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Abstract

Concerns about a possible turn of the global trade policy agenda are on the rise. Indeed, even if tariffs are at a historically low levels, non-tariff measures (NTMs) play an important – and growing – role in global trade policy. In this paper, using a recently released database on NTMs (UNCTAD), and relying on a gravity model, we focus on Chinese exports with two aims in mind: the first is to test for possible heterogeneous effects of different type of NTMs. The second is to verify empirically whether NTMs have larger negative effects for specific set of goods, i.e. final goods. We find that 1) technical NTMs tend to have positive effects on trade flows, whereas non-technical NTMs do not have clear effects at the aggregate level and 2) NTMs have heterogeneous effects at the product level: in the case of final goods, non-technical NTMs have negative and significant effects.

Keywords: international trade, trade policy, non-tariff measures, gravity model, China.

JEL Classification: F13, F14.

Resumen

Las preocupaciones sobre un posible giro de la agenda de la política comercial mundial van en aumento. De hecho, incluso si los aranceles se encuentran en niveles históricamente bajos, las medidas no arancelarias (MNA) desempeñan un papel importante, y creciente, en la política comercial mundial. En este documento, utilizando una base de datos recientemente publicada, y que contiene información sobre las MNA (UNCTAD) y utilizando en un modelo de gravedad, nos centramos en las exportaciones de China con dos objetivos en mente: el primero es evaluar posibles efectos heterogéneos de diferentes tipos de MNA. El segundo es verificar empíricamente si las MNA tienen efectos negativos más marcados para un conjunto específico de bienes, es decir, los bienes finales. Encontramos que 1) las MNA técnicas tienden a tener efectos positivos en los flujos comerciales, mientras que las MNA no técnicas no tienen efectos claros a nivel agregado y 2) las MNA tienen efectos heterogéneos a nivel del producto: en el caso de los bienes finales, las MNA no técnicas tienen efectos negativos y significativos.

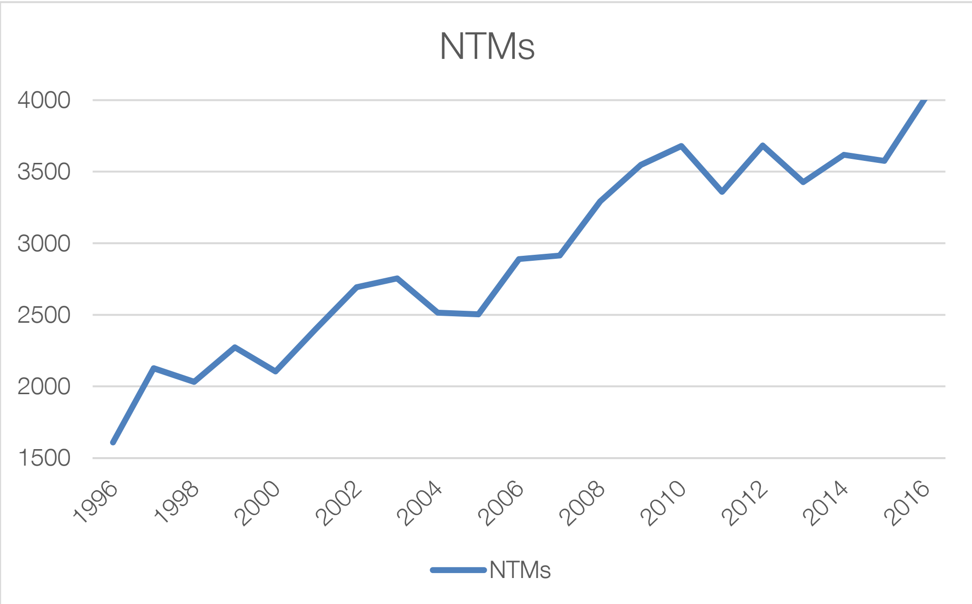
Palabras clave: comercio internacional, política comercial, medidas no arancelarias, modelos de gravedad, China.

Códigos JEL: F13, F14.

1 Introduction

The World Bank (WB), the International Monetary Fund (IMF) and the World Trade Organization (WTO) recently released a joint report (2017) warning against the turn of the global trade policy agenda. Indeed, in a context of erratic global trade developments, policy issues returned in the spotlight both in politics and academia (Feng et al., 2017; Nicita and Murina, 2017; Baccini et al., forthcoming; Blanchard et al., 2016; Conconi et al., 2016; Haaland and Venables, 2016; Baldwin, 2011; Antras and Yeaple, 2013; Vandenbussche and Zanardi, 2010). Even if tariffs are at historically low levels, non-tariff measures (NTMs) play an important – and growing – role in global trade policy, as certified by the burgeoning interest of international governmental and non-governmental bodies (i.a. Cadot and Malouche, 2012; UN, 2013; WTO, 2012; GTA, 2018), and their impacts on trade are potentially more complex than those of tariffs.

Figure 1: NTMs, 1996-2016



Source: Authors' elaboration on i-tip.wto.org.
Note: "NTMs" represents the sum of all different NTMs initiated and in force in a specific year, using a flow approach.

Theoretical and empirical work on NTMs provides mixed results. As brilliantly summarised by Fugazza (2013), from a theoretical perspective it is ambiguous how certain type of NTMs (e.g. technical regulations) may affect exporters' and importers' behaviour, and therefore trade (see also Bertola and Faini, 1990, with special emphasis on quotas). On the empirical side, the recent literature has largely concentrated on the effect of sanitary and phytosanitary standards (SPS, a subset of technical measures) on trade, with overwhelming attention to agricultural products (e.g. Nicita and Murina, 2017; Ferro et al., 2015; Melo et al., 2015; whereas Fontagné et al, 2015, cover the entire spectrum of HS-4 sectors; Gibson and Wang, 2018).

There are no clear-cut results: at the aggregated level (using panel data including different exporting countries), the effect of NTMs on trade is mixed at best (Ghodsi et al., 2017;

Hayakawa et al., 2016). We therefore decided to focus on China, the world biggest exporter. Increasing competition from China has been pointed as one of the causes that reinvigorated the recent revival of trade policy measures, with accuses of being the driver of increases in unemployment (Autor et al., 2013), lower wages (Ashournia et al., 2014), or affecting political and electoral patterns (see Colantone and Stanig, forthcoming (a); Colantone and Stanig, forthcoming (b); Che et al., 2016; Autor et al., 2016).[1]

In this paper, using a new measure of NTMs (Nicita and Murina, 2017), a recently released database (UNCTAD, 2017), and relying on gravity models (Baier and Bergstrand, 2007; Head and Mayer, 2014; Glick and Rose, 2016; UNCTAD-WTO; 2016), we focus on Chinese exports with two aims in mind: the first is to disentangle the effects of destination country's NTMs on Chinese exports. Due to possible heterogeneous effects of different NTMs on trade flows, we separate NTMs measures by groups, i.e. technical (mainly product regulations to promote certain standards) and non-technical (i.e. anti-dumping and other measures inclined to shelter domestic producers from import competition) measures (UNCTAD, 2015). In addition, we also aim to measure empirically whether NTMs have heterogeneous effects for specific sets of goods. Indeed, focusing trade policy on intermediate goods would rise input costs and possibly disrupt global value chains. Oppositely, following political economy arguments (Baccini et al., forthcoming), we would expect final goods to be the focus of more restrictive NTMs, as they induce tougher import competition (Amiti and Konings, 2007). Final goods may report larger NTMs effects also because of a higher degree of substitutability (Jones, 2011).

We find that – at least in the case of measures related with Chinese exports– measuring NTMs as a uniform aggregate may be misleading. NTMs have heterogeneous effects on trade. A first type of heterogeneity is at NTMs level: whereas technical NTMs tend to have positive effects on trade flows (likely to be demand-driven), non-technical NTMs do not have clear effects (having a negative but not significant coefficient). In addition, NTMs have heterogeneous effects also at the product level: in particular, non-technical NTMs have negative effects for final goods. As outlined above, this may be due to political economy reasons or heterogeneous substitution effects.

The rest of the paper is organised as follows: Section II revises the relevant literature on gravity models, NTMs and the political economy of trade policy. Section III explains our methodological choice and provide the relevant details. Section IV briefly describes data used. Section V analyses the main results and their robustness. Section VI concludes.

1 A parallel strand of literature estimate welfare effects related to "China's trade shock", finding aggregate welfare gains (Feenstra and Weinstein, 2017), however with considerable within-state variance (Caliendo et al., 2015).

2 Literature Review

The prominence of trade costs within international trade theory served as a natural magnet for many applied economists investigating its influences on trade flows (and economic growth). With the changing trend in relative importance between tariffs and NTMs during the last decades, the need of explicitly account for the latter in models and estimations became indisputable. However, NTMs are heterogeneous and complex in nature, often having legal origins, and their measurement is inherently difficult. Anderson and Neary (2003) provide one of the few comprehensive attempts to estimate NTMs, through a "Mercantilist Trade Restrictiveness Index" (MTRI) which would represent "the uniform tariff which yields the same volume of imports as a given tariff structure" (p.27).[2] Using the theoretical approach of Anderson and Neary (2003) as a reference, Kee et al. (2009) elaborated an "Overall Trade Restrictiveness Index" (OTRI) (see also i.a. Nicita and Olarreaga, 2008; Irwin, 2010). The OTRI combines tariffs with anti-dumping (AD) duties data (which only represents a fraction of the NTMs family), allowing to calculate a weighted average ad-valorem correspondent for tariffs and AD duties at country level, where weights depends on imported-product level characteristics, such as volume composition and demand elasticities.[3] The high level of data requirements limited the OTRI replicability, and currently comparable data exist for 2008 and 2009 only. Using these data, Kee et al. (2014) argues that trade policy faced no dramatic change between 2008 and 2009. They reached this conclusion plotting against each other the OTRI level in the two available years. At that time, AD duties were available for 13 countries.

Since then, data collection efforts have increased exponentially,[4] opening a wide set of opportunities for researchers. So far, results estimating the NTMs effects on trade have proved to be mixed (Ghodsi et al., 2017). Moreover, very few examples provide internationally comparable results, and most of them focus on agriculture. For example, Ferro et al. (2015) use "maximum residue level of pesticides" as a proxy for restrictiveness dictated by NTMs, finding a negative relation with exports in more regulated markets. Melo et al. (2014) find heterogeneous effects of regulation on Chilean fresh fruit exports. Fontagné et al. (2015) use French firm level data to detect a negative impact of trade barriers (sample restricted to SPS) on both margins of exports. Kirpichev and Moral-Benito (2018), using a panel of Spanish firms, found that newly introduced NTMs do not only have negative effects on export growth, but also on other firm dimensions (e.g. productivity). In parallel, another strand of literature points toward a positive effect of specific certification measures and other standards, mainly on imports from

2 In parallel, in a quest for coherent variables available for properly identifying a reduction in trade costs, a part of the literature focused on free trade agreements (FTAs) and currency unions (CUs), as they are expected to reduce trade costs. Concretely, FTAs are supposed to influence tariffs and NTMs. Most of the studies find a clear positive relation with FTAs and bilateral trade flows, but do not differentiate its drivers, including a dummy variable that identifies dichotomously the existence of an agreement and the eventual membership of the two countries involved in bilateral trade (e.g. Baier and Bergstrand, 2007; Philippidis and Sanjuán, 2007; Hayakawa and Kimura, 2015; Caporale et al., 2009; Kawasaki, 2015; Thorbecke, 2015a; Freeman and Pienknagura, 2016). CUs instead, are expected to reduce transaction costs, favouring trade. Rose's seminal contribution (2000) – together with Glick and Rose (2002) – calculating the effects of the use of a common currency on bilateral trade flows started a buoyant discussion on methods and techniques for minimising the potential estimation errors. Baldwin and Taglioni (2006) provide a detailed survey, highlighting the famous "gold, silver and bronze" errors and how to avoid them, while still applying gravity models. Rose (2017) and Glick and Rose (2016) recently summarised the results and provides new estimates for the entry and exit effects. For historical evidence on currency unions and trade see, i.a., Flandreau (2000), López-Córdova and Meissner (2003) and Timini (2018).

3 A precursor of this index was the TRI elaborated by the IMF in its review for the "Trade Liberalization in IMF-Supported Programs (EBS/97/163). Used mainly for managerial purposes, it has not been exempted by critics as some biases arose in the way tariffs and NTMs were rated.

4 See data section for more details

developing countries (e.g. Henson and Humprey, 2009; Henson et al., 2011; Murina and Nicita, 2017). Trimarchi (2018), focusing on anti-dumping measures, and Leonardi and Meschi (2016) extend these positive effects to the labour market. Among these, Murina and Nicita (2017) exploits the rich UNCTAD-TRAINS database in a disaggregated fashion, using a cross-section perspective, focussing on the effect of sanitary and phytosanitary (SPS) measures on agricultural imports in the EU market, and how the level of development in the country of origin may affect the capacities for compliance (the higher the income, the lower the difficulty of meeting the required standards).

Nevertheless, despite its role in the world economy, there is no work focusing on the whole set of NTMs for the specific case of Chinese exports. Imbruno (2016) examines its imports and assesses the effectiveness of a group of trade policy instruments since the Chinese accession to the WTO. Caporale et al. (2016) instead, analyses exports to the main destinations, and its relationship with the Chinese industrial structure, using aggregate data, and not including in the gravity model any proxies for NTMs. Chandra (2016) offers a view on the effect of US imposed temporary trade barriers, finding negative spillovers on Chinese exports (including those to third countries).[5] Finally, using data for Chinese exports of fruit and vegetables, Gibson and Wang (2018) focus on SPS measures and trade intermediaries, finding a positive association between NTMs and exports.

Our contribution is to consider the entire spectrum of exports and NTMs at the finest (internationally comparable) level of detail while, at the same time, allowing for possible heterogeneous effects at the NTM and product type level. Indeed, the diversity within NTMs (technical and non-technical measures) and product (final vs. intermediate and capital) types emphasize the need for allowing such heterogeneity to be taken into account empirically.

In other words, we aim to estimate the effects of NTMs on Chinese exports, at product-country level, differentiating by NTMs (i.e. between technical and non-technical measures) and by product classification (i.e. final and non-final good). The reasons for doing so are threefold: first, we aim to estimate the effects of the NTMs imposed by destination countries on Chinese exports. Second, we aim to take into account and disentangle possible heterogeneous effects of different NTMs. Indeed, in some cases, demand side effects may be positive: for example consumers may buy more products with higher regulatory requirements as they will reflect more sophisticated health, safety, and possibly also environmental protection standards (e.g. Nicita and Murina, 2017). Supply side effects may not be necessarily negative, if regulation does not directly aim to shield producers from import competition (as in case, for example of SPS measures, and other "technical" measures, as defined by UNCTAD, 2015). Nevertheless, if the final aim of NTMs is to shelter domestic producers, it is highly likely to have negative effects on the supply side (e.g. those NTMs classified by UNCTAD, 2015, as non-technical, i.e. anti-dumping and other measures inclined to shelter domestic producers from import competition, which translates in measures ranges from "contingent trade-protective" to "non-automatic licensing, quotas, prohibitions and quantity control", and from "trade-related investment" to "government procurement restrictions"). Moreover, we want to test for the possible existence of "political economy" arguments or heterogeneous substitution effects: NTMs may be more restrictive in some cases (i.e. have larger negative/positive effects for a specific set of goods). Indeed, trade policies focusing on intermediate goods would rise input costs and possibly disrupt global value chains. Oppositely, following political economy arguments (Baccini et al.,

5 For more information on temporary trade barriers and the relative database, see e.g. Bown and Crowley (2016)

forthcoming), we would expect final goods to be the focus of non-technical NTMs as they induce tougher import competition (Amiti and Konings, 2007). However, the same effects may be derived from a different degree of substitutability across product types: this would explain that the same number of NTMs may have, for example, more detrimental effects on final goods if these are more easily substitutable than intermediate goods. Due to the nature of the data in our possession, we cannot disentangle the two theories.

3 Methodology

In our methodological approach, we follow Head and Mayer (2014) and UNCTAD-WTO (2012) using an augmented gravity model, inclusive of multilateral trade resistances (MTRs) theorised by Anderson and Van Wincoop (2003), an issue that some studies on NTMs failed to properly take into account. To properly address the "zeros of trade", as standard in the literature, we implemented a pseudo-poisson maximum likelihood estimating procedure (Santos Silva and Tenreyro, 2006). We use disaggregated bilateral trade flows data.[6] Therefore, our main specification can be written as follow:

$$Tr_{jkt} = \exp(\beta_0 + \beta X'_{jkt} + \lambda W'_{jkt} + \omega Z_{jt} + \delta_j + \gamma_{sector} + \eta_t) + \epsilon_{jkt} \quad (1)$$

where Tr_{jk} denotes nominal Chinese exports of product k to country j. X' is a vector which contains trade policy related variables: 1) $Tariff_{jk}$, which is the effectively applied tariff reported by each destination country j for a specific product k (in logarithm). 2) RI_{jk}, which is a proxy for NTMs, as firstly implemented in Murina and Nicita (2017), reflecting the "regulatory intensity" for product k in country j. The regulatory intensity index is calculated by simply considering the number of NTMs that are applied to imports of a particular product coming from China. For example, if the product corresponding to the Harmonised System (HS) 6-digit category 611019 ("Jerseys, pullovers, cardigans, waist-coats & similar articles, knitted/crocheted, of fine animal hair other than of Kashmir [cashmere] goats") faces nine different measures in country A, the corresponding $RI_{A611019}$ will be equal to nine. Following Nicita and Murina (2017), in the main specification we include the RI in log, but we run a series of robustness tests using alternative functional forms. Following the same methodology and to account for eventual contrasting effects, we also calculated the RI_{jk} separately for technical (RI-tech) and non-technical measures (RI-nontech).[7] In addition, we include a vector W', which contains other relevant variables: 1) $final_k$, defined as in Martínez-Zarzoso and Johannsen (2016), i.e. a dummy =1 in case product k is not an intermediate nor a capital good following BEC classification. In addition, we include in the regressions two interaction terms, between the $final\ good_k$ dummy and RI-tech and RI-nontech, respectively, to test for the possible existence of heterogeneous effects for different product categories. Z' is a vector containing additional control variables, $lnGDP_{jt}$ and MRI_{jt}. $lnGDP_{jt}$ is the logarithm of the destination country nominal GDP. MRI_{jt} is a multilateral resistance index[8]. Indeed, to control for MTRs (as suggested by, inter alia, Head and Mayer, 2014; Feenstra, 2016; Shepherd, 2016; Anderson, 2011; and UNCTAD-WTO, 2016), we follow the method proposed by Carrère et al. (2010), widely used in the literature, e.g. Cirera

6 French (2014) highlights sub-optimal estimation performances of aggregated models with respect to trade barriers, as composition of trade flows matters.

7 NTMs technical and non-technical measures are classified following UNCTAD (2015), also called UN MAST classification. Technical measures include: chapters A to C, i.e. sanitary and phytosanitary measures; technical barriers to trade; pre-shipment inspection and other formalities. Non-technical measures include: chapters D to O, i.e. contingent trade-protective measures; non-automatic licensing, quotas, prohibitions and quantity-control measures other than for SPS or TBT reasons; price-control measures, including additional taxes and charges; finance measures; measures affecting competition; trade-related investment measures; distribution restrictions; restrictions on post-sales services; subsidies (excluding export subsidies); government procurement restrictions; intellectual property; rules of origin.

8 $MRI_{it} = \sum_{j=1}^{n} \frac{Y_{jt}}{Y_{wt}} \ln(Dist_{ij})$, where Y_{wt} is the world output at time t (for an explanation of the variables included in the equation, see text)

et al. (2016).[9] As a further control for endogeneity issues, we included pseudo-pair fixed effects, δ_j,[10] the use of which automatically exclude the possibility of obtaining separate estimates for the standard "gravity-related" variables. However, this would have only been a second-best strategy to (partly) control for trade costs. Finally, γ_{sector} represents two-digit sector fixed effects, η_t are time fixed effects, and ϵ_{jkt} the error term.

9 The procedure to estimate MTRs suggested by Baier and Bergstrand (2009), coherent with the Anderson and Van Wincoop (2003) theoretical framework, is highly data intensive (see i.a. Head et al., 2010; Melitz and Toubal, 2014 for a practical application; and Baltagi et al., 2014 for a theoretical discussion).

10 Due to the lack in exporter variance, importer fixed effects correspond to pair-fixed effects in our database.

4 Data

Our quantitative analysis exploits a new dataset generated by a variety of different sources. We follow Schindler and Beckett (2005) and Day (2015), including Chinese export data in the database mirroring import data from destination countries. Data on trade flows and tariffs come from UN COMTRADE (through the World Bank World Integrated Trade Solutions data platform – WITS).[11] On the NTMs side, there has been a recent explosion of interest. Data collection has follow accordingly. Indeed, at least three major projects delivered (public) databases containing internationally comparable information on NTMs. The first, the PRONTO project, is comprehensive in its scope: the authors involved created a diverse set of databases (ranging from Export Processing Zones to domestic environmental taxes), of which one is strictly dedicated to "measuring the incidence of NTMs" (NTM-MAP),[12] at the HS 2 digit level. The second, the Global Trade Alert database, contains rich information, devoting "particular attention to the policy choices of the G-20 economies",[13] on NTMs "flows", i.e. the change in NTMs barriers. The information is collected by teams of international trade experts, i.e. it is not "official" *strictu sensu*. More importantly (at least from the perspective of our analysis), it does not provide information on the NTMs "stock" (i.e. how many NTMs for each product were there at the beginning of the period). Finally, the third database, is the UNCTAD TRAINS, the "global database on NTMs",[14] which provides information at the highest internationally comparable level of disaggregation (HS 6 digit) for a large number of countries. Therefore, for NTMs, we decided to capitalise on the latter, as it includes information on the NTMs "stock" (the number of NTMs imposed by each country at the product level) at the finest internationally comparable level of disaggregation (HS 6 digit). In addition, we classified each product by the basic classes of goods identified in the System of National Accounts (SNA). Each one of these is related to the Broad Economic Categories (BEC) classification, which makes the equivalence with HS classification doable (Miroudot, 2009). GDP and distance data (necessary to calculate the MRI) are from CEPII. Limitation in terms of countries are related to both the availability of data for NTMs and trade flows at the product level. There are approximately 5,000 product observations per country-time,[15] including the "zeros of trade", for a total of more than three million observations, for the period 2001-2014: we focus on China since its accession in the WTO to the latest available data, as the Chinese integration into the world economy, as far as trade is concerned, increased dramatically and the potential for using tariffs have been circumscribed into WTO rules.

11 https://wits.worldbank.org/

12 More information at: http://pronto.wti.org.

13 More information at: http://www.globaltradealert.org.

14 http://trains.unctad.org/.

15 The member states of the European Union are included in the database as a single country, as the EU trade policy is defined at the Union level. See Appendix I for the complete list of countries included in the database.

5 Results

The results from the gravity model, with pseudo-poisson maximum likelihood estimates, are presented in Table 1. Column 1 represents a standard specification for panel gravity models focussed on understanding the effects of trade policy tools. Beyond the time, sector and (pseudo) country-pair fixed effects, it includes the effectively applied tariff variable, which reports a negative and significant coefficient. This means, as expected, that a tariff increase in country j reduces Chinese exports to country j. Moreover, it also includes the logarithm of the destination country GDP and the MRI. Column 2 contains – in addition to the previous regression – the regulatory index (RI, we test the robustness of a logarithmic specification in the robustness section), including all type of NTMs. The coefficient is positive and significant, meaning that, there is an association between higher NTMs and higher trade flows. The average result may be driven by positive demand side effects. It can be the case that consumers are more willing to buy products with higher regulatory requirements (increasing the trade value), in terms of technical standards. However, it is difficult to imagine that non-technical barriers may have any positive effects. Therefore, in column 3, we allow for heterogeneous effects of technical and non-technical NTMs, via two different variables. Indeed, we confirm our suspects that the NTMs positive and significant coefficient in column 2 was driven by technical NTMs, such as SPS measures. Non-technical NTMs have a negative coefficient, although is not significant. Finally, in column 4 we additionally introduce a dummy ("final") and its interaction with both subsets of NTMs (RI-tech and RI-nontech). In this way we test for the possible existence of heterogeneous effects for different product subsets: NTMs may be more restrictive in some cases (i.e. have larger negative effects for a specific set of goods). Indeed, trade policies focusing on intermediate goods would rise input costs and possibly disrupt global value chains. Oppositely, following political economy arguments (Baccini et al., forthcoming), we would expect final goods to be the focus of non-technical NTMs as they induce tougher import competition (Amiti and Konings, 2007). However, final goods may report larger NTMs effects also because of a higher degree of substitutability (Jones, 2011).

Table 1: Chinese exports, Regulatory Intensity and final goods

	(1)	*(2)*	*(3)*	*(4)*
lnGDP	0.888***	0.885***	0.892***	0.889***
	(0.091)	(0.091)	(0.090)	(0.090)
MRI	0.098	0.252**	0.255**	0.248**
	(0.128)	(0.124)	(0.122)	(0.122)
tariff [ln(1+tariff)]	-0.152***	-0.148***	-0.148***	-0.163***
	(0.014)	(0.014)	(0.014)	(0.014)
ln_RI [ln(1+RI)]		0.133***		
		(0.034)		
RI-tech [ln(1+RI-tech)]			0.136***	0.138***
			(0.037)	(0.048)
RI-nontech [ln(1+RI-nontech)]			0.031	0.147
			(0.098)	(0.117)
final				0.462***
				(0.028)
*final*RI-tech*				-0.0276
				(0.055)
*final*RI-nontech*				-0.517***
				(0.128)
Observations	3,176,012	3,176,012	3,176,012	3,176,012
Year FE	YES	YES	YES	YES
Sector 2-digit FE	YES	YES	YES	YES
Country-pair FE	YES	YES	YES	YES

Source: Authors' elaboration.

Note: Poisson regressions. Dependent variable: Chinese exports. Fixed effects and constants not reported for the sake of simplicity. Robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

5.1 Robustness analysis

To ensure the robustness of the results, we considered a set of alternative specifications. Results are included in Table 2.

In the first set of robustness tests, we focus on the NTMs functional form. In the main regression we included NTMs in logarithm, however there is no agreement yet in the literature. Therefore, we test – in column 1 – the incorporation of NTMs as a dummy (=1 if RI-tech and RI-nontech are ≥1, respectively), and in levels (column 2). Changing the NTMs functional form does not produce any relevant change to our main results.

In the second set of robustness test, we consider possible geographical and institutional peculiarities that may in turn introduce biases in the results. In column 3, we address the legitimate concern that "Honk Kong traders distribute a large fraction of China's exports" (Feenstra and Hanson, 2004), therefore counting Chinese exports only may be a source of bias. Consequently, we combined Chinese with Honk Kong exports for a product k to a country j. In column 4, we take into account the prominence and peculiarities of the China-US trade relationship (Thorbecke, 2015b), running a regression without China-US bilateral data to check whether overall results are driven by this subset. In both cases results hold, with coefficient equal in sign and significance, and very similar in "size". In column 5, in line with column 4, we exclude trade with the European Union, to check that results are not driven by the specificities of this important trade relationship.

In column 6 we exclude agricultural products from the regression. Even if agricultural products constitute a minority of Chinese exports (Zhang, 2006), we aim to prove that the NTMs-related effects in this analysis go beyond those typically related to SPS in agricultural products (e.g. Gibson and Wang, 2018; Nicita and Murina, 2017; Ferro et al., 2015; Melo et al., 2015).

In the last set of robustness test, we address some general issues related to the equation specification choice. Therefore, in column 7 we run a regression at 4-digit HS level, instead of our preferred choice of 6-digit HS level. In other words, we use trade flows at a more aggregated level. This imply some assumptions on tariffs (to have the applied tariff at the 4-digit level, we calculate the average effects among 6-digit products) and NTMs (we simply sum the number of NTMs across products, assuming there is no equal regulation across product). Finally, in column 8, we relax the sector fixed effects, with the introduction of 1-digit sector fixed effects.

It is worth noting that across all specifications, there are no changes in the sign or significance of our main variables of interests.

Table 2: Robustness tests

	(1) NTMs dummy (=1 if NTM≥1)	(2) NTMs In level	(3) + Honk Kong	(4) without US	(5) without EU	(6) without agricultural goods	(7) 4-digit	(8) γ at 1 digit level
lnGDP	0.899***	0.897***	0.770***	0.844***	0.884***	0.885***	0.892***	0.907***
	(0.090)	(0.091)	(0.088)	(0.090)	(0.095)	(0.093)	(0.121)	(0.091)
MRI	0.273**	0.168	0.290**	0.358**	0.303*	0.265*	0.480***	0.304**
	(0.119)	(0.125)	(0.119)	(0.171)	(0.156)	(0.125)	(0.163)	(0.123)
tariff [ln(1+tariff)]	-0.164***	-0.164***	-0.168***	-0.112***	-0.169***	-0.170***	-0.140***	-0.116***
	(0.014)	(0.014)	(0.014)	(0.012)	(0.016)	(0.014)	(0.023)	(0.013)
RI-tech	0.266***	0.0210***	0.137***	0.140**	0.187***	0.139***	0.176***	0.199***
	(0.071)	(0.007)	(0.048)	(0.056)	(0.048)	(0.049)	(0.034)	(0.048)
RI-nontech	0.078	0.061	0.148	0.110	0.128	0.149	0.094	0.186
	(0.115)	(0.047)	(0.114)	(0.085)	(0.118)	(0.118)	(0.071)	(0.115)
final	0.480***	0.453***	0.450**	0.315***	0.452***	0.460***	0.793***	0.826***
	(0.029)	(0.027)	(0.028)	(0.028)	(0.031)	(0.029)	(0.035)	(0.021)
*final*RI-tech*	-0.122	-0.0054	-0.029	-0.050	0.015	-0.0175	-0.054	-0.058
	(0.087)	(0.0091)	(0.055)	(0.065)	(0.065)	(0.057)	(0.042)	(0.06)
*final*RI-nontech*	-0.444***	-0.210***	-0.523***	-0.316***	-0.582***	-0.540***	-0.260***	-0.566***
	(0.124)	(0.059)	(0.125)	(0.101)	(0.135)	(0.131)	(0.082)	(0.127)
Observations	3,176,012	3,176,012	3,176,012	3,113,492	3,110,980	2,785,925	800,947	3,176,012
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Sector 2-digit FE	YES	YES	YES	YES	YES	YES	YES	1 digit
Country-pair FE	YES	YES	YES	YES	YES	YES	YES	YES

Source: Authors' elaboration.

Note: Poisson regressions. Dependent variable: Chinese exports. Fixed effects and constants not reported for the sake of simplicity. Robust standard errors in parentheses; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

6 Conclusions

In this article we estimate the effects of trade policy on Chinese exports, using trade data at the highest internationally comparable level of disaggregation (HS 6 digit), with a particular focus on NTMs. We show that NTMs have heterogeneous effects on Chinese exports both by NTMs group and across product type. Indeed, technical NTMs tend to have positive effects on trade flows (likely to be driven by demand-side effects), non-technical NTMs do not have a significant effect overall (having a negative but not significant coefficient). Moreover, technical NTMs have larger positive effects, as well as non-technical NTMs have negative effects, for final goods. As outlined above, this may be due to political economy reasons (Baccini et al., forthcoming): trade policies focusing on intermediate goods would rise input costs and possibly disrupt global value chains. Oppositely, final goods may be the focus of non-technical NTMs, as they induce tougher import competition (Amiti and Konings, 2007). Final goods may report larger NTMs effects also because of a higher degree of substitutability (Jones, 2011).

These conclusions have a twofold relevance for increasing our understanding of trade policy effects in general, and NTMs in particular. In the first case, we argue that it is necessary to disentangle NTMs by group (at least allowing the technical – non-technical dichotomy to emerge) in order to fully grasp the diversity of demand and supply-side effects. In addition, we claim that to understand non-technical NTMs effects is necessary to go beyond aggregate flows, as these seem to concentrate (i.e. to have stronger effects) on a particular set of products, namely final goods.

Our results call for further research to understand whether NTMs have been used in substitution of traditional trade policy tools (e.g. tariffs, quotas, see i.a. Blonigen and Prusa, 2003; Konings and Vandenbussche, 2005; Ketterer, 2016), particularly focusing on final goods to shelter domestic firms from the surge in international competition deriving from the “secular decline” of tariff rates.

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Appendix I

Table A.I.1: Countries included in the database (ISO 3 digit code)

Countries									
AFG	ARG	AUS	BEN	BFA	BOL	BRA	BRN	CAN	CHL
CIV	COL	CPV	CRI	CUB	ECU	ETH	EUN	GHA	GIN
GMB	GTM	HND	IDN	IND	JPN	KAZ	KHM	LAO	LBR
LKA	MEX	MLI	MMR	MYS	NER	NGA	NIC	NPL	NZL
PAK	PAN	PER	PHL	PRY	RUS	SEN	SGP	SLV	TGO
THA	TJK	URY	USA	VEN	VNM				

Source: Authors' elaboration

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