

Preferential tariffs and export diversification: the G3 Free Trade Agreement case

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Agenda

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- Historical background
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- Methodology and data
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- Results
- Marginal effects
- Conclusions

Motivation

- Export diversification: one of the goals of open economies
- Proliferation of preferential tariff rates structures and Free Trade Agreements (FTA) to eliminate the transaction costs associated with international trade.
- Lack of coverage about the relationship between export diversification and low tariffs on the literature.
- Lack of analysis for Colombia with actual data from in-force FTAs.

Objective

- To find answers about the relationship between liberalization and diversification in the international trade context through the quantitative assessment on the actual impact of a lower tariff faced by an exporter country in its by-product export diversification in the case of G3 FTA.
- Data on trade, macroeconomic environment and import tariffs for Colombia and Mexico since 1995 are used, which include the full time span of the G3 FTA.

Objective (II)

There are three key questions to be answered:

1. Is there a higher probability for Colombia to export a product to Mexico when the tariffs offered by this country are lower and when the preferential treatment is broader for Colombia with respect to third countries?;
2. Are these lower tariffs and the broader preferential margin also inducing an increase in the number of products exported by Colombia at an industry-level?; and,
3. Did Venezuela's withdrawal from G3 in 2006 and the diplomatic crisis between Colombia and Venezuela in 2005, 2009 and 2010 have a significant impact on Colombian exports' diversification to Mexico through the trade deviation mechanism?

Historical background

Colombia, as a developing country, had not been immune to trade integration since several decades ago:

- **1969:** Creation of the Andean Group (Andean Community –CAN– since 1996)
- **1995:** Creation of G3 with Colombia, Mexico and Venezuela as members
- **2004-2005:** Start of negotiations with the US, Canada, EFTA and EU
- **2006:** Venezuela voluntarily withdrew from G3 and CAN

Historical background (II)

- **2009:** Entry into force of FTAs with Chile, Guatemala, El Salvador and Honduras
- **2011:** Entry into force of FTAs with EFTA and Canada
- **2010-2012:** Negotiations of FTAs with Panama, South Korea, Turkey, the Asia-Pacific Economic Cooperation (APEC) and Israel
- **2012:** Entry into force of FTA with the US

Literature review

In the literature about the export diversification there are many applications, supported by several methodologies which include both mathematic and econometric methods.

OLS applications:

- Significant impact of the real exchange rate volatility on the growth of minor exports (Teigeiro & Elson [1973]; Díaz-Alejandro [1976]; Alonso [1993]; Steiner & Wülner [1994]; Botero & Meisel [1998]; Mesa, Cock and Jiménez [1999])
- Differential effects across industries (Alonso [1993]; Steiner & Wülner [1994])
- Differential effects across exports' destinations (Mesa, Cock and Jiménez [1999])

Literature review (II)

Multivariate models (VEC and Johansen Cointegration):

- Significant effects of relative prices, real wages in the manufacturing sector and market creation costs in the determination of minor exports (Villar [1992])
- Existence of a cointegration vector in the minor exports with GDP being weakly exogenous; openness and the interest rate spread were significant (Quintero [1997])

GLS and IV application:

- Relative prices are not significant for traditional Colombian exports and they are significant for the minor exports (Villar [1984])

Literature review (III)

Panel Data models:

- There are sunk costs over time which shows a hysteresis in the decision to export for the companies; the individual characteristics of each company have a more determinant impact than the one caused by the macroeconomic environment (Roberts & Tybout [1997])
- Negative and significant effect on export diversification from export costs, international transport costs and domestic market entry costs (Dennis & Shepherd [2007])
- Trade liberalization between Mexico and the US has increased the export variety from the former to the latter (Feenstra & Kee [2007])
- Diversification in the US has increased significantly for many countries, not only for the neighbors which indicates that NAFTA did not have a determinant effect (Debaere & Mostashari [2005])

Literature review (IV)

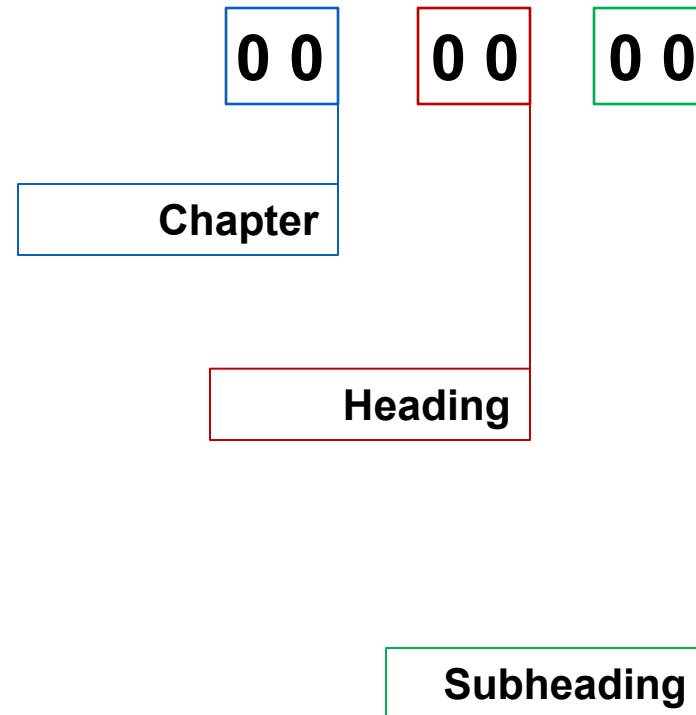
Panel Data models (cont'd):

- Diversification in the US has increased significantly for many countries, not only for the neighbors which indicates that NAFTA did not have a determinant effect (Debaere & Mostashari [2005])
- Analysis of the experiences of the FTAs signed by the US with Mexico and with Chile to assess the eventual impact of the FTA signed by Colombia with the US (Volpe & Gómez [2007])

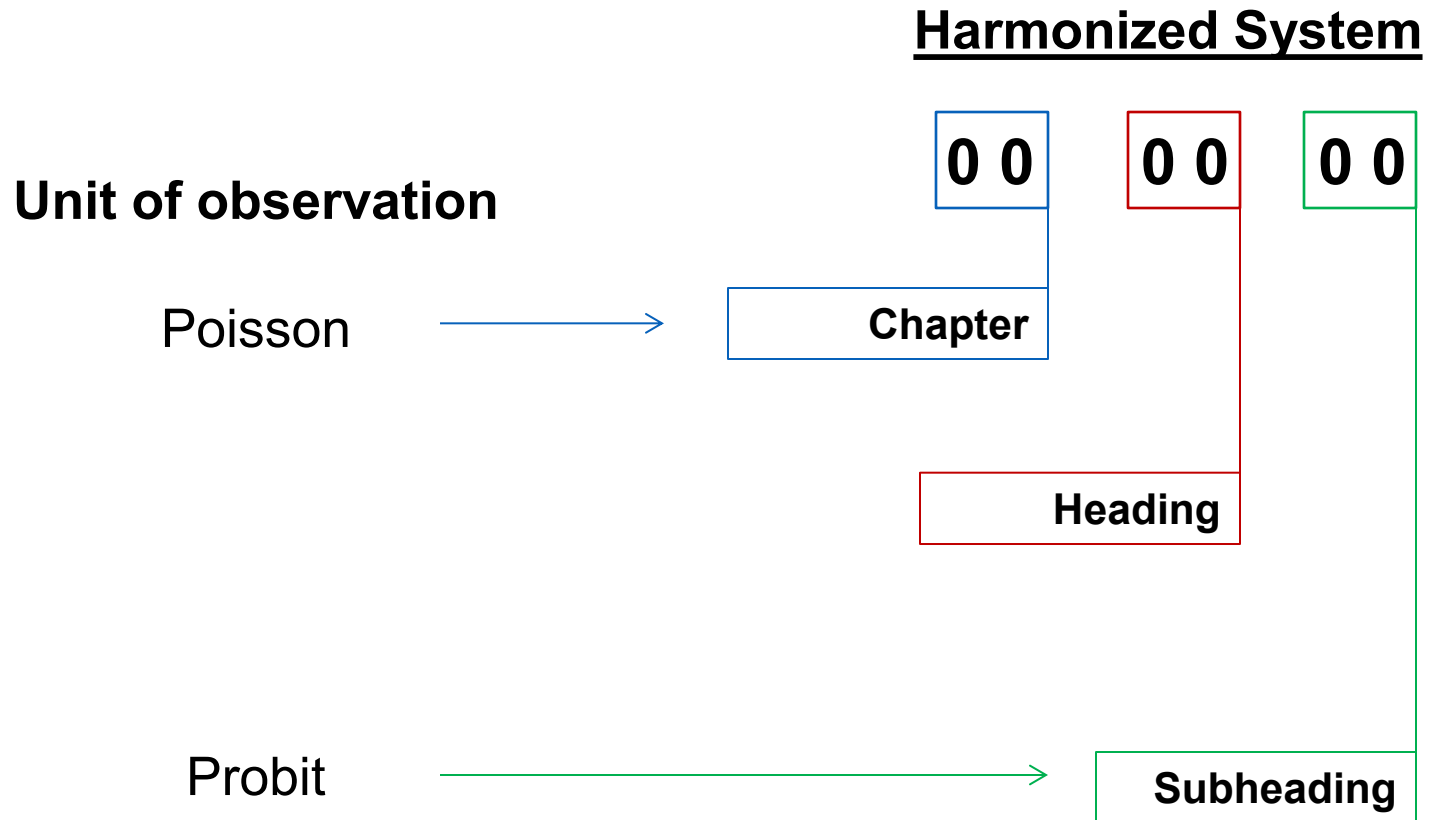
Methodology and data

Two methodologies: the first one to assess the probability of exporting a product from Colombia to Mexico (Probit model) and the second one to assess whether lower tariffs and tariff preferences allows Colombia to export a larger number of products to Mexico (Poisson model).

Harmonized System



Methodology and data



Methodology and data (II)

Dependent variables:

For the Probit model, the dependent variable is *exp_to_mex* and it is constructed with data on exports from Colombia to Mexico as a dummy variable equal to 1 when Colombia exports a particular product *i* to Mexico in a determined year *t*, and zero otherwise.

In the case of the Poisson model, the dependent variable is *exp_count*; it is constructed with data on exports as the number of HS 6-digit level products exported by Colombia to Mexico by each HS chapter (HS 2-digit aggregation).

In both cases, the source of the data is UN Comtrade.

Methodology and data (III)

Independent variables:

- The dependent variable's first year data and its first-order lag
- Trade policy variables (see next slide)
- Macroeconomic controls for both Colombia and Mexico: Total GDP, GDP per capita, square GDP per capita and real exchange rate.
- Dummy for Venezuela's withdrawal from G3
- Dummy for binational crisis Colombia-Venezuela in 2005, 2009 and 2010.

GDP and GDP per capita data were obtained from the IMF's WEO Database and The World Bank's World Data Bank. Real exchange rate is taken from the data bank of Banco de la República de Colombia.

Methodology and data (IV)

The independent variables of interest i.e. the trade policy variables for the Probit model are:

$$tariff_{i,t} = \ln(1 + pref_mex_trf_{i,t})$$

$$preference_{i,t} = \ln\left(\frac{1 + pref_mex_trf_{i,t}}{1 + mfn_wld_trf_{i,t}}\right)$$

where $pref_mex_trf_{i,t}$ is the trade-weighted average of the tariff faced by Colombia in the Mexican market for each product i (Harmonized System -HS- 6-digit line) in year t and $mfn_wld_trf_{i,t}$ is the trade-weighted average of the MFN/preferential tariff faced by the rest of the world in the Mexican market for each product i in year t . These variables are the same for the Poisson model but the sub-index i indicates the HS chapter (2-digit) instead of the HS 6-digit line and it is denoted with a j .

Methodology and data (V)

Probit model: dynamic Panel model. For the following variable sets:

$$Y_{i,t} = \text{exp_to_mex}_{i,t}; X_{i,t} = [\text{exp_to_mex}_{i,1}, \text{exp_to_mex}_{i,t-1}, \text{tariff}_{i,v}, \text{preference}_{i,v}, \text{gdpcol}_v, \text{gdpmex}_v, \text{gdppccol}_v, \text{gdppcmex}_v, \text{gdppccolsq}_v, \text{gdppcmexsq}_v, \text{exchrates}_v, \text{vzla_withdraw}_t, \text{vzla_crisis}_t]'$$

The model is specified as

$$P(Y_{i,t}=1|X_{i,t}) = \Phi(X'_{i,t} \beta)$$

where Φ represents the Probit function, which is the cumulative distribution function associated with the standard normal distribution.

Methodology and data (VI)

Poisson model: dynamic Panel model. For the same variable sets indicated before (j instead of i), the model is specified as

$$\lambda_{j,t} = E\{Y_{j,t} | X_{j,t}, \alpha_i\} = \exp\{X_{j,t}'\beta + \alpha_i\}$$

which states that the expected value of the vector $Y_{j,t}$ conditional on the vector $X_{j,t}$ and the individual effect α_i equalize the Poisson distribution parameter and it is determined in the estimation by the interaction of the regressor vector ($X_{j,t}$), the coefficients (β) and the individual effect (α_i) in an exponential fashion.

A special characteristic of this model is that it allows interpreting the coefficients associated to *tariff* and *preference* directly as elasticities.

Methodology and data (VII)

Three specifications, all estimated through RE and QFE:

1. Dependent variable vs. *tariff*, *preference*, the initial value and the lag of the dependent.
2. Dependent variable vs. *tariff*, *preference*, time dummies, the initial value and the lag of the dependent.
3. Dependent variable vs. *tariff*, *preference*, the initial value and the lag of the dependent, and Venezuela's withdrawal and crisis dummies.

Descriptive statistics

Descriptive statistics of the Probit unbalanced panel, 1995-2010 (with gaps)

	Variable	Observations	Mean	Std. Error	Min	Max
Dependent	<i>exp to mex</i>	28,014	0.270	0.444	0.000	1
Tariff variables	<i>pref_mex_trf</i>	28,014	2.194	5.395	0	206.400
	<i>mfn_wld_trf</i>	28,014	26.562	13.321	0	232.000
	<i>tariff</i>	28,014	0.591	0.941	0	5.335
	<i>preference</i>	28,014	-2.514	1.240	-4.946	4.510
Controls	<i>gdpcol</i>	28,014	5.036	0.380	4.569	5.668
	<i>gdpmex</i>	28,014	6.647	0.330	5.814	6.998
	<i>gdppccol</i>	28,014	8.195	0.334	7.769	8.758
	<i>gdppcmex</i>	28,014	8.923	0.282	8.209	9.235
	<i>gdppccolsq</i>	28,014	16.390	0.668	15.539	17.515
	<i>gdppcmexsq</i>	28,014	17.846	0.563	16.419	18.471
	<i>exchrates</i>	28,014	101.869	10.570	86.150	123.550
Dummies	<i>vzla_withdraw</i>	28,014	0.451	0.498	0	1
	<i>vzla_crisis</i>	28,014	0.335	0.472	0	1

Source: Comtrade, International Monetary Fund, The World Bank; author's calculations.

According to the table above, the average percentage of products exported by Colombia to Mexico with respect to the total number of Colombian available products in the sample is 27%.

Descriptive statistics (II)

Descriptive statistics of the Poisson unbalanced panel, 1995-2010 (with gaps)

	Variable	Observations	Mean	Std. Error	Min	Max
Dependent	<i>count</i>	659	12.948	18.662	0	125
Tariff variables	<i>pref_mex_trf</i>	659	3.096	8.565	0	100.000
	<i>mfn_wld_trf</i>	659	15.736	11.906	0	124.590
	<i>tariff</i>	659	0.714	1.015	0	4.615
	<i>preference</i>	659	-1.917	1.028	-4.331	1.097
Controls	<i>gdpcol</i>	659	5.055	0.388	4.569	5.668
	<i>gdpmex</i>	659	6.653	0.333	5.814	6.998
	<i>gdppccol</i>	659	8.212	0.341	7.769	8.758
	<i>gdppcmex</i>	659	8.928	0.284	8.209	9.235
	<i>gdppccolsq</i>	659	16.424	0.682	15.539	17.515
	<i>gdppcmexsq</i>	659	17.855	0.567	16.419	18.471
	<i>exchrates</i>	659	101.290	10.618	86.150	123.550
Dummies	<i>vzla_withdraw</i>	659	0.475	0.500	0	1
	<i>vzla_crisis</i>	659	0.349	0.477	0	1

Source: Comtrade, International Monetary Fund, The World Bank; author's calculations.

According to the table above, the average number of exported products by HS chapter is around 13, even though its volatility is very high as its standard deviation shows.

Results

- Preliminary estimations for both methodologies were performed to assess the statistical relevance of the variables, both those associated with tariffs and the macroeconomic controls.
- In these estimations, which are not reported, macroeconomic controls showed no statistical significance and there was strong evidence of collinearity between these controls and the time dummies since the former vary across time but not across individuals.

Results (II)

Probit:

- **Unobserved heterogeneity in the data:** highly significant, oscillating in the 51%-52% range for the RE results and between 51% and 53% in the QFE.
- **Strong state dependence:** high significance and a positive sign for the initial value and the first-order lag of the binary dependent variable. It supports the hypothesis of the market creation costs.
- **Preferences improve diversification, tariffs do not:** A lower tariff faced by Colombia in the Mexican market is associated with a lower probability of exporting a given Colombian product to Mexico, which seems to be counter-intuitive. If the preferential margin favors Colombia (*preference* is reduced), then the probability of exporting a given product to Mexico is higher.

Results (III)

Probit:

- **Time dummies capture the economic cycle:** just 1999 and 2002 reveal high significance for both types of individual effects, and 2006 also shows significance although it is lower than for the late 1990s.
- **Venezuela's withdrawal had no effect:** Venezuela's withdrawal from G3 was concomitant with Venezuela's withdrawal from the CAN. CAN's free trade policy gave a five-year period of grace to Venezuela.
- **Bi-national crisis improved diversification:** only when QFE are used. The results suggest that the decrease on the exports to Venezuela could induce a trade deviation to the Mexican market.

Results (IV)

Poisson:

- **The individual effect is highly significant:** it suggests the presence of unobserved heterogeneity and the possibility of over-dispersion in the data.
- **Lower tariffs improve diversification:** a 1% decrease on the tariff level applied by Mexico to Colombia in each HS chapter generates an increase between 19% and 24% on the number of exported products per HS chapter.
- **Preferences deter diversification:** a 1% increase in the value of the inverse preferential margin (*preference* is reduced by 1%) induces a reduction of about 11% to 13% in the number of exported products by HS chapter.

Results (V)

Poisson:

- **Time dummies capture the economic cycle:** 1999 seems to be the only relevant year. As before, 1999 coefficient shows a negative value, which gives evidence of the impact of Colombia's economic crisis also in the evolution of the export supply to Mexico.
- **Venezuela's withdrawal and bi-national crisis had no effect:** there is evidence to argue that neither Venezuela's withdrawal from the G3 FTA nor the diplomatic crisis with Colombia in the late 2000s had a significant, observable effect in the exported number of products to Mexico, which supports the absence of trade deviation, at least the one directed to the Mexican market.

Marginal effects

Probit estimation, Marginal effects for selected variables and specifications

Dependent variable: <i>exp_to_mex</i>	Random effects			Quasi-fixed effects		
	1	2	3	1	2	3
<i>tariff</i>	-0.001 (0.004)	0.014 *** (0.005)	0.000 (0.004)	-0.010 ** (0.004)	0.010 * (0.006)	-0.009 ** (0.004)
<i>preference</i>	-0.291 *** (0.036)	-0.291 *** (0.037)	-0.288 *** (0.036)	-0.180 *** (0.043)	-0.176 *** (0.044)	-0.175 *** (0.043)

Standard errors in parentheses
Significance: *10%, **5%, ***1%

- A decrease of 1 pp in the tariffs can cause either a decrease between 0.9% and 1% or an increase of about 1% to 1.4% in the probability of exporting a product to Mexico;
- A decrease of 0.1 in the preferential margin increases the probability by around 1.8% if QFE are considered in the estimation and around 2.9% if RE are taken into account, improving export diversification.
- Because of the connection between both variables, a decrease in the tariff faced by Colombia in the Mexican market –*ceteris paribus*– will also broaden the preference margin for Colombia, hence favoring its export diversification.

Marginal effects (II)

Poisson estimation, Marginal effects for selected variables and specifications

Dependent variable: <i>exp_count</i>	Random effects			Quasi-fixed effects		
	1	2	3	1	2	3
<i>tariff</i>	-0.649 *** (0.102)	-0.530 *** (0.158)	-0.613 *** (0.133)	-0.662 *** (0.103)	-0.567 *** (0.165)	-0.630 *** (0.137)
<i>preference</i>	1.942 (1.482)	4.964 ** (2.309)	1.439 (1.894)	2.159 (1.531)	5.804 ** (2.459)	1.696 (1.927)

Standard errors in parentheses
Significance: *10%, **5%, ***1%

- A decrease of 1 pp in the tariffs can cause an average increase between 0.53% and 0.66% in the number of products exported from Colombia to Mexico by HS chapter;
- A decrease of 0.1 in the preferential margin decreases the by-HS chapter number of exported products by about 0.49%-0.58%.
- Because of the connection between both variables, the sample data shows that a variation in one percentage point on the tariff applied by Mexico to Colombia –*ceteris paribus*– causes a variation in the preferential margin that is not enough to offset the benefits on the export diversification caused by the tariff itself.

Conclusions

- Contrary to most of the economic literature available on the topic, macroeconomic variables controlling by the size of the economies –including the exchange rate– have no significant impact on export diversification.
- It is shown that the inclusion of time dummies in the estimation captures more accurately the variations caused by economic cycles and makes the models have a better fit.
- For Colombia it is more probable to export a given product to Mexico if this product was exported in the previous year and even more when the product was exported in the beginning of the G3 FTA; the possible explanation for this effect is the presence of market creation costs in the export process.

Conclusions (II)

- Given the positive correlation between the tariffs and the preferential margin, when tariffs are reduced –*ceteris paribus*– the joint impact of the two variables results in a wider export diversification.
- In the Poisson approach, if the improvements in the preferential margin are caused only by reductions in the tariffs applied to Colombia, the deterrent effect of the preferential margin cannot offset the positive impact of lower tariffs on the export diversification of Colombia to Mexico.
- Export diversification in this context showed high levels of endogeneity and unobserved heterogeneity but no major state dependence.

Conclusions (III)

- Economic cycles in Colombia seemed to have an important effect on export diversification, both for the probabilistic and the count data approach, since the major recession of 1999 was captured by the model.
- There is no evidence that Venezuela's withdrawal from G3 FTA could cause a trade deviation to Mexico, hence the absence of improvement on the export diversification in both approaches.
- The bilateral crisis between Colombia and Venezuela in the late 2000s showed in just a few specifications positive and significant impact on the export diversification from Colombia to Mexico, giving evidence on the presence of a trade deviation effect caused by this diplomatic rupture.

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**Thank you for your
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