereof.	189	25	142	22
Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof.	156	15	119	22
Organic chemicals.	86	4	72	10
Plastics and articles thereof.	71	7	52	12
Miscellaneous chemical products.	64	6	50	8
Mineral fuels, mineral oils and products of their distillation; bituminous substances.	62	5	47	10
Inorganic chemicals; organic or inorganic compounds of precious metals.	61	4	50	7
Rubber and articles thereof.	54	6	41	7
Pharmaceutical products.	52	5	41	6
Optical, photographic, cinematographic, measuring, medical or surgical instruments.	52	9	38	5
Fish and crustaceans, molluscs and other aquatic invertebrates.	51	4	39	8

shares of the Spanish trade, have been among the most active ones regarding the implementation of NTMs. A total of 1,340 non-tariff measures have been taken in that period against Spain, 137 of which were classified as liberalizing, 1,118 as protectionist and the rest have an indeterminate effect.[8]

[8]In order to capture the scope of these measures, we report pairs of measures and products in Table 3. For instance, if the same measure affected 2 distinct products, we report 2 measures in order to capture the magnitude of the trade barriers imposed by foreign economies.

Table 3: Number of NTB policies implemented by the rest of the world that affect Spain.

Country	Total NTB	Liberalizing	Protectionist	Indeterminate
India	1,000	138	762	100
US	490	34	433	23
China	263	23	226	14
Brazil	236	5	221	10
Russia	162	6	148	8
Argentina	128	-	114	14
Venezuela	117	69	47	1
Indonesia	99	13	81	5
Turkey	77	-	77	5
Germany	50	1	49	6
Algeria	47	-	4	43
Saudi Arabia	44	-	44	-
France	45	1	34	12
Kazakhstan	39	-	39	2
Korean Republic	38	2	35	1

Finally, Table 4 shows the amount of non-tariff and tariff measures that affect Spanish trade. NTMs have clearly outnumbered tariff changes during the last years. More concretely, most protective measures have taken the form of NTMs while tariff measures have been liberalizing in majority. Since the mechanisms of the WTO and other trade agreements have imposed difficulties for rising tariffs, it seems that countries are turning to NTMs as the way out to protect their national industries. Sometimes NTMs are also imposed when the country is suffering uncompetitive behavior from a country abroad or when the health and safety standards are at stake.

Table 4: Tariff vs non-tariff measures affecting Spanish exports.

	Tariff	Protectionist	Liberalizing	Indeterminate	Non-tariff	Protectionist	Liberalizing	Indeterminate
2008	5	3	2	-	157	140	1	16
2009	299	82	201	16	578	519	26	33
2010	385	77	293	15	611	493	55	63
2011	372	83	269	20	522	418	68	36
2012	432	174	257	1	618	589	17	12
2013	327	123	198	6	869	619	154	96
Total	1820	542	1220	58	3355	2778	321	256

In the GTA database, measures are classified according to their effect. Protectionist measures include those policies which hinder international competition and grants benefits to local producers. Examples of such policies include subsidies for exporting firms, requirements to buy local inputs, tax-based incentives to export or the implementation of import and export quotas. Most of the NTMs adopted since 2008 have had a strong distortionary character as these barriers do not affect trade only through prices but also through quantities.

On the contrary, liberalizing measures are the ones that favor competition at the international scale. Instances of these policies include the elimination of quotas or bureaucratic requirements to export or import and other similar measures. These policies represent only the 11.6% of the NTMs that affect Spain adopted between 2008 and 2013. Nevertheless, it is worth to notice that measures

keep following the trend of liberalization that began decades ago. Lastly, there is an indeterminate category where we include policies whose effects are not clear yet. Some examples of this category include policies which are not targeted explicitly towards trade, but may affect it indirectly somehow.

Needless to say, both the compilation and the labeling of the NTMs available in the GTA database crucially depend on the GTA experts criteria. Visual inspection of the measures included in the database reveals that they all seem reasonably labeled. However, we acknowledge that some controversy may remain with respect to the labeling of some included NTMs as well as the possibility of some missing NTMs not included in the database. More details on the non-tariff measures included in the GTA database can be found in Appendix A.

3 Empirical analysis at the product-destination level

3.1 Econometric model

In order to identify the effect of non-tariff measures on export performance at the product-destination level, we consider the following specification:

$$\Delta \ln X_{ipd,t} = \beta NTM_{pd,t-1} + \text{Fixed Effects} + \epsilon_{ipdt} \tag{1}$$

where X refers to export volume of product p to country d from firm i in year t.[9] $NTM_{pd,t-1}$ is a dummy variable that takes the value 1 if there is at least one non-tariff measure affecting product p and country d in year $t-1$. The measure can be either protectionist ($NTM^{PROT}_{pd,t-1}$) or liberalizing ($NTM^{LIBE}_{pd,t-1}$). Finally, different sets of Fixed Effects are included in the specifications in order to consider alternative strategies to enhance identification.

In particular, we consider three types of configurations. First, we exploit within time variation by including firm-product-country fixed effects. Identification is thus based on a diff-in-diff strategy that compares the change in exports in the same firm-product-country triplet before and after the non-tariff protectionism measure. Second, we include firm-product-year fixed effects and use a diff-in-diff strategy comparing the change in exports for the same firm-product-year triplet across destinations (countries) with and without NTBs implemented against Spain in the same year. Third, we include firm-country-year fixed effects so that identification is based on between product variation for the same firm-country-year triplet. We also add some relevant covariates to these configurations such as tariff barriers to control for possible correlations.

We argue that our identification strategy based on a very granular approach allows us to claim that our β estimates capture the effect from NTMs to exports growth of Spanish firms. However, feedback effects from exports performance to NTMs implementation may represent a threat to our identification. For instance, if NTBs affecting Spain are introduced in those country-product pairs

[9] Crucially, we only consider here the intensive margin of exports growth due to the high reporting threshold in our dataset. However, we acknowledge that NTMs may also have effects in the extensive margin.

in which Spanish exporters perform particularly well. In our case, there are two points that alleviate this concern: (i) most of the NTMs in the data are implemented to protect certain national products or industries but are not targeted to particular countries, especially in the case of Spain as a part of the EU;[10] (ii) tariffs at the country-product level also proxy for this potential reverse causality concern to the extent that trading partners also target the best performing country-products through tariffs. However, our main estimates remain unaltered when controlling for tariffs in the regressions.

Three further comments regarding our empirical strategy are warranted. First, our approach is based on policy changes and trade flows while the literature traditionally considers the stocks of tariffs/protectionism and imports/exports. Given the nature of the GTA database, which compiles information on implementation and termination of different NTMs, it is more appropriate to focus on their effects on growth rates. Second, despite we acknowledge they might be relevant, we abstract from potential non-linear effects depending on the initial stock of protectionism for each country-product pair since we do not have this information readily available. Third, since we analyze NTMs potentially affecting Spanish exports (e.g. phitosanitary requisites for Spanish firms to enter certain foreign markets) we do not explore their effects on Spanish imports that would be more difficult to rationalize.

Finally, it is also worth noting that we consider a partial equilibrium approach in line with the empirical literature on tariff cuts at the firm level summarized above. This is so because in a context of general equilibrium, we should include in our regressions not only the measures that affect Spain but also all the other measures taken in the rest of the world. For instance, the protectionist measures taken by the US against France will indirectly affect Spanish exports.

3.2 Baseline results

Table 5 shows our baseline estimates over the whole period 2009-2013 including three different groups of fixed effects. Estimates in column (1) are identified from variation over time. In particular, the inclusion of firm × country × product fixed effects implies that we compare the same triplet firm-product-country before and after the introduction of the non-tariff barrier (NTB). The estimate indicates that the average growth rate of exports is 4.8 pp. smaller when a protectionism non-tariff measure is introduced. In columns (2)-(4) we show that this effect is robust to alternative configurations of fixed effects exploiting variation over time.

In column (5), we include firm × product × year fixed effects so that identification is based on variation across countries of the same firm-product-year triplet. In particular, we compare a firm exporting the same product in the same year to countries implementing NTBs against Spain with the same firm-product-year exporting to other countries not implementing any NTB against Spain. The estimated effect is again negative, large and statistically significant at conventional significance

[10] For instance, the Buy American requirement in the 'American Recovery and Reinvestment Act of 2009', one of the largest NTBs in the data, required all of the iron, steel, and other manufactured goods used in the program to be made in the United States. Therefore, all US trading partners are equally affected by this measure.

levels. Export growth in the same firm-product-year to those countries implementing protectionism non-tariff measures against Spain is, on average, 3.1 pp. lower than exports to other countries without NTBs. Column (6) illustrates that this effect remains robust and significant when we include firm × year together product × year fixed effects instead of the triplet firm × product × year.

Table 5: Effect of protectionist non-tariff measures on export growth.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$NTM^{PROT}_{pd,t-1}$	-0.048***	-0.048***	-0.047***	-0.025***	-0.031***	-0.024***	-0.003	-0.014
(s.e.)	(0.017)	(0.012)	(0.013)	(0.007)	(0.007)	(0.007)	(0.046)	(0.010)
R2	0.24	0.24	0.11	0.22	0.29	0.22	0.43	0.22
# obs	132,381	146,736	165,245	148,320	129,807	148,313	43,855	148,253
# firms	12,564	10,327	14,516	10,439	8,771	10,438	5,170	10,438
# countries	187	188	189	196	196	196	145	184
# products	118	118	118	118	117	117	118	118
Fixed effects:								
Firm × country × product	YES	NO	NO	NO	NO	NO	NO	NO
Firm × year	NO	YES	NO	YES	NO	YES	NO	YES
Firm	NO	NO	YES	NO	NO	NO	NO	NO
Year	YES	NO	YES	NO	NO	NO	NO	NO
Product × country	NO	YES	YES	NO	NO	NO	NO	NO
Product	NO	NO	NO	YES	NO	NO	YES	YES
Country	NO	NO	NO	YES	YES	YES	NO	NO
Product × year	NO	NO	NO	NO	NO	YES	NO	NO
Country × year	NO	NO	NO	NO	NO	NO	NO	YES
Firm × product × year	NO	NO	NO	NO	YES	NO	NO	NO
Firm × country × year	NO	NO	NO	NO	NO	NO	YES	NO

Notes. Dependent variable is export growth at the firm-country-product level ($\Delta \ln X_{ipd,t}$). Sample covers 2009-2013. Standard errors are clustered at the product-destination level.

Column (7) reports the estimates when including firm × country × year fixed effects so that identification is based on variation across products of the same firm-country-year triplet. This implies that we are comparing the same firm exporting different products to the same country, some products affected by NTBs and some others not affected. In this case, the effect of non-tariff protectionism measures is estimated to be non-significant. This lack of effect might reflect product complementarities in exports at the firm level that are not present at the country level: firms export a basket of products to a given country and it is costly to adjust only one of these products but not the others; in contrast, it may be easier to adjust exports of the same product to different countries. Indeed, there are much less firms exporting several products to the same country in our data, only 5,170 firms against 8,771 exporting the same product to several countries which is the basis of the estimates in column (5).

In order to gauge the magnitude of the estimated effects, note that the estimated effect of a protectionism non-tariff measure ranges from -4.8 pp. to -2.4 pp. while the average growth rate in exports at the firm-product-country level in our data for the year 2010 is 6.5%. This implies that the estimated effects are not only statistically significant but also economically sizable, as they account for 74%-37% of average growth in absolute value.

Table 6 repeats the exercise from Table 5 but including only liberalizing non-tariff measures rather than protectionist ones. The results reflect that there is indeed a non-linear effect between liberalization and protectionism non-tariff measures. This finding casts doubt on the assumption that the effect of protectionism policies on trade is equal to the effect of liberalizing policies but with opposite sign.

Column (1) in Table 6 analyzes the removal of NTBs for the same triplet firm-product-country. It indicates that the average growth rate of exports is 3 pp. bigger after the liberalization. However, comparing with Column (1) of Table 5 we can see that the effect is smaller and statistically non-significant. Again, in columns (2)-(4) we show that this effect is robust to different combinations of fixed effects.

Table 6: Effect of liberalizing non-tariff measures on export growth.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$NTM^{LIBE}_{pd,t-1}$	0.030	0.009	0.026	0.009	0.001	0.010	0.053	0.001
(s.e.)	(0.031)	(0.030)	(0.032)	(0.023)	(0.020)	(0.022)	(0.040)	(0.028)
R2	0.24	0.24	0.11	0.22	0.29	0.22	0.43	0.22
# obs	132,381	146,736	165,245	148,320	129,807	148,313	43,855	148,253
# firms	12,564	10,327	14,516	10,439	8,771	10,438	5,170	10,438
# countries	187	188	189	196	196	196	145	184
# products	118	118	118	118	117	117	118	118
Fixed effects:								
Firm × country × product	YES	NO	NO	NO	NO	NO	NO	NO
Firm × year	NO	YES	NO	YES	NO	YES	NO	YES
Firm	NO	NO	YES	NO	NO	NO	NO	NO
Year	YES	NO	YES	NO	NO	NO	NO	NO
Product × country	NO	YES	YES	NO	NO	NO	NO	NO
Product	NO	NO	NO	YES	NO	NO	YES	YES
Country	NO	NO	NO	YES	YES	YES	NO	NO
Product × year	NO	NO	NO	NO	NO	YES	NO	NO
Country × year	NO	NO	NO	NO	NO	NO	NO	YES
Firm × product × year	NO	NO	NO	NO	YES	NO	NO	NO
Firm × country × year	NO	NO	NO	NO	NO	NO	YES	NO

Notes. Dependent variable is export growth at the firm-country-product level ($\Delta \ln X_{ipd,t}$). Sample covers 2009-2013. Standard errors are clustered at the product-destination level.

Similarly to the exercise with protectionist measures, we include firm × product × year fixed effect to exploit variation across countries of destination. This is reflected in column (5), where we observe that the effect is almost negligible and less signficant than that of protectionist measures. In such a way, average export growth of firms that export to countries removing NTBs is only 0.05 pp. higher than that of firms exporting to countries that keep the measures. As compared to the decrease in growth of 3.1 pp. estimated in column (5) of Table 5, the effect of the liberalization is negligible. Hence, export growth is hindered when a NTB is implemented, but its removal does not necessarily imply an improvement in this situation, which is consistent with the fact that NTB are

more distortionary than tariff barriers. Column (6) confirms that this effect is robust to a different configuration of fixed effects.

Finally, column (7) includes fixed effects so that variation takes place across different products. Thus, we explore the effects of the removal of the NTB for the same firm exporting different products to the same country. Similarly to protectionist measures, the effect is not statistically significant and small. Column (8) show that this is robust to another configuration of fixed effects.

All in all, Tables 5 and 6 point to the presence of non-linear effects regarding non-tariff measures. While protectionism policies exert a negative and significant effect on export growth, the estimated effects for liberalizing measures are not statistically distinguishable from zero. A plausible explanation for this non-linearity is the existence of two forces that point in the same direction when protectionist measures are implemented but in opposite directions when they are removed. The implementation of a protectionist measure in a given country lowers the threshold marginal cost at which it is profitable to export. Thus, some firms will not be able to export to that country anymore and will face an adjustment cost to change the destination of their products. These two effects would explain the strong and statistically significant negative effect that we find. On the other hand, when the protectionist measure is lifted, despite the increase in the threshold marginal cost at which it is profitable to export, firms still have to face an adjustment cost to penetrate the formerly protected market again. This would be consistent with the negligible effect on export growth that we find in our data since both effects go in opposite directions. Table B.3 in Appendix B confirms this pattern when both liberalizing and protectionist measures are simultaneously in the regression.

4 Additional exercises at the product-destination level

4.1 The role of tariffs changes

Non-tariff measures may well be implemented in conjunction with other tariff-based measures as a part of a more general trade policy with a given trade partner and/or product. If this is the case, omitting tariff changes from the regression would result in biased estimates of the effect of non-tariff measures on export growth. This is so because NTMs would capture in reality the effect of their accompanying tariff changes. In order to address this concern, we estimate our baseline specification but controlling for changes in tariffs:

$$\Delta \ln X_{ipd,t} = \beta NTM_{pd,t-1} + \gamma \text{Tariff}_{pd,t-1} + \text{Fixed Effects} + \upsilon_{ipdt} \tag{2}$$

where X refers to export volume of product p to country d from firm i between year $t-1$ and year t. $\text{Tariff}_{pd,t-1}$ is a dummy variable that takes the value 1 if there is at least one tariff measure affecting product p and country d in year $t-1$. The tariff measure can be either protectionist (Tariff $\text{increase}_{pd,t-1}$) or liberalizing (Tariff $\text{cut}_{pd,t-1}$). The remaining elements in equation (2) are defined in our baseline specification in equation (1).

It is worth mentioning that our estimates are robust to the inclusion of a continuous variable of tariff changes and/or levels instead of the two separate dummy variables. However, we prefer the specification with the two discrete tariff cut and tariff increase variables in order to allow for the presence of non-linear effects as in the case of NTMs. Also, given that our dependent variable measures exports growth rather than exports levels, we favor the specification with tariff changes rather than tariff levels, again in line with the NTMs.

Table 7 reports the estimated effects. Our baseline results in Table 5 hold even when controlling for tariff measures as well as liberalizing NTMs. The coefficients remain similar in magnitude and sign to those of the baseline specification. Regarding protectionist measures, the results are very similar to those of the specification in Table 5 and coefficient estimates prove to be robust to the inclusion of tariff measures in the regression. Regarding liberalizing measures, the estimated effects are negligible in most cases and not statistically significant. Therefore, the non-linear result also holds when we control for tariff measures, while protectionist NTMs harm export growth the effect of liberalizing NTMs is not significant.

Turning to tariff changes, the estimated effects are not significant in all cases, which probably points to the lack of enough variation in the data due to the reduced number of tariff changes affecting Spain over the 2009-2013 period. Finally, it is worth noting that these results are backed as well by Tables B.4 and B.5 in the Appendix, where we regress export growth on protectionist and liberalizing non-tariff policies separately while controlling for tariffs.

4.2 Results by type of non-tariff measure

We now turn to the analysis of the different types of NTMs in order to identify which policies are the most harmful. We label the different NTMs in our sample according to the UN MAST classification (see Appendix A for a detailed description of the different UN MAST categories). Then, we run a regression as in equation (1) but including a set of 11 NTMs, one for each UN MAST category.

The results are reported in Table 8 where we exploit different fixed effects configurations. When exploiting variation across time in column (1) by including firm-product-destination fixed effects, categories A, G and M present statistically significant negative coefficients. These categories correspond to sanitary measures (barriers on health and environmental standards), finance measures (guarantees of payment to national industries and such) and government procurement measures (measures regulating the products used for public procurement projects). This result also holds when controlling for liberalizing measures.

Column (2) exploits variation across countries, comparing the rate of growth of exports for the same firm-product-year triplet in countries with and without NTMs. The categories that present statistically significant coefficients are again categories A, G and M together with categories B (that corresponds to technical barriers to trade) and F (that corresponds to measures related to internal

Table 7: Effect of non-tariff measures and tariffs on export growth.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$NTM^{PROT}_{pd,t-1}$	-0.057***	-0.058***	-0.057***	-0.030***	-0.036***	-0.030***	-0.022	-0.017
(s.e.)	(0.023)	(0.017)	(0.019)	(0.011)	(0.010)	(0.010)	(0.047)	(0.013)
$NTM^{LIBE}_{pd,t-1}$	0.023	0.024	0.024	0.006	-0.011	0.005	0.032	-0.033
(s.e.)	(0.034)	(0.040)	(0.038)	(0.031)	(0.034)	(0.032)	(0.061)	(0.028)
Tariff increase$_{pd,t-1}$	-0.017	-0.044	-0.029	-0.019	-0.031	-0.021	0.067	0.002
(s.e.)	(0.034)	(0.045)	(0.035)	(0.022)	(0.021)	(0.022)	(0.055)	(0.019)
Tariff cut$_{pd,t-1}$	-0.013	-0.012	-0.011	-0.0005	0.002	0.001	-0.012	-0.005
(s.e.)	(0.031)	(0.024)	(0.021)	(0.018)	(0.017)	(0.019)	(0.039)	(0.017)
R2	0.24	0.24	0.11	0.22	0.29	0.22	0.44	0.22
# obs	132,381	146,736	165,245	148,320	129,807	148,313	43,855	148,253
# firms	12,564	10,327	14,516	10,439	8,771	5,170	2,401	10,438
# countries	187	188	189	196	196	196	145	184
# products	118	118	118	118	117	117	118	118
Fixed effects:								
Firm × country × product	YES	NO	NO	NO	NO	NO	NO	NO
Firm × year	NO	YES	NO	YES	NO	YES	NO	YES
Firm	NO	NO	YES	NO	NO	NO	NO	NO
Year	YES	NO	YES	NO	NO	NO	NO	NO
Product × country	NO	YES	YES	NO	NO	NO	NO	NO
Product	NO	NO	NO	YES	NO	NO	YES	YES
Country	NO	NO	NO	YES	YES	YES	NO	NO
Product × year	NO	NO	NO	NO	NO	YES	NO	NO
Country × year	NO	NO	NO	NO	NO	NO	NO	YES
Firm × product × year	NO	NO	NO	NO	YES	NO	NO	NO
Firm × country × year	NO	NO	NO	NO	NO	NO	YES	NO

Notes. Dependent variable is export growth at the firm-country-product level ($\Delta \ln X_{ipd,t}$). Sample covers 2009-2013. Standard errors are clustered at the product-destination level.

taxation of imports or price control instruments). All of them exhibit the expected sign except for price control measures. The latter may reflect a problem of endogeneity, where protectionist measures are being implemented in those industries which are importing the most from Spanish companies. This result also holds when we control for tariff measures and differentiate between protectionist and liberalizing measures.

In such a way, finance (category G) and government procurement (category M) protectionist measures exhibit statistically significant negative coefficients. It is worth noting that there are few measures in some of the categories that are significant in Table 8 — see Table A.1 in the Appendix —, which might cast doubt on the estimates for categories A, B and F. Therefore, we think that the most robust results are those of categories G and M, corresponding to finance and government procurement measures.

Finally, in column (3) we present the results when exploiting variation across products. In line with the results from tables 5 and 6, the effects are not significant for most categories. Only finance measures remain statistically significant with a negative effect.

Table 8: Effect of protectionist non-tariff measures on export growth by UN MAST category.

	(1)	(2)	(3)
$NTM^{PROT}_{pd,t-1}$ (Category A)	-0.089***	0.131**	-0.348
(s.e)	(0.044)	(0.066)	(0.369)
$NTM^{PROT}_{pd,t-1}$ (Category B)	-0.081	-0.095**	0.183
(s.e)	(0.069)	(0.040)	(0.211)
$NTM^{PROT}_{pd,t-1}$ (Category D)	0.086	0.057	0.003
(s.e)	(0.096)	(0.060)	(0.119)
$NTM^{PROT}_{pd,t-1}$ (Category F)	0.266***	0.255**	-0.072
(s.e)	(0.088)	(0.081)	(0.249)
$NTM^{PROT}_{pd,t-1}$ (Category E)	0.028	-0.017	0.057
(s.e)	(0.094)	(0.037)	(0.100)
$NTM^{PROT}_{pd,t-1}$ (Category G)	-0.272***	-0.289***	-1.379***
(s.e)	(0.037)	(0.081)	(0.223)
$NTM^{PROT}_{pd,t-1}$ (Category I)	-0.013	0.018	0.057
(s.e)	(0.061)	(0.048)	(0.049)
$NTM^{PROT}_{pd,t-1}$ (Category L)	-0.031	-0.017	-0.029
(s.e)	(0.031)	(0.019)	(0.058)
$NTM^{PROT}_{pd,t-1}$ (Category M)	-0.146***	-0.073***	-0.023
(s.e)	(0.052)	(0.021)	(0.102)
$NTM^{PROT}_{pd,t-1}$ (Category P)	-0.017	-0.035	0.080
(s.e)	(0.040)	(0.032)	(0.047)
$NTM^{PROT}_{pd,t-1}$ (Category X)	0.019	-0.009	0.061
(s.e)	(0.041)	(0.026)	(0.065)
R2	0.24	0.29	0.43
# obs	132,381	129,807	43,855
# firms	12,564	8,771	5,170
# countries	187	196	145
# products	118	117	118
Fixed effects:			
Firm × country × product	YES	NO	NO
Year	YES	NO	NO
Product	NO	NO	YES
Country	NO	YES	NO
Firm × product × year	NO	YES	NO
Firm × country × year	NO	NO	YES

Notes. Dependent variable is export growth at the firm-country-product level ($\Delta \ln X_{ipd,t}$). Sample covers 2009-2013. Standard errors are clustered at the product-destination level. Category A = Sanitary and phitosanitary measures; Category B = Technical barriers to trade; Category D = Contingent protection measures; Category E = Non-automatic licensing, quotas, prohibitions and qualiy-control measures (other than SPS and TBT); Category F = Price control measures, including taxes and charges; Category G = Finance measures; Category I = Trade-related investment measures; Category L = subsidies; Category M = Government procurement measures; Category P = Export measures; Category X= Unclear instrument

4.3 Cumulative effects

We have so far focused on annual growth by product-destination as dependent variable. We now turn to cumulative effects in which the persistence of the non-tariff measures effects is explored. More concretely, we consider our baseline specification in (1) but substituting the dependent variable by cumulative growth over 1, 2, and 3 years after implementation of the corresponding non-tariff measure. Importantly, we restrict our analysis to a sample of permanent firm-product-destinations triplets, i.e., firm-product-destinations trade relationships that are present in all years 2009-2013.

Table 9: Cumulative effect of non-tariff measures on export growth.

	Firm-country-product FE			Firm-product-year FE			Firm-country-year FE		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Cumulative growth	1-year	2-year	3-year	1-year	2-year	3-year	1-year	2-year	3-year
$NTM^{PROT}_{pd,t-1}$	-0.051***	-0.074***	0.007	-0.048***	-0.067***	0.009	0.009	0.016	0.052
(s.e.)	(0.014)	(0.030)	(0.006)	(0.012)	(0.017)	(0.026)	(0.044)	(0.070)	(0.075)
$NTM^{LIBE}_{pd,t-1}$	0.043	0.055*	0.070***	0.013	0.011	0.025	0.079	0.048	-0.053
(s.e.)	(0.032)	(0.028)	(0.023)	(0.027)	(0.057)	(0.051)	(0.129)	(0.074)	(0.037)
R2	0.15	0.31	0.55	0.31	0.33	0.34	0.46	0.48	0.49
# obs	66,824	63,752	47,046	50,236	47,865	35,306	9,512	8,889	6,511
# firms	5,951	5,951	5,951	2,574	2,574	2,574	640	640	640
# countries	152	152	152	150	150	150	69	69	69
# products	113	113	113	101	101	101	100	100	100
Fixed effects									
Firm × country × product	YES	YES	YES	NO	NO	NO	NO	NO	NO
Year	YES	YES	YES	NO	NO	NO	NO	NO	NO
Product	NO	NO	NO	NO	NO	NO	YES	YES	YES
Country	NO	NO	NO	YES	YES	YES	NO	NO	NO
Firm × product × year	NO	NO	NO	YES	YES	YES	NO	NO	NO
Firm × country × year	NO	NO	NO	NO	NO	NO	YES	YES	YES

Notes. Dependent variable is export growth at the firm-country-product level ($\Delta \ln X_{ipd,t}$) over 1, 2, and 3 years. Sample covers 2009-2013. Standard errors are clustered at the product-destination level. Sample of permanent firm-product-destinations triplets.

Table 9 presents the estimated effects of non-tariff measures on cumulative growth. Three findings are worth highlighting. First, the effects for annual growth in the permanent sample are very similar to those of the baseline specification in Table 5. Second, when exploiting variation over time for each firm-country-product triplet (columns 1-3) or variation across destinations for each firm-product-year triplet (columns 4-6), we find that the statistically significant negative effect of non-tariff barriers is even larger after two years but vanishes in the third year. When significant, the magnitude of the estimated effects is sizable. For instance, the 1- and 2-year effects in columns (1) and (2) of -5.1 pp. and -7.4 pp. can be compared with the sample average cumulative growth 1- and 2-years ahead of 6.3% and 11.6%, respectively. This result may indicate that non-tariff barriers imply an important cost in the short-run probably due to the uncertainty implied by the protectionism measures, but firms eventually learn how to overcome the barrier and are able to undo the initial negative shock. Third, estimates based on variation across products for the same firm-country-year triplet (columns 7-9) remain statistically indistinguishable from zero for all time horizons.

Finally, the estimated effects of liberalizing non-tariff measures remain statistically insignificant for the 1-year growth in all the three fixed effects configurations. However, in the case of firm-country-product fixed effects, the estimated coefficient on liberalizing NTMs becomes positive and significant, which points to a potentially positive effects of liberalizing measures but only after a certain lag.

5 Firm-level analysis

We now turn to the analysis at the firm level rather than at the firm-product-destination level. If firms are able to undo the NTM shocks by increasing their exports to other product-destinations pairs, the negative impact on export growth at the firm-product-destination level would vanish at the firm level. In order to investigate this possibility, we consider overall export growth at the firm level as our dependent variable of interest. To be more concrete, we now consider the following empirical specification:

$$\Delta \ln X_{i,t} = \beta_F NTM_{i,t-1} + \theta Z_{i,t-1} + \eta_i + \delta_t + \nu_{i,t} \tag{3}$$

where $\Delta \ln X_{i,t}$ refers to overall export growth of firm t in year t. $Z_{i,t-1}$ refers to a set of firm controls, namely, size and total factor productivity. A set of firm and year fixed effects is also included (η_i and δ_t). In addition to export growth at the firm level, we also consider two alternative outcomes as dependent variable, employment/output growth and productivity growth.

Finally, $NTM_{i,t-1}$ refers to exposure to non-tariff measures of firm i computed as a weighted average of product-destination non-tariff measures as follows:

$$NTM_{i,t} = \sum_{pd} \frac{X_{ipd,t-1}}{X_{i,t-1}} NTM_{pd,t-1} \tag{4}$$

Given the discrete nature of the $NTM_{pd.t-1}$ variable, the exposure to non-tariff measures at the firm level ($NTM_{i,t}$) ranges between zero and one and can be interpreted as the share of firm's exports exposed to the implementation of non-tariff measures. The average share in our sample is 7.2% while the median is 0 and the 90 percentile is 22.2%.

In order to estimate equation (3) we match the Balance of Payments data with firms balance sheet data from the Spanish Mercantile Register collected by the Central Balance Sheet Office in the Banco de España as well as the SABI (Iberian Balance Sheet Analysis System) database. Using this balance-sheet information, we compute firms total factor productivity (TFP) following Levinsohn and Petrin (2003).

Table 10 presents the estimates of equation (3) for the four dependent variables. In a few words, our results point to a negative and significant effect of non-tariff barriers on export growth at the firm level that is accompanied by a negative effect on output growth while the effect on employment growth is not statistically significant. As a result, the effect on firms' TFP growth is negative,

significant and sizable. Moreover, the strong power of controls can be gauged from the fact that R-square goes to 0.21 in column (7) to 0.61 in column (8) without a very small decrease in the coefficient magnitude. As Altonji et al. (2005) point out, the persistence of a coefficient despite a substantial increase in regression R-square due to controls provides a strong support for exogeneity of the right hand side variable of interest.

Table 10: Firm-level effects of non-tariff measures.

Dep. Variable	Exports growth		Output growth		Employment growth		TFP growth	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$NTM_{i,t-1}^{PROT}$	-0.045***	-0.045***	-0.017***	-0.016***	-0.005	-0.003	-0.033***	-0.027***
(s.e.)	(0.003)	(0.003)	(0.007)	(0.006)	(0.007)	(0.005)	(0.013)	(0.01)
$NTM_{i,t-1}^{LIBE}$	0.06	0.05	0.007	0.005	0.024**	0.014	0.018	0.000
(s.e.)	(0.05)	(0.05)	(0.009)	(0.008)	(0.010)	(0.009)	(0.020)	(0.015)
Average Dep. Variable	0.07	0.09	0.004	0.005	-0.003	0.001	-0.006	-0.006
R2	0.19	0.21	0.24	0.47	0.34	0.55	0.21	0.61
# obs	81,192	59,477	61,092	58,485	63,061	58,886	55,791	55,791
# firms	24,077	17,963	18,484	17,693	18,963	17,791	16,919	16,919
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm Controls	NO	YES	NO	YES	NO	YES	NO	YES

Notes. Dependent variable is annual growth at the firm level in terms of exports, output, employment, or total factor productivity (TFP). Sample covers 2009-2013. Standard errors are clustered at the firm level.

Columns (1) and (2) of Table 10 exploit the effects of protective and liberalizing NTMs with and without firm-specific controls. The results show that protectionist NTMs hinder overall export growth at the firm level. This finding indicates that firms do not compensate the reduction in exports in the affected product-destinations pairs by increasing their exports to other product-destinations. The implied cost of NTMs are thus sizable at the firm level. In contrast, the impact of liberalizing NTMs is statistically insignificant.

Next, we turn to output growth. In line with the results obtained for exports growth, columns (3) and (4) show that output growth also exhibits negative and statistically significant coefficients when regressed on protective NTMs and non-significant results regarding liberalizing measures. The results on employment growth, estimated in Columns (5) and (6) are weaker. The effect of protectionist measures is negligible while liberalizing measures show a positive and larger effect that becomes non-significant when controlling for firm characteristics.

Since consumer welfare is hard to measure, firm TFP is usually used as a proxy when estimating the welfare gains from trade (e.g. Trefler, 2004). Columns (7) and (8) show our estimated harming effects of trade protectionism in the form of NTMs on productivity. This finding is consistent with the mechanism that a protectionist measure increases the marginal cost of exporting to the implementing country. It also diminishes the size of the market to which exporting firms have access. Thus, we are able to document a sizable harmful effect from protectionism in the form of NTMs, while liberalizing NTMs seem to have small effects. Turning to liberalizing NTMs, the estimated effects

on TFP (welfare) are not statistically significant, which confirms the non-linear pattern found at the product-destination level for exports.

5.1 Aggregate effects

In order to gauge the aggregate impact of the non-tariff protectionism measures, we compare actual export growth with a counterfactual growth in the absence of non-tariff barriers. For each firm i in our sample we compute the export growth one would have observed if $NTM_{i,t-1} = 0$:

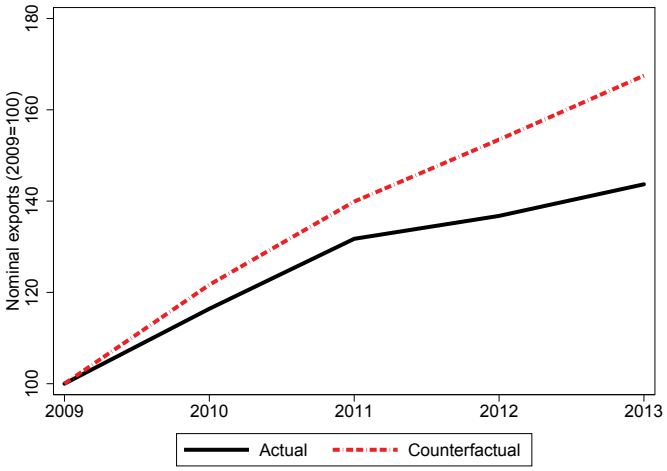
$$\widetilde{\Delta \ln X_{i,t}} = \Delta \ln X_{i,t} - \hat{\beta}_F NTM_{i,t-1} \tag{5}$$

Armed with the firm-specific counterfactual growth ($\widetilde{\Delta \ln X_{i,t}}$), we simply aggregate across all firms in our sample using firm-specific export shares ($\phi_{i,t}$) as weights:

$$\widetilde{\Delta \ln X_t} = \sum_i \phi_{i,t} \widetilde{\Delta \ln X_{i,t}}. \tag{6}$$

Figure 2 shows the actual evolution of nominal exports from 2009 to 2013 together with the counterfactual evolution in the absence of non-tariff barriers. While actual growth was around 11% per year, our counterfactual indicates that it would have been around 14% per year if non-tariff barriers would not have been implemented.

Figure 2: Aggregate exports growth in the absence of NTBs.



Notes. Actual refers to annual nominal growth of goods exports. Counterfactual refers to aggregate growth in the absence of NTBs as computed in equation (6).

6 Concluding remarks

The so-called 'murkier' protectionism in the form of non-tariff barriers is playing a prominent role in international trade during the post-crisis era. Policies such as subsidies to local industries, regulations

favoring domestic firms in public procurements, or financial bailouts represent good examples of non-tariff measures that might distort trade flows. While the benefits of trade liberalizations in the form of tariff cuts have been extensively analyzed in the literature, the consequences of the recent increase in non-tariff barriers are not yet well understood.

By combining non-tariff measures affecting Spain at the product-country level with firm-product-country information on exports for Spanish firms over the years 2009-2013, this paper provides empirical evidence in favor of the hypothesis that non-tariff protectionist measures significantly reduce export growth. The estimated reduction in exports due to non-tariff barriers ranges between 37 and 74% of the average export growth by firm-product-destination in our sample. In contrast, the impact of liberalizing measures is not statistically significant. Moreover, firm exposure to non-tariff barriers is associated to lower productivity growth (consumer welfare).

Two main conclusions emerge from these findings according to our interpretation. On the one hand, the rise of anti-globalization episodes like Trump's trade threats or Brexit is a legitimate source of concern given the sizable costs that protectionism non-tariff policies may imply. On the other hand, the conventional 'symmetry' assumption made when estimating the effects of protectionism measures using liberalization-based elasticities may be at odds with the data.

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A More details on the GTA database

In our data we are using the GTA classification which is easily transformed into the UN MAST categorization. As we observe, the GTA classification is more precise and we have used it on the data, but the UN MAST will be used for exposition purposes. UN MAST classifies policies from chapters A to P according to whether policies affect imports (chapters A to O) or exports (P Export-related measures):[11]

A Sanitary and phitosanitary measures: Measures that are applied to protect human or animal life from risks arising from additives, contaminants, toxins or disease-causing organisms in their food; to protect human life from plant- or animal-carried diseases; to protect animal or plant life from pests, diseases, or disease-causing organisms; to prevent or limit other damage to a country from the entry, establishment or spread of pests; and to protect biodiversity. These include measures taken to protect the health of fish and wild fauna, as well as of forests and wild flora. (GTA database: Sanitary and phitosanitary measures).

B Technical barriers to trade: Measures referring to technical regulations, and procedures for assessment of conformity with technical regulations and standards, excluding measures covered by the SPS Agreement. (GTA database: Technical barriers to trade).

D Contingent trade-protective measures: Measures implemented to counteract particular adverse effects of imports in the market of the importing country, including measures aimed at unfair foreign trade practices, contingent upon the fulfilment of certain procedural and substantive requirements. (GTA database: Import monitoring, Special safeguard, Safeguard, Anti-subsidy, Anti-circumvention, Anti-dumping).

E Non automatic licensing, quotas, prohibitions and quantity-control measures: Control measures generally aimed at restraining the quantity of goods that can be imported, regardless of whether they come from different sources or one specific supplier. These measures can take the form of non-automatic licensing, fixing of a predetermined quota, or through prohibitions. Measures introduced for SPS and TBT reasons are classified in chapters A and B above. (GTA database: Import licensing requirement, Import tariff quota, Import ban, Import quota).

F Price control measures, including taxes and charges: Measures implemented to control or affect the prices of imported goods in order to, inter alia, support the domestic price of certain products when the import prices of these goods are lower; establish the domestic price of certain products because of price fluctuation in domestic markets, or price instability in a foreign market; or to increase or preserve tax revenue. This category also includes measures other than tariffs measures that increase the cost of imports in a similar manner, i.e. by fixed percentage or by a fixed amount. They are also known as para-tariff measures. (GTA database: Internal taxation of imports).

FDI: Measures related to investment of foreign companies. (GTA database: FDI measures, FDI: Financial incentive, FDI: Treatment and operations, FDI: Entry and ownership rule).

[11] Since our paper is focused on Spanish data, we have omitted the categories where Spain was not affected.

G Finance measures: Finance measures are intended to regulate the access to and cost of foreign exchange for imports and define the terms of payment. They may increase import costs in the same manner as tariff measures. (GTA database: Competitive devaluation, Trade payment measure.)
I Trade-related investment measures: It includes local content measures and measures aimed at trade-balancing. (GTA database: Local sourcing, Trade balancing measure, Localisation incentive, Local labour, Local operations).
X Instrument unclear: Instruments which do not fall under any of the previous classifications. (GTA database: Import-related non-tariff measure, Instrument unclear).
L Subsidies: Financial contribution by a government or public body, or via government entrustment or direction of a private body (direct or potential direct transfer of funds: e.g. grant, loan, equity infusion, guarantee; government revenue foregone; provision of goods or services or purchase of goods; payments to a funding mechanism), or income or price support, which confers a benefit and is specific (to an enterprise or industry or group thereof, or limited to a designated geographical region). (GTA database: Bailout (capital injection or equity participation), State loan, Financial grant, In-kind grant, Production subsidy, Interest payment subsidy, Loan guarantee, Tax or social insurance relief, Consumption subsidy, Import incentive, Financial assistance in foreign market, State aid, nes, Price stabilisation).
M Government measures: Measures controlling the purchase of goods by government agencies, generally by preferring national providers. (GTA database: Public procurement access, Public procurement preference margin, Public procurement localisation, Public procurement, nes)
N Intellectual Property: Measures protecting intellectual property. (GTA database: Intellectual property measures).
P Export measures: Export-related measures are measures applied by the government of the exporting country on exported goods. (GTA database: Export ban, Export tariff quota, Export quota, Export licensing requirement, Export tax, Tax-based export incentive, Export subsidy, Trade finance, Other export incentive, Export-related non-tariff measure, nes).

In Table A.1, we can observe the type of protectionist policies that most have affected the Spanish products. GTA database uses a slightly more disaggregated classification which is close to the UN MAST classification. As we observe, after the financial collapse of 2008, governments have been actively intervening in trade regulation. The most used measures fall under categories M, L and P according to the UN MAST classification. That is, governments have been supporting domestic firms mainly through conditions on public procurement, state subsidies for international markets and tax-based incentives to trade. All these non-tariff measures hinder competition in local markets by making foreign products less competitive or increase international penetration of national producers by decreasing their costs through subsidies and public protection. In our data, we have included a total of 45 categories according to the GTA classification that affected Spain during the 2008-13 period.

Table A.1: Number of NTBs that affected Spain by GTA category.

UN MAST CLASSIFICATION	Total NTBs	Liberalizing	Protectionist	Indeterminate
Category A	5	-	4	1
Category B	13	6	6	1
Category D	85	2	83	-
Category E	176	-	130	46
Category F	46	40	6	-
Category G	107	20	87	-
Category I	171	7	161	3
Category L	520	45	433	42
Category M	474	11	453	10
Category P	1619	156	1321	142
Category X	121	34	77	10

In order to conclude with the description of the protectionist policies that have been used in our analysis, we present Table A.2. This table shows the exports at risk due to protectionist measures. To generate these numbers, we go through each intervention and calculate the amount of trade affected by importing country, exporting country and HS category. However, these amounts do not refer to the year in question, as the volume may be affected by these measures. Instead, we take a base year and calculate the exports at risk for that year. As we observe, there was a huge rise in the percentage of exports at risk due to NTBs from the beginning of the crisis until now. Particularly, NTBs put at stake almost a 40% of Spanish exports in 2009, while in 2016, it was a 66%. We observe how the Export measures category explains most of the risk followed by Subsidies and Government procurement. Investment measures related to local content requirements also experienced a big growth during the period. On the other hand, it is also interesting to see that tariff measures did not increase substantially and their explicative power in the percentage of exports at risk is rather low. This also happens for other European economies such as Germany, France or Italy but developing economies also experience a similar phenomenon. Hence, we believe that the use of NTBs as a proxy for protectionism is justified and empirically consistent. NTBs are the most important trade policy instrument that countries have used in order to put restrictions on to foreign trade. In addition, the evolution of tariffs has been rather positive during the last years and slightly biased towards liberalizing (see Table 4). Thus, countries are turning to a murkier way of protectionism, that is much more difficult to detect and has been much less studied, which constitutes a motivation for the present paper.

Table A.2: Spanish exports at risk due to NTBs.

UN MAST chapter	Foreign discriminatory policy instrument	Percentage of Spain's exports at risk due to... 2009	2010	2011	2012	2013	2014	2015	2016
	All instruments	40.20%	54.33%	58.79%	63.02%	64.46%	66.37%	66.13%	68.30%
D	Contingent trade protection	0.03%	0.06%	0.06%	0.09%	0.11%	0.15%	0.18%	0.15%
E	Non-automatic licensing, quotas	0.22%	0.44%	0.57%	0.64%	1.79%	0.73%	1.01%	0.94%
F	Price control measures	0.06%	0.06%	0.08%	0.10%	0.11%	0.13%	0.22%	0.27%
G	Finance measures	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
I	Investment measures	0.26%	5.08%	6.37%	6.73%	6.71%	6.93%	7.33%	7.46%
L	Subsidies (except export subsidies)	6.87%	11.81%	8.93%	12.56%	13.83%	16.49%	17.25%	20.16%
M	Government procurement	1.27%	1.62%	1.77%	2.43%	2.51%	2.67%	2.86%	3.07%
P	Export measures	35.70%	45.36%	50.37%	54.86%	55.90%	55.96%	55.97%	57.73%
	Import tariff increases	0.36%	0.61%	0.70%	1.01%	1.61%	1.66%	1.80%	2.04%
	Instrument unclassified	0.04%	0.36%	0.43%	0.46%	0.52%	0.59%	0.70%	0.76%

B Additional results

Table B.3: Effect of protectionist and liberalizing non-tariff measures on export growth.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$NTM^{PROT}_{pd,t-1}$	-0.049***	-0.046***	-0.047***	-0.023***	-0.028***	-0.023***	-0.006	-0.011
(s.e.)	(0.018)	(0.017)	(0.015)	(0.009)	(0.008)	(0.009)	(0.045)	(0.012)
$NTM^{LIBE}_{pd,t-1}$	-0.004	-0.022	0.002	-0.022	-0.042	-0.023	0.063	-0.050
(s.e.)	(0.043)	(0.021)	(0.025)	(0.026)	(0.027)	(0.025)	(0.050)	(0.029)
R2	0.24	0.24	0.11	0.22	0.29	0.22	0.44	0.22
# obs	132,381	146,736	165,245	148,320	129,807	148,313	43,855	148,253
# firms	12,564	10,327	14,516	10,439	8,771	10,438	5,170	10,438
# countries	187	188	189	196	196	196	106	184
# products	118	118	118	118	117	117	116	118
Fixed effects:								
Firm × country × product	YES	NO	NO	NO	NO	NO	NO	NO
Firm × year	NO	YES	NO	YES	NO	YES	NO	YES
Firm	NO	NO	YES	NO	NO	NO	NO	NO
Year	YES	NO	YES	NO	NO	NO	NO	NO
Product × country	NO	YES	YES	NO	NO	NO	NO	NO
Product	NO	NO	NO	YES	NO	NO	YES	YES
Country	NO	NO	NO	YES	YES	YES	NO	NO
Product × year	NO	NO	NO	NO	NO	YES	NO	NO
Country × year	NO	NO	NO	NO	NO	NO	NO	YES
Firm × product × year	NO	NO	NO	NO	YES	NO	NO	NO
Firm × country × year	NO	NO	NO	NO	NO	NO	YES	NO

Notes. Dependent variable is export growth at the firm-country-product level ($\Delta \ln X_{ipd,t}$). Sample covers 2009-2013. Standard errors are clustered at the product-destination level.

Table B.4: Effect of protectionist non-tariff measures and tariffs on export growth.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$NTB_{pd,t-1}$	-0.047**	-0.047***	-0.046**	-0.025***	-0.032***	-0.025***	0.0004	-0.014
(s.e.)	(0.020)	(0.013)	(0.015)	(0.008)	(0.007)	(0.008)	(0.048)	(0.010)
$Tariff_{pd,t-1}$	-0.059**	-0.010	-0.041**	0.0004	0.001	0.003	-0.083**	0.020
(s.e.)	(0.012)	(0.018)	(0.013)	(0.016)	(0.016)	(0.016)	(0.042)	(0.020)
R2	0.24	0.24	0.11	0.22	0.29	0.22	0.43	0.22
# obs	132,381	146,736	165,245	148,320	129,807	148,313	43,855	148,253
# firms	12,564	10,327	14,516	10,439	8,771	10,438	5,170	10,438
# countries	187	188	189	196	196	196	145	184
# products	118	118	118	118	117	117	118	118
Fixed effects:								
Firm × country × product	YES	NO	NO	NO	NO	NO	NO	NO
Firm × year	NO	YES	NO	YES	NO	YES	NO	YES
Firm	NO	NO	YES	NO	NO	NO	NO	NO
Year	YES	NO	YES	NO	NO	NO	NO	NO
Product × country	NO	YES	YES	NO	NO	NO	NO	NO
Product	NO	NO	NO	YES	NO	NO	YES	YES
Country	NO	NO	NO	YES	YES	YES	NO	NO
Product × year	NO	NO	NO	NO	NO	YES	NO	NO
Country × year	NO	NO	NO	NO	NO	NO	NO	YES
Firm × product × year	NO	NO	NO	NO	YES	NO	NO	NO
Firm × country × year	NO	NO	NO	NO	NO	NO	YES	NO

Notes. Dependent variable is export growth at the firm-country-product level ($\Delta \ln X_{ipd,t}$). Sample covers 2009-2013. Standard errors are clustered at the product-destination level.

Table B.5: Effect of liberalizing non-tariff measures and tariffs on export growth.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$NTB_{pd,t-1}$	0.029	0.008	0.025	0.009	0.001	0.010	0.050	0.0005
(s.e.)	(0.031)	(0.030)	(0.031)	(0.022)	(0.020)	(0.022)	(0.036)	(0.027)
$Tariff_{pd,t-1}$	-0.062***	-0.014	-0.044*	-0.003	-0.004	-0.0003	-0.080*	-0.022
(s.e.)	(0.008)	(0.016)	(0.016)	(0.015)	(0.016)	(0.016)	(0.046)	(0.020)
R2	0.24	0.24	0.11	0.22	0.29	0.22	0.43	0.22
# obs	132,381	146,736	165,245	148,320	129,807	148,313	43,855	148,253
# firms	12,564	10,327	14,516	10,439	8,771	10,438	5,170	10,438
# countries	187	188	189	196	196	196	145	184
# products	118	118	118	118	117	117	118	118
Fixed effects:								
Firm × country × product	YES	NO	NO	NO	NO	NO	NO	NO
Firm × year	NO	YES	NO	YES	NO	YES	NO	YES
Firm	NO	NO	YES	NO	NO	NO	NO	NO
Year	YES	NO	YES	NO	NO	NO	NO	NO
Product × country	NO	YES	YES	NO	NO	NO	NO	NO
Product	NO	NO	NO	YES	NO	NO	YES	YES
Country	NO	NO	NO	YES	YES	YES	NO	NO
Product × year	NO	NO	NO	NO	NO	YES	NO	NO
Country × year	NO	NO	NO	NO	NO	NO	NO	YES
Firm × product × year	NO	NO	NO	NO	YES	NO	NO	NO
Firm × country × year	NO	NO	NO	NO	NO	NO	YES	NO

Notes. Dependent variable is export growth at the firm-country-product level ($\Delta \ln X_{ipd,t}$). Sample covers 2009-2013. Standard errors are clustered at the product-destination level.

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