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Trade policy and trade resilience during the 2020 trade downturn

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Abstract

The COVID-19 pandemic resulted in large and heterogeneous declines in bilateral trade flows. This study investigates whether these diverse effects can be explained by differences in trade costs as measured by pre-existing trade policies such as tariffs, non-tariff measures, and participation in trade agreements. Results indicate that trade flows subject to higher trade costs declined by more than average during 2020. The results also show that the effect of higher trade costs was lower the larger the importer's market share. We interpret these results as evidence that the fall in demand during 2020 caused less-established and higher-cost suppliers to be squeezed out of international markets. More generally, the results of this paper have important implications for development, as they indicate that similar trade costs impose relatively higher burdens on smaller exporters.

Key words

International trade, COVID-19, trade policy, tariffs, non-tariff measures, trade agreements.

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1. Introduction

As a consequence of the COVID-19 pandemic, trade considerably declined for most products and countries during 2020. The negative impact of COVID-19 on international trade, while widespread, has been far from homogeneous. What factors can explain such heterogeneity? This paper explores whether pre-existing trade policy influenced heterogeneous declines in the bilateral trade flows observed in 2020.

This paper contributes to the literature on the effects of COVID-19 on international trade[1] by analyzing whether the changes in international trade observed during 2020 can be related to pre-existing trade policy (tariffs, non-tariff measures and trade agreements). The rationale for this hypothesis is that a decline in global demand would affect international trade flows by forcing less established and higher-cost suppliers out of international markets.[2]

Our work also adds to the literature on heterogeneous effects to trade costs by investigating whether similar trade policies have diversely affected trade flows, depending on market shares in importer markets. The analysis of this paper follows the rationale of Chen and Novy (2022), who use gravity equations to investigate the heterogeneity of trade costs. They find that the effect of trade costs is stronger when bilateral import shares are smaller. While Chen and Novy (2022) specifically investigate a change in trade costs resulting from the formation of a currency union, their rationale applies to all forms of trade costs. The fact that the trade elasticity tends to be inversely correlated with import shares links to the rationale of Helpman et al. (2008), who found that bilateral trade cost elasticities are larger for less developed countries, and Melitz and Redding (2015) who documented that trade elasticities vary across markets and levels of trade costs. Carrère et al. (2020) also show the importance of non-constant trade elasticities, by highlighting distance effects. Other studies also show that trade agreements boost international trade, though their effect might be attenuated by distance (Head and Mayer, 2014).

The question of the heterogeneous effects of trade costs has been extensively studied in the micro-level literature, which demonstrates that knowledge of the firm-level response to trade costs is key for understanding the relation between aggregate exports and trade costs. It is shown that the elasticity of trade flows to trade costs is not constant across countries. Novy (2013) and Spearot (2013), find that the aggregate trade cost elasticity decreases with bilateral trade intensity. Fontagné and Berthou (2015) provide estimates of the microeconomic elasticity of exports with respect to variable trade costs (i.e. tariffs), pointing out the bias in the intensive margin at the country level exports due to firm and product composition effects. Bas et al. (2017) show that the elasticity of trade with respect to trade costs should be smaller (in absolute value) when trade liberalization concerns country-pairs where the volume of bilateral trade is already large. Therefore, the bilateral aggregate elasticity decreases in absolute value with the share of exports going to a destination.[3]

In this paper, we test the hypothesis of less elastic trade flows, when trade relations are tighter in the context of the trade downturn of 2020. Our findings show that trade flows subject to higher costs (as measured by tariffs and non-tariff measures) are associated with larger trade declines. Conversely, trade flows under RTAs are associated with lower trade declines. Importantly, the overall results reveal that these effects tend to be smaller for thicker trade relationships. That is, larger trade flows and trade flows between more established trading partners are less sensitive to trade costs. These results are analogous to the findings of the literature on firm heterogeneity that shows heterogenous effect of trade costs at the firm level, depending on size, productivity and product composition (Fontagné and Berthou, 2015; Fontagné et al., 2020). Here we focus on the tightness of trade relations as revealed by importer's market share, and similarly to findings of Bas et al.

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[1] See for example: Greenaway and Nelson (2022) and Bas, Fernandez and Paunov (2022).

[2] This paper does not account for any increase of trade costs during Covid-19, a fact that is already explored in the literature (Evenett et al., 2022).

[3] In fact, imposing a uniform elasticity would produce estimates that would be close to the average elasticity. This would entail an underestimation of the trade growth for initially low traders and an overestimation for top trade pairs.

(2017) that use firm level data or Novy (2013) who builds on Feenstra (2003), using the translog demand system with homogeneous firms to obtain variable trade elasticities, the elasticity of trade when there is a shock (e.g., demand shock), depends on already established trade links: it is smaller when trade links are tighter.

The remainder of this paper proceeds as follows. Section 2 describes the data and provides some descriptive statistics. Section 3 shows the empirical analysis. Section 4 explains the results and finally Section 5 concludes.

2. Data and descriptive statistics

To assess the impact of trade policy on the trade downturn of 2020, this paper utilizes detailed bilateral data at the 6-digit level of the Harmonized System classification. The data for the analysis is purged for outliers and small trade flows. In particular, we completely omit countries where total trade figures are very small, and also omit any trade flow of little magnitude (less than one thousand United States dollars). Moreover, we only consider importers-products with an overall decline in trade so as to remove specific flows whose demand has been increasing (e.g. medical equipment). Finally, we address outliers by removing about 5 per cent of importer-exporter-product observations for which the change in trade during the period is unreasonably large.[4] Overall, the data used in the analysis is comprised of 2,526,200 observations. The final sample includes 54 importing countries and 78 exporting countries covering 4,856 products at HS6 level classification. The trade data is from the UN COMTRADE database. Tariff data is from the UNCTAD TRAINS database. Ad-valorem equivalents (AVEs) capture the costs associated with non-tariff measures (NTMs) imposed at the border and are from Kee and Nicita (2022). Data on the presence of trade agreements originates from the WTO and is compiled by the CEPII. The CEPII database is also the source of the distance and contiguity variable.

For the purpose of this paper, we organize the data as follows. As the analysis relies on changes in trade, we use data at two points in time. For the baseline we use the pre-pandemic averages of 2017-2019, and compare them with data for 2020.[5] Our dependent variable is the percentage change in the traded flow between trade partners for a given product. The analysis with sub-samples split the data into 24 distinguished datasets, each covering a broad sector.[6]

Before providing some descriptive statistics of the data, we briefly discuss the trade policy variables used in the analysis. We use two variables capturing variable trade costs. The first trade policy variable is the effectively applied tariff on the trade of a HS6-digit product. The second trade policy variables capture the bilateral costs related to non-tariff measures applied at the border. These costs are measured by estimating ad-valorem cost equivalents (Kee and Nicita, 2022).[7] The third trade policy variable is the presence of a regional trade agreement (RTA). On this, we distinguish between general trade agreements, and deep trade agreements which include custom unions and agreements that go beyond tariff preferences, such as those including investment agreements and services provisions.

[4] Such treatment of outliers is required because of possible measurement error in the bilateral trade data. Note that trade data often manifests inexplicable large variance across years at the product level. This problem is more common for the data of small countries and for relatively small trade flows.

[5] Using 2017-2019 averages allows considering also occasional trade flows which may not occur every year. Results are qualitatively similar when using only 2019 data. In constructing bilateral trade, we use import data, while recurring to mirror export data when the importing country does not report any statistics in the given year.

[6] The sectors are defined based on the ISIC classification for manufacturing and the Broad Economic Categories (BEC) classification for agriculture.

[7] The ad-valorem equivalent of a non-tariff measure is the uniform tariff that will result in the same trade impacts on the import of a product due to the presence of the NTM. In other words, the AVEs represent the additional costs (in percentage terms) that the presence of NTMs has on imports.

In the analysis, we distinguish the heterogeneous effects of trade policy based on the tightness (i.e. closeness) of trade relations, as revealed by the import share. This variable equals the share of imports from a given origin over all imports of an importer. The analysis introduces this variable both at the aggregate level and at the product level. The former tests whether trade with established trading partners was more resilient. The latter tests the hypothesis whether tight trade relations (i.e. a higher import share) lead to higher trade resilience (i.e. smaller elasticity of trade to the shock). In this context, we look at the elasticity of such trade relations in the presence of heterogeneous trade costs, through an interaction between the import shares and the trade policy variables.

The role of trade policy in the context of trade resilience already shows in the descriptive statistics. As shown in Table 1, of all positive bilateral flows that were subject to an RTA in 2017-2019 about 65.2 per cent were still positive in 2020. This increases to 73.4 per cent in the case of a deep RTA. On the other hand, among flows that did not have a signed RTA, the surviving share is 63 per cent. Regarding tariffs, flows that disappeared have a tariff that is about 1 percentage point higher than surviving flows, and around 0.05 percentage points higher when measured by the ad-valorem equivalents of NTMs. Regarding the magnitude of changes in trade flows, the average decline in trade flows across products was about 36 per cent. In the case of flows not subject to any RTA the decline was about 39 per cent, while flows under RTAs declined about 38 per cent. Finally, trade flows subject to deep RTAs declined by an average of about 30 per cent.

Table 1. Summary statistics

	Number of observations
All Sample	2,526,200
without RTA	1,098,726
with RTA	697,111
with deep RTA	730,363
Share of surviving flows without RTA over all observations without RTA	63.0 per cent
Share of surviving flows with RTA over all observations with RTA	65.2 per cent
Share of surviving flows with deep RTA over all observations with deep RTA	73.4 per cent
Gap in the average tariff between surviving and disappearing flows	1.03 p.p
Gap in the average ad-valorem equivalent of non-tariff measured between surviving and disappearing flows	0.05 p.p
	Trade change flows (mean)
All Sample	-36 per cent
without RTA	-39 per cent
with RTA	-38 per cent
with deep RTA	-30 per cent

Notes: Authors' calculations. Percentage points are denoted by p.p.

3. Empirical Analysis

The analysis of this paper aims to investigate whether the patterns of trade declines observed in 2020 can be explained by pre-existing trade policies. As a starting point we estimated a gravity type regression where the identification is achieved by exploiting the surviving probability of flows (extensive margin) and the bilateral variation in the changes of trade flows (intensive margin) on pre-existing trade policy (tariffs, AVEs of NTMs and RTAs), controlling for importer-product and exporter-product characteristics. We then allow for variable trade cost elasticities by adding interaction terms to the benchmark regression model to test whether trade policy has heterogeneous effects across bilateral trade flows.

3.1 Trade costs and margins of trade

To explore whether the pre-existing trade policy affected the changes in trade patterns observed between 2017-19 and 2020, we use an econometric approach that includes covariates and fixed effects as controls. The analysis explores two related aspects. First, it explores whether the probability of an existing flow to remain positive in the 2020 trade downturn (i.e. surviving flow) depends on trade policy variables. Second, the analysis explores whether trade costs are correlated with the percentage changes of trade flows between the baseline scenario and 2020. The two econometric estimations follow similar specifications. More formally, the estimating equation is given by:

$$X_{ijk} = \beta_0 + \beta_1 \ln(1 + \tau_{ijk}) + \beta_2 \ln(1 + AVE_{ijk}) + \beta_3 AG_{ij} + \beta_4 DAG_{ij} + G_{ij} + \varphi_{ik} + \omega_{jk} + \varepsilon_{ijk} \quad (1)$$

where the subscripts are as follows: *i* denotes the importer, *j* the exporter and *k* the product. In equation (1), X_{ijk} corresponds in turn to: (i) a dummy equal to 1 if the trade flow has remained positive in 2020; and (ii) the percentage change in the value of trade flows between 2020 and the baseline scenario, with larger declines denoted by larger negative percentages. These two dependent variables are regressed on the log of the bilateral applied tariff (τ_{ijk}), the log of the bilateral ad-valorem equivalents of NTMs (AVE_{ijk}), a dummy variable capturing the presence of an RTA (AG_{ij}). Additionally another dummy variable identifies the effect of a deep RTA between *i* and *j* (DAG_{ij}). The specification also includes gravity-type variables (G_{ij}), as controls for additional bilateral trade costs. The specification also controls for changes in demand conditions in the importing countries by including importer-product fixed effects (φ_{ik}). Similarly, changes in supply conditions in the exporting countries are controlled by exporter-product fixed effects (ω_{jk}).

In equation (1), the signs β_1 and β_2 are expected to be negative as higher tariffs or ad-valorem equivalents of NTMs would imply in turn: (i) a lower probability for the flow to remain positive; and (ii) a relatively larger decline in trade flows.[8] On the other hand, we anticipate the signs of β_3 and β_4 to be positive, as the presence of an RTA and the additional effect of the trade being under deep RTAs should reduce trade costs and therefore result in: (i) higher probability of the flow to remain positive; and (ii) a lower trade decline.[9] To evaluate the extensive margin (i.e. the survival rate) we use a linear probability model (LPM), with heteroscedasticity-consistent robust standard error estimates.[10]

[8] Note that a reduction in trade flows is denoted by a negative sign. Therefore, higher tariffs are expected to be negatively correlated with the dependent variable.

[9] Note that by defining trade policy variables at their pre-existing level in 2019 the analysis does not control for possible changes in trade policy between 2019 and 2020. In the case of tariffs, these changes affect less than 0.5 per cent of observations, and less so in the case of RTAs. Considering these small changes, and that there is no time series for the ad-valorem equivalent of NTMs allowing to calculate changes in the NTM variable, we omit this control.

[10] This model avoids the incidental parameter problem associated with fixed effects compared to a logit or probit model. Consider a panel data with N individuals over T time periods. If T is fixed, as N grows large (i.e., N → ∞) the covariate estimates become biased. This occurs because the number of "nuisance parameters" grows quickly as N increases (Wooldridge, 2010).

3.2 Heterogeneous effect of trade costs

This section explores heterogeneous effects of trade policies. In a recent work, Chen and Novy (2022) find that the elasticity of trade to trade costs depends on how much countries trade with each other. To analyze whether the impact of trade costs is different depending on how much countries trade with each other, we add to equation (1) the import share of trade (IS_{ij}), and its interaction with the trade policy variables.

$$
\begin{aligned}
X_{ijk} = \beta_0 + \gamma_0 IS_{ij} + \beta_1 \ln(1+\tau_{ijk}) + \gamma_1 \ln(1+\tau_{ijk}) * IS_{ij} + \beta_2 \ln(1+AVE_{ijk}) \\
+ \gamma_2 \ln(1+AVE_{ijk}) * IS_{ij} + \beta_3 AG_{ij} + \gamma_3 AG_{ij} * IS_{ij} + \beta_4 DAG_{ij} \\
+ \gamma_4 DAG_{ij} * IS_{ij} + \beta_5 G_{ij} + \varphi_{ik} + \omega_{jk} + \varepsilon_{ijk}
\end{aligned}
\quad (2)
$$

The interpretation of the β coefficients remains similar to equation (1). For the gamma coefficients, the interpretation is as follows. The coefficient γ_0 captures the relation between the percentage changes in trade flows and import shares. A positive coefficient would imply that the drop in trade flows has been smaller for larger shares. Consistent with the hypothesis of higher trade elasticities for the smaller trade flows, we expect positive signs for the coefficients γ_1 and γ_2 (i.e. trade costs tend to have larger effects when the import shares are smaller) and we expect negative signs for γ_3 and γ_4, as the impact of participating in an RTA is expected to be more important for smaller trade flows. In other words, we expect the interaction term to have the opposite sign of the associated trade policy variable, implying that relatively larger trade flows are less affected by trade costs.

4. Results

We start by presenting the results on the extensive margin (i.e. surviving trade flows), and then proceed with the intensive margin of trade. We finally discuss the results related to the heterogeneous effects of trade costs.

4.1 Trade costs and the extensive margin of trade

Table 2 reports the results on the extensive margin of trade. All coefficients are significant and have the expected sign, indicating that lower trade costs are positively correlated with the probability of a trade flow remaining positive. Higher tariffs and AVEs of non-tariff measures result in lower survival rates (columns 1 and 2), while the presence of an RTA increases survival rates (column 3). The presence of a deep RTAs further adds to survival rates (column 4). These results also remain significant when adding all trade policy variables in the model (column 5), and when including gravity type variables (column 6).[11]

In terms of magnitude, results in columns 1 to 4 show that a decrease in tariffs by 1 percentage point induces an increase in survival rate by 1.4 percentage points; a one percentage point reduction in costs associated with AVEs of NTMs would increase survival rates by about 0.5 percentage points. Trade flows subject to an RTA have a survival probability 16 percentage points higher than those without an RTA, and those subject to a deep RTA about 26 percentage points higher.[12] As before, the effects of the different trade policies become smaller when concurrently assessed as they generally overlap.

[11] Note that the two gravity variables are significant and of the expected signs: higher distance would reduce the probability of survival and a dummy equal to 1 for contiguity would increase it.

[12] Similar estimations to that of column 6 are run for each ISIC sector, as shown in Table A.2 of the Appendix. Results show that more than 80 per cent of the estimations at the sectoral level have significant coefficients with the expected sign.

Table 2. Extensive margin, baseline estimations

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	Surviving dummy					
ln(1+tariff)	-1.414***				-0.661***	-0.433***
	(0.014)				(0.011)	(0.010)
ln(1+AVE)		-0.475***			-0.067***	-0.033*
		(0.020)			(0.020)	(0.019)
RTA dummy			0.159***		0.057***	0.017***
			(0.001)		(0.001)	(0.001)
Deep RTA dummy				0.258***	0.191***	0.086***
				(0.001)	(0.001)	(0.001)
ln(distance)						-0.073***
						(0.001)
Contiguity						0.082***
						(0.001)
Constant	0.713***	0.669***	0.576***	0.592***	0.601***	1.241***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.005)
Observations	2,526,200	2,526,200	2,526,200	2,526,200	2,526,200	2,526,200
R-squared	0.415	0.407	0.421	0.426	0.430	0.443

Note: all specifications include exporter-product and importer-product fixed effects. The level of significance is: *** p<0.01, ** p<0.05, * p<0.1.

4.2 Trade costs and the intensive margin of trade

The intensive margin of trade is measured by the percentage change in trade flows between 2020 and the baseline period. The control variables are similar to those of the extensive margin, as in each of the estimations, trade policy variables are examined in turn. The results are presented in Table 3.

Overall, the results for the intensive margin of trade are qualitatively similar to those for the extensive margin of trade. A lower tariff or AVEs of NTMs and the presence of an RTA result in a lower percentage decline in trade. The results also remain consistent, but for the AVEs of NTMs variable in the specification where all trade policy and control variables are included in the regression (column 6).[13] Taken separately, an increase in tariff of one percentage point decreases trade by an additional 0.8 percentage points, while an increase of the AVEs of non-tariff measures by one percentage point induces a decrease in trade by 0.3 percentage points.[14] The presence of an RTA would reduce the decline in trade by about 10 percentage points relative to a similar flow