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A Microeconomic Look at the Impact of Tariffs on Latin American Exports

Integration and Trade Sector

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Abstract

The impact of tariff changes on aggregate bilateral trade flows operates through both the intensive and extensive margins of trade. However, there is a difference in the timing of this impact. After a tariff fall, the immediate adjustment in export flows comes about via the intensive margin. The reaction from the extensive margin seems to happen one year later. We thus focus on the intensive margin and find that the impact on it is heterogenous. Higher tariffs are more detrimental to larger firms than to their smaller counterparts.

JEL classifications: F13, F14, F61

Key words: intensive margin, extensive margin, tariff liberalization

1. INTRODUCTION

Barriers to trade have a detrimental effect on aggregate bilateral trade flows. The negative relationship between trade costs and trade flows is widely established in the literature using the gravity model, which is the workhorse for studying the impact of trade policy on aggregated trade flows.[1] However, while we have known for the past 50 years or so that trade liberalization is beneficial for aggregated export flows, far less evidence has been published on how tariffs impact exports at a more micro level. In particular, little has been produced on whether trade liberalization pushes aggregate exports up by making exporters larger (average exporter size—intensive margin) or by increasing exporters' participation (number of exporters—extensive margin).

This shortfall was partly due to the fact that microlevel trade flow data was previously unavailable. As these datasets became more available, some studies began to explore the interaction between variable trade costs (specifically, tariffs) and the margins of trade. Fontagné and Berthou (2015) find that about 20% of the impact of tariffs on exports is driven by firms adjusting their product mix across destinations. One recent study by Fugazza et al. (2018) analyzes the heterogeneous impact of market access barriers on Peruvian exporters using export transaction data for 2000–2014. The authors study the simultaneous impact of tariffs and nontariff measures in the destination market on Peruvian exporters. Regarding tariffs, they find that tariff liberalization has a heterogenous impact, and this impact is such that higher tariffs in the destination markets are beneficial to larger firms. In other words, trade protectionism benefits the largest firms. While these findings—like those of Fontagné and Berthou—are novel and thought-provoking, they are based on the experience of a single country thus cannot be generalized.[2]

The objective of this paper is to fill in this gap and extend the evidence on the relationship between tariffs and the microlevel components of aggregate bilateral trade flows across countries,[3] focusing on Latin America. In the 1990s, the region began to liberalize trade, reduce its own tariffs, and negotiate trade agreements with its main partners to reduce barriers to trade reciprocally, a process that continued throughout the 2000s. To achieve our objective, we first assess whether the main impact of the changes in tariffs faced by Latin American exporters in destination markets is on the number of exporter firms (thus altering export participation) and/or on the average size of exporters (thus altering exporters' expansion). Second, we focus on the intensive margin and evaluate the heterogeneous impact of tariffs. Specifically, we examine whether larger or smaller firms are more affected by changes in tariffs.[4]

For the first part of the analysis, we use the indicators on margins of trade from the Exporter Dynamics Database (EDD) for nearly 60 countries and revised data on applied tariffs to decompose the impact of tariffs on aggregate export flows by margin of trade and by country groupings, comparing Latin American and non-Latin American countries.[5] For the second part of the analysis, we use exporter-level data for 48 countries to

[1] See Anderson et al. (2010), Baier et al. (2004), and Frankel (1997).

[2] Another group of studies shed light on the microeconomic impact of trade liberalization using firm-level data—Eslava et al. (2013), Fernandes (2007), Pavcnik (2002), Trefler (2004), etc. However, these are mostly focused on productivity

[3] Cebeci et al. (2012) explore a cross-country setup and find that tariffs mainly affect aggregate exports via firm numbers. However, the authors do not explore the relative importance of margins within country estimations. They do discuss the importance of the average size—the intensive margin—in these estimations.

[4] The Latin American countries included in the sample used are Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Mexico, Nicaragua, Peru, Paraguay, and Uruguay.

[5] The World Bank's Exporter Dynamics Database (http://www.worldbank.org/en/research/brief/exporter-dynamics-database) contains information on measures of the intensive and extensive margin for almost 60 countries, mostly covering the 2000s. We use the dataset with indicators of the margins at the country-HS2-digit-destination-year level. We combine these indicators with data on the (simple) average applied tariff rate applied at the HS 2-digit level in the destination markets of exporters. The tariff database is a joint CESIfo Group-World Bank effort following the methodology of Felbermayr, Teti, and Yalcin (2018).

evaluate the heterogeneity in the impact of tariffs depending on exporter size.[6] Given the periods of data availability, we focus most of our analysis on the 2000s.

2. DECOMPOSING THE IMPACT OF TARIFFS IN FOREIGN MARKETS BY MARGIN OF TRADE

In this section, we follow the gravity model framework where the variable of interest $(1 + \tau_{CDJT})$ is the natural logarithm of the tariff level (1+tariff) faced by exporters from country C in destination market D for each sector J (defined at the HS 2-digit level) in year T, interacted with a categorical variable indicating whether the exporting country is a Latin American country or not (LAC and NO_LAC variables).[7] Fixed effects at the country-destination-sector (δ_{CDJ}), destination-sector-year (δ_{DJT}), and country-sector-year (δ_{CJT}) are included.

(1) $$ln\,(Y_{CDJT)} = \beta_0 + \beta_1 ln\,(1 + \tau_{CDJT}) * LAC + \beta_2 (1 + \tau_{CDJT}) * NO\_LAC + \delta_{CDJ} + \delta_{DJT} + \delta_{CJT} + \varepsilon_{CDJT}$$

The dependent variables (Y_{CDJT}) are the natural logarithm of the number of exporters and the natural logarithm of the average size of exporting firms, both at the country-sector-destination-year levels.

Table 1 shows the results from estimating (1).[8] Columns (1)-(3) show that an increase in tariffs leads to a decrease in total exports for both country groupings (as we expected) and also in both the number of exporters and the size of the firms. However, the relative importance of the impact through the intensive margin is more pronounced for Latin American countries. The coefficient of -0.656 for the intensive margin in column (2) represents 61% of the total effect of tariffs on bilateral exports.[9] Meanwhile, the impact on total exports for non-Latin American countries is more evenly distributed between the intensive margin and the extensive margin. The corresponding coefficient for the intensive margin (-0.693) represents 52% of the impact on total exports.

We also evaluate the impact of tariffs on the dynamics of exporters' entry, exit, and survival rates—the forces behind the extensive margin. We estimate (1) as above but using the indicators on entry rate, exit rate, and first-year entrants' survival rate as dependent variables. The results are presented in table 2. We observe that higher tariffs have a significant, negative impact on entry rates in Latin American countries.[10] While tariffs increase the number of exits and lower the survival rate of entrants' in non-Latin American countries, the evidence on exit and survival rates is not significant for Latin American countries.

The estimation of (1) and the corresponding results in table 1 show the decomposition of the immediate impact of tariff liberalization. However, when tariffs change, not all agents (or potential exporters) adjust their decisions at the same time—instead, they do so at different paces and thus the impact of the tariff changes can be observed over different periods. To assess and control for the timing in the impact, we estimate the same model as in (1) but add two variables of interest: one that picks up on the tariff levels in t-1 multiplied by the LAC categorical variable, and another that multiplies tariffs in t-1 by the non-LAC categorical variable. Similarly to the results in table 1, the coefficients of these variables will reveal the extent and significance of

[6] The same group of Latin American countries listed above.

[7] LAC takes the value of 1 if the exporting country is a Latin American country, otherwise it equals 0. Similarly, NO_LAC takes the value of 1 if the exporting country is country from any of the other regions represented in the Exporter Dynamics Database, otherwise it equals 0.

[8] To decompose aggregate export flows properly, we reduce the sample to only those observations that have data for both margins. The overall EDD dataset used in this analysis contains observations where the number of exporters is 1, thus, the corresponding average exporter size for those observations is censored for confidentiality purposes.

[9] Since the average exporter size in a given year is calculated including incumbent exporters and new exporters, we also analyze how the relative importance of the intensive margin changes if we only consider the incumbent exporters. The results reveal that the relative importance of the intensive margin for explaining the impact of tariffs becomes even larger. The impact for Latin American countries went up from 61% in the estimation to 72%, including both incumbents and newcomers.

[10] We also estimate the impact on net entry rate (number of entries minus the number of exits/the number of exporters) and obtain qualitatively similar results (significant, negative impact).

the impact of tariffs during the previous year on both margins of trade. The results are reported in table 3. The significance and relatively larger importance of the simultaneous impact via the intensive margin is confirmed for both Latin American and non-Latin American countries. However, regarding the noncontemporaneous impact of tariffs, the lower two coefficients in column (1) reveal that this impact operates largely and significantly via the extensive margin only.

Consequently, the impact of tariffs within aggregate export flows at the origin-sector-destination level operates through both margins. The reaction initially comes mainly from the intensive margin: as exporters (probably those that are already in the exporting market) export more, they become larger. However, over time, or at least one year later, tariffs impact exports via the extensive margin, increasing the number of exporters/enhancing export participation.

3. IS THE IMPACT OF TARIFFS ON THE INTENSIVE MARGIN EVEN AMONG ALL EXPORTERS?

Previous work has shown that exports are dominated by a small group of very large firms (Bernard et al., 2007, Mayer and Ottaviano, 2008, Freund and Pierola, 2015). Size matters for exports and the effect of lower trade barriers in the destination markets will probably be different for large firms that export more varieties of goods and larger amounts of these than small firms, which tend to export smaller amounts and a narrower variety of goods.

To analyze the extent to which the size of the exporter makes a difference for the impact of tariffs on the intensive margin (i.e., the actual values exported by firm), we use exporter-level data for 48 countries, including the same 13 Latin American countries included in the exercise above for 2000–2013.[11] We follow the gravity model framework as above and estimate the following:

$$(2) \quad \ln(Y_{CFDJT}) = \beta_0 + \beta_1 TOP_{CFT_{-1}} * \ln(1+\tau_{CDJT}) * LAC + \beta_2 NO\_TOP_{CFT_{-1}} * \ln(1+\tau_{CDJT}) * LAC + \beta_3 TOP_{CFT_{-1}} * \ln(1+\tau_{CDJT}) * NO\_LAC + \beta_4 NO\_TOP_{CFT_{-1}} * \ln(1+\tau_{CDJT}) * \_LAC + \delta_{CFDJ} + \delta_{CFT} + \delta_{CJT} + \delta_{DJT} + \delta_{CDT} + \varepsilon_{CFDJT}$$

where Y_{CFDJT} is the natural logarithm of the exports of firm F in country C to destination D of sector J (defined at the HS 2-digit level) and year T; τ_{CDJT} is the natural logarithm of the applied tariffs (1+tariff) charged in destination D to exporters in country C sector J and year T as defined above; $TOP_{CFT_{-1}}$ is a categorical variable that indicates whether exporter F in country C in year $T-1$ was a large firm; $NO\_TOP_{CFT_{-1}}$ is a categorical variable that indicates whether exporter F in country C in the previous year T was a small firm. The classification of firms by size (large vs. small) followed four alternative thresholds: whether a firm is in the top 1% of the exporter-size distribution, in the top 10%, in the top 25%, or in the upper half of the exporter-size distribution. The LAC and NO_LAC variables are the same as was explained above. The four variables with interactions capture the log of the tariffs for each of the four possible combinations of categorical variables: LAC and large firms, NO_LAC and large firms, LAC and small firms, NO_LAC and small firms. We also include δ_{CFDJ} to analyze within effects, δ_{CFT} to analyze firm-year effects, δ_{CJT} for country-sector-year specific effects, δ_{DJT} destination-sector-year specific effects (such as MFN tariffs), and δ_{CDT} bilateral-year fixed effects.

The results are included in table 4. Column (1) presents the results defining "large" firms in the top 1% of the exporter-size distribution. In column (2), the categorical variable for size is defined as including the top

[11] These data were collected for the purpose of calculating the indicators in the EDD and as such, they cover the same countries in the EDD except for 12 countries where access to micro data was not allowed and the EDD indicators were calculated remotely.

10%; and columns (3) and (4) are for alternative definitions in the top 25% and the top 50%, respectively. The results in columns (1)-(4) show that the tariffs imposed on exporters have a negative impact, as expected, and this impact is always significant for the larger firms. The negative effect on the smaller firms is always significant for the group of non-Latin American countries. The significance for the group of smaller exporters in Latin American countries disappears once we consider more inclusive definitions of larger firms (those in the top 25% and top 50%).

The results also reveal that the impact of tariffs is heterogeneous among Latin American exporters. Tariffs in destination markets are more detrimental to larger exporters in Latin America relative to smaller exporters. Even if the coefficients for the group of smaller exporters in Latin America are not always significant, the results from tests that evaluate whether the coefficients for larger and smaller exporters are different reveal that the impact of the tariffs is greater for the larger Latin American exporters—except when size is defined as the top 1%. If we consider the results in (2)—where both coefficients are significant and different from each other—this means that a 1% increase in the tariffs applied to larger Latin American exporters (the top 10%) is associated with a 0.8% decrease in their total exports.

In 2000–2013, tariffs in the destination countries decreased 2.9% for the median exporter within the sample of "larger" Latin American exporters on average, across all different size definitions for larger exporters. This meant a 2.3% increase in exports for the median exporter on average across all size groups. Similarly, given a 2.5% cut in tariffs for the median exporter within the group of smaller firms in Latin America (averaged across all size definitions) within the same period, their exports increased 0.9% on average—a smaller yet still positive increase relative to the one observed among the larger firms.

4. CONCLUSIONS

First, we find that the impact of tariffs on aggregate bilateral trade flows operates through both the intensive and extensive margins of trade, however, there is a difference in the timing of this impact. When tariffs fall, the immediate adjustment in export flows is produced via the intensive margin—exporters that are already in the export market become larger. The reaction from the extensive margin seems to happen later. In our results, we find that a decrease in tariffs increases the number of exporters one year later. We then focus on the intensive margin and find that the impact is heterogenous in the region. Larger firms seem to be jeopardized more by higher tariffs than their smaller counterparts.[12]

From a policy perspective, the results—including those on the impact on entry rates—highlight the importance of supporting policies that encourage more firms to export and policies that help exporters expand. However, more focus on the latter type of policies may lead to bigger payoffs in terms of overall export growth in the region. Given the importance of larger firms for export growth and comparative advantage, as seen in previous studies, the results in the second part of our analysis underline the importance of trade agreements that could lead trading partners cutting tariffs further as a strategy to allow firms to grow larger and thus increase trade.

[12] While these results would seem to contradict the results from Fugazza et al. (2018), it is worth noting that several differences in the samples used could explain these contradictions. To start, Fugazza et al. use data for Peru only, while our sample has data for 48 countries. The authors capture size using a continuous variable (exporter size) instead of a categorical variable. We use a different set of destination countries, fixed effects, level of disaggregation of tariffs; and, most importantly, we focus only on the manufacturing sector.

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TABLES

TABLE 1. DECOMPOSITION OF THE IMPACT OF TARIFFS BY MARGIN OF TRADE

Dependent variables:	Number of Exporters	Average Export Value per Exporter	Total Exports
	(1)	(2)	(3)
Applied Tariff * LAC==1	-0.420***	-0.656***	-1.075***
	(0.0602)	(0.183)	(0.196)
Applied Tariff * LAC==0	-0.633***	-0.693***	-1.326***
	(0.0545)	(0.161)	(0.175)
Observations	622,117	622,117	622,117
R2	0.962	0.864	0.911

Robust errors. Fixed effects: origin-destination-product, destination-product-year, origin-product-year

*** p<0.01, ** p<0.05, * p<0.1

TABLE 2. THE IMPACT OF TARIFFS ON EXPORTER DYNAMICS

Dependent variables:	Entry Rate (1)	Exit Rate (2)	1st-year survival entrants (3)
Applied Tariff * LAC==1	-0.0720*	-0.0293	-0.00205
	(0.0410)	(0.0419)	(0.0549)
Applied Tariff * LAC==0	-0.0137	0.0769**	-0.0861*
	(0.0330)	(0.0346)	(0.0440)
Observations	901,184	879,236	607,594
R^2	0.599	0.603	0.520

Robust errors. Fixed effects: origin-destination-product, destination-product-year, origin-product-year

*** p<0.01, ** p<0.05, * p<0.1

TABLE 3. DECOMPOSITION OF THE IMPACT OF TARIFFS OVER TIME, BY MARGIN OF TRADE

Dependent variables:	Number of Exporters	Average Export Value per Exporter	Total Exports
	(1)	(2)	(3)
Applied Tariff$_t$* LAC==1	-0.108	-0.529**	-0.637**
	(0.0773)	(0.241)	(0.259)
Applied Tariff$_t$* LAC==0	-0.371***	-0.547***	-0.918***
	(0.0733)	(0.210)	(0.231)
Applied Tariff$_{t-1}$* LAC==1	-0.446***	-0.167	-0.613**
	(0.0734)	(0.224)	(0.241)
Applied Tariff$_{t-1}$* LAC==0	-0.381***	-0.217	-0.599***
	(0.0680)	(0.204)	(0.222)
Observations	621,947	621,947	621,947
R^2	0.962	0.864	0.911

Robust errors. Fixed effects: origin-destination-product, destination-product-year, origin-product-year

*** p<0.01, ** p<0.05, * p<0.1

TABLE 4. THE HETEROGENEOUS IMPACT OF TARIFFS BY SIZE

Dependent variable (Total Exports) Size threshold for large	Top 1% (1)	Top 10% (2)	Top 25% (3)	Top 50% (4)
Ln(1+t) * Larger Exporters * LAC	-0.942***	-0.832***	-0.764***	-0.692***
	(0.317)	(0.267)	(0.261)	(0.258)
Ln(1+t) * Smaller Exporters * LAC	-0.621**	-0.449*	-0.210	-0.0184
	(0.259)	(0.270)	(0.287)	(0.341)
Ln(1+t) * Larger Exporters * No LAC	-0.863***	-0.918***	-0.815***	-0.784***
	(0.288)	(0.278)	(0.277)	(0.278)
Ln(1+t) * Smaller Exporters * No LAC	-0.764***	-0.519*	-0.536*	-0.680**
	(0.278)	(0.280)	(0.282)	(0.287)
Observations	5,555,206	5,555,206	5,555,206	5,555,206
R^2	0.884	0.884	0.884	0.884

Clustered errors at origin-destination-product-year level

Fixed effects: Origin-Firm-Destination-Product, Origin-Firm-Year, Origin-Product -Year, Destination-Product-Year, Origin-Destination-Year

*** p<0.01, ** p<0.05, * p<0.1