

A Flat Tariff Structure: Implications for the Colombian Economy

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Agenda

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Summary

Quantitative evaluation of the economic effects from the implementation of a flat tariff structure for all imported goods to Colombia through a CGE model.

This model represents the Colombian economy from a general approach, considering imperfect substitution between domestic and imported goods, wage flexibility, perfect mobility of factors and perfect competition in all sectors.

Tariffs

- Tariff is the simplest instrument for policy trade.
- Traditionally, it has been considered, especially in the beginning of its implementation, as just an income for the government.
- Tariffs also act as instruments to protect those national sectors which are more sensitive to competition with imported products.
- Despite this, this tax distorts the costs for trading and it is reflected in the price the final consumer pays for purchasing the imported good.

World tariff trends

- Current trend in developing countries is to reduce their tariffs and to use non-tariff barriers instead.
- Currently dominating trade policy is the negotiation of bilateral and multilateral free trade agreements.
- This kind of policy tests the exploitation of comparative advantages for each country and it generates scenarios for the creation of competitive advantages.

Problems:

- Tariff reduction: it unprotects sensitive industries to trade openness
- Free trade agreements: generation of erroneous expectations and information asymmetries

Motivation

- Finding a relationship between the minimization of tariff variance across industries and economic growth in Colombia
- Formulation of unilateral tariff reduction policies
- Policy design to avoid rent-seeking from importing industries
- Creation of mechanisms for the elimination of short term tariff reductions
- Successful experiences in South American countries like Peru and Chile
- Scarcity of research papers about this issue not only for this region but for the world

Motivation (II)

- Opinions from the experts:
 - ✓ Juan Carlos Echeverry (current Ministry of Finance of Colombia): a flat tariff structure in Colombia will reduce the uncertainty from the economic agents. Fiscal cost derived from such policy would be compensated by the increase on trade flows. Remuneration of capital and labor would increase and the policy would produce an additional annual GDP growth of about 0.22 percentage points. (Dinero Magazine, No. 292, July 12nd, 2007)
 - ✓ Marques & Martínez (2000): a low, flat tariff yields four advantages: i) reduces the distortion on resource allocation due to the unequal protection for national industries; ii) benefits the consumers via relative prices; iii) increases the level of trade integration and reduces differential treatment for industries derived from lobby; and, iv) contributes to the minimization of trade diversion inherent to free trade agreements

Literature Review

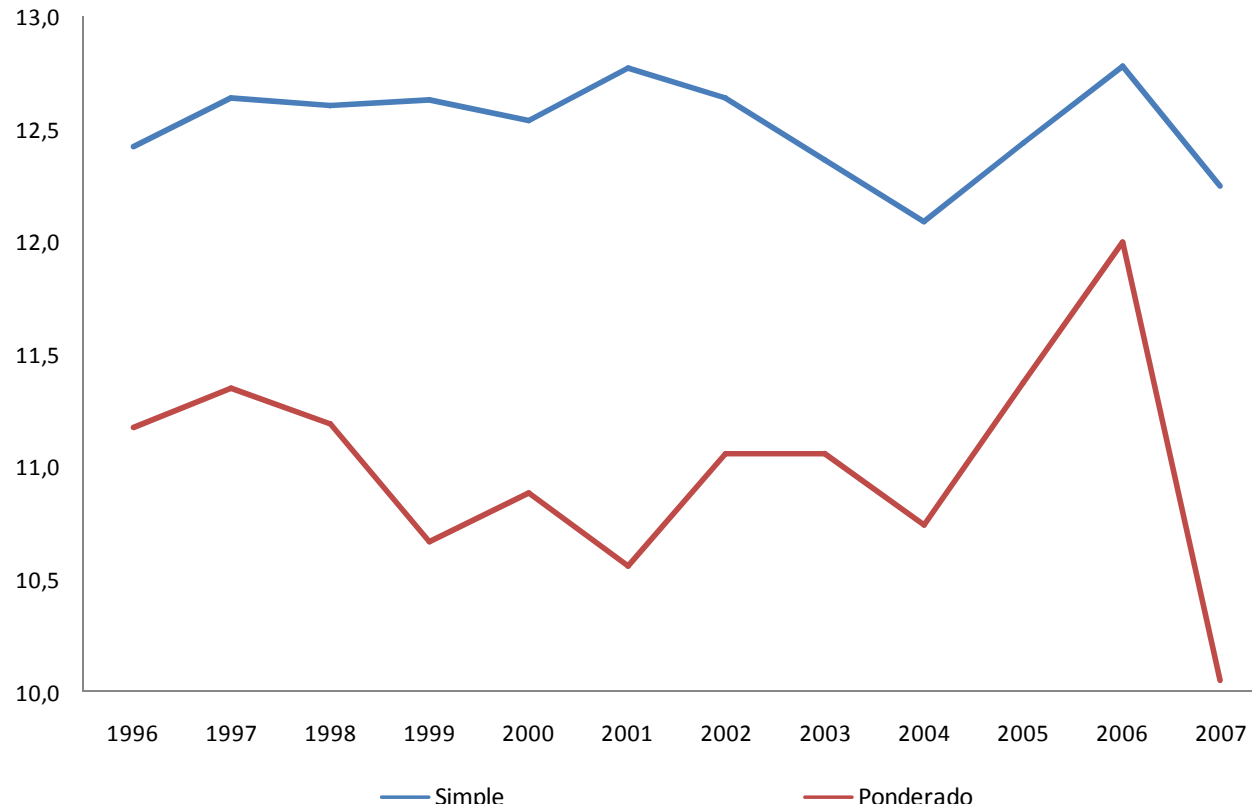
- In economic literature, there are plenty of papers that evaluate the effects of tariff variations and of free trade, although studies emphasizing on flat tariffs are limited.
- Gallarotti (1985): inverse relationship between economic behavior and tariff dispersion within a country, i.e. economic behavior improves as tariff variance reduces.
- Edwards (1993): open economies grow faster than the closed ones, even in the long run.
- Rodriguez & Rodrik (2000): there exists evidence that open trade policies are associated with larger economic growth.
- Brock & Turnovsky (1993): differential tariff barriers seem to create short run benefits in the economic growth but welfare costs in the long run.

Revisión de literatura (II)

- The most relevant study about this issue is Laens and Terra (2004), where they ran a CGE model to estimate the effects of different tariff levels in MERCOSUR's countries.
- Authors set several tariff structures for MERCOSUR; the structure that reported the largest gains in terms of openness, productive efficiency through GDP growth, resource allocation and increases in trade flows was a flat tariff in a level of 6% (this flat tariff structure was simulated because it actually is applied by Chile since a couple decades ago).
- A low, flat tariff structure strengthens the pattern of specialization of agriculture affecting the manufacturing sectors in all MERCOSUR countries. This means that, given the productive structure of Latin American countries, there is an exploitation of comparative advantages because the most protected sectors are exposed to competition with imported goods which creates pressure on domestic producers to become more competitive.

Tariffs in Colombia

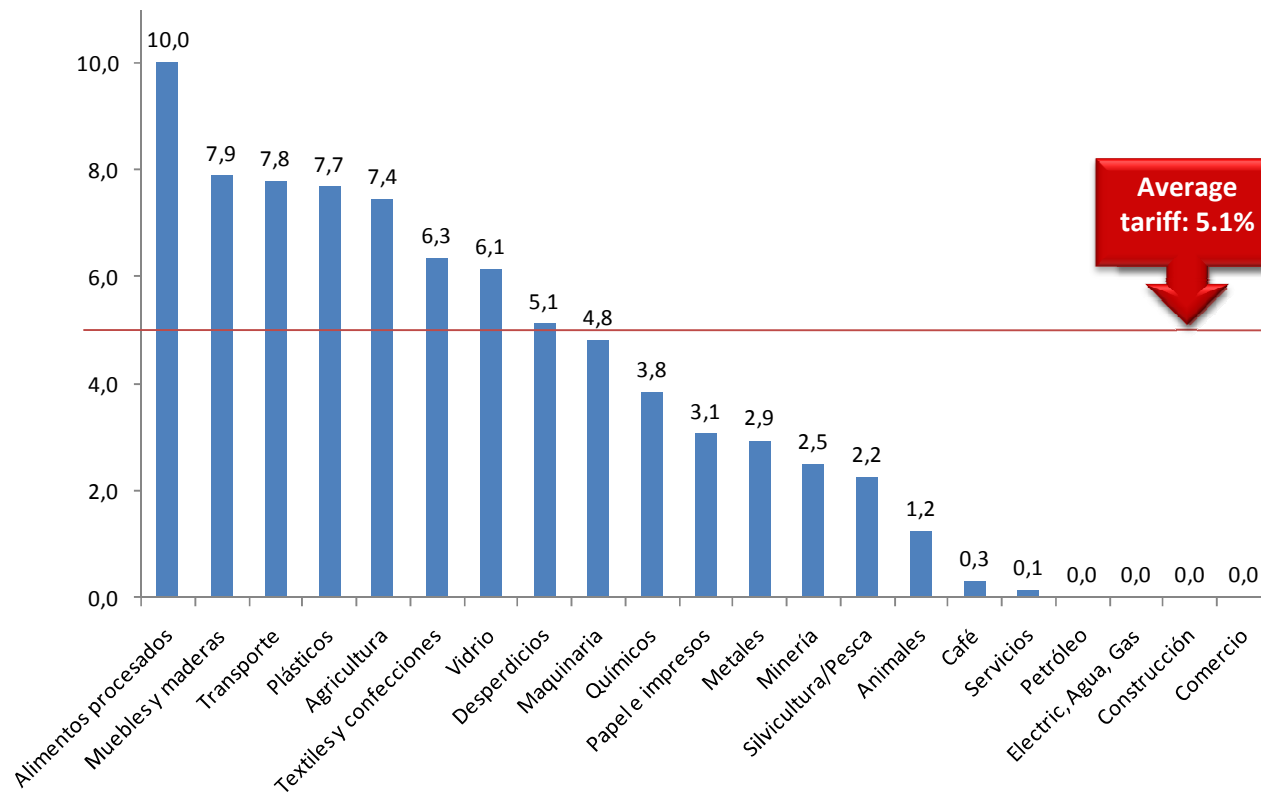
Average tariff rate applied by Colombia, 1991-2006
(*Ad Valorem* percentage of imports value)



Source: Comtrade, computed as the average of tariff rates applied by Colombia to all products according to the HS 2002, 6 digit. Own calculations.

Tariffs in Colombia (II)

Effectively applied tariff rate by Colombia, sectors, 2005



Source: National Statistics Bureau of Colombia DANE, computed as the ratio between collected taxes from import tariffs and total imports value derived from the SAM 2005. Own calculations.

Methodology

Advantages of CGE models:

- They allow to estimate general effects through the imposition of clearly defined transmission mechanisms within a coherent accounting structure of an economy.
- They represent in a realistic way a national economy through the incorporation of market mechanisms into the resource allocation and monetary circuit.
- They are an useful tool to describe the main declared relationships into the model, and to make an *ex-ante* quantitative assessment of the effects derived from several policies, besides the indirect effects that escape to economic intuition.
- It is the more adequate methodology to characterize the effects of variations on by-sector policies.

Methodology (II)

Disadvantages of CGE models:

- Their results are very sensitive to changes in the parameters as substitution and transformation elasticities. (Most common criticism)
- They do not allow a correct modeling of dynamic decisions in savings and investment, as well as the estimation of the economic growth path after the occurrence of a non-anticipated shock.
- They do not allow to make an exact quantification of the effects derived from policy changes, because the information has a high grade of aggregation.

The model

- The model was calibrated with the Colombia's SAM 2005 constructed by the National Planning Department (DNP) based on national accounts by Statistics Bureau of Colombia (DANE).
- Data were grouped in 10 sectors: agriculture/livestock, retail, construction, electricity/gas/water, manufacturing, mining, financial services, community services, Government services and transportation.
- The model is based on the structure proposed by Lofgren, Harris, Robinson *et al* (2002) in a study made for International Food Policy Research Institute (IFPRI) and modified by Daniel Vaughan (DNP) in July 2005.

The model (II)

- The applied model is Walrasian, imposing the market-clearing condition and introducing a component of balance in savings-investment accounts. The latter condition adjusts (closes) the model.
- There is imperfect substitution between domestic, exported and imported goods.
- The model is formed by four blocks: prices, output and trade, institutions and system constraints.

The model (III)

Prices block:

- Imports price, exports price, demand price of domestic non-tradable goods, absorption, traded product value, price by productive activity, aggregate price of intermediate expenditure, consumer price index and producer price index.

Output / Trade block:

- Combination of intermediate expenditure and value added, as well as between the production inputs, is modeled as a CES function. Likewise, value added for each sector is modeled as a CES function.

- Imperfect substitutability between domestic sales and exports, as well as between imports and domestic goods. The latter is modeled as a CES Armington function.

The model (IV)

Institutions block:

- Factors income is distributed among domestic institutions (Government, households and firms) in fixed proportions after discounting payments represented in direct taxes and abroad transferences.
- Resource transferences between firms and households are done in fixed proportions of institutional incomes after discounting direct taxes and savings.
- Household's consumption expenditures are residual: the amount that remains of their income after taxes, savings and transfers to firms is used to purchase goods.
- IFPRI's model structure has been modified in this estimation by fixing in zero subsistence levels for all sectors, condition that models household's utility function as standard Cobb-Douglas and which first order conditions build up a linear expenditure system (LES).
- Demand of investment is fixed and declared exogenous, as well as government expenditure. Government income is the sum of tax income, transferences from factors and transferences from abroad.

The model (V)

System constraints:

- Demand of factors is flexible while its supply is fixed with the payment for each factor acting as the adjustment variable. Therefore, there is full employment in the economy as well as full use of installed capacity.
- There exists equilibrium in current account balance and foreign savings are fixed. Exchange rate is free floating and it acts as the adjustment variable for current account balance.
- Government is able to finance every deficit to keep as an equality its income *vis-à-vis* the sum of its expenditure and its savings.
- Direct taxes are fixed for every institution and Government savings are the endogenous variable which clears the balance in Government accounts.
- Total savings (sum of public, private and foreign savings) and total investment (sum of gross fixed capital formation and stock variation) are equal. Marginal propensity to consumption is the adjustment variable.
- Total absorption is measured as the sum of final domestic demand, which is equaled to GDP plus imports minus exports.

The model (VI)

Calibration parameters: (Source: DEE-DNP)

- Factor-factor elasticity of substitution: 0.8
- Factor-intermediate consumption elasticity of substitution: 0.6
- Exports and Armington elasticities:

Sector	CET*	Armington
Agriculture/Livestock	2.00	0.30
Retail	0.50	0.30
Construction	1.00	0.30
Electricity/Gas/Water	0.20	0.30
Manufacturing	1.80	0.30
Mining	3.00	0.30
Financial services	0.75	0.30
Community services	0.75	0.30
Government services	0.75	0.30
Transportation	0.30	0.30

Regarding the latter two types of elasticities, the chosen values are consistent with estimations made by Hernández (1998) and Lozano (2004).

Source: National Planning Department of Colombia

*Constant Elasticity of Transformation

Model solution

Simulations were calibrated on GAMS platform with MCP solver; this solver applies a mixed complementarity algorithm to reach the solution. This algorithm is called this way because there exists a complementarity condition between functions and variables and a mixed structure of equalities and inequalities.

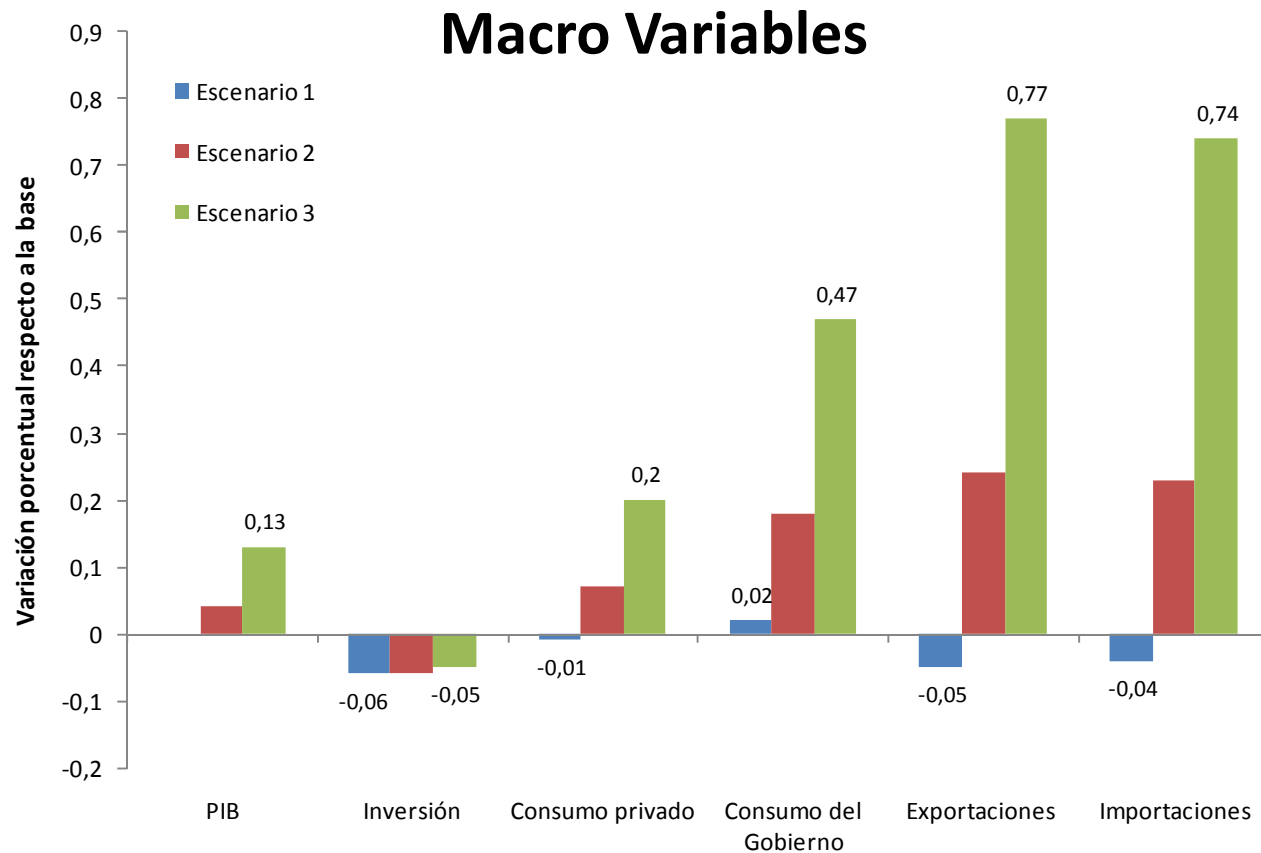
This algorithm ignores the optimization methods and focuses on a general method of nonlinear programming to structure the model in a system of equations which satisfies the conditions posed by Kuhn, Karush and Tucker (generalized method of Lagrange multipliers for inequality constraints).

Simulations

Three scenarios:

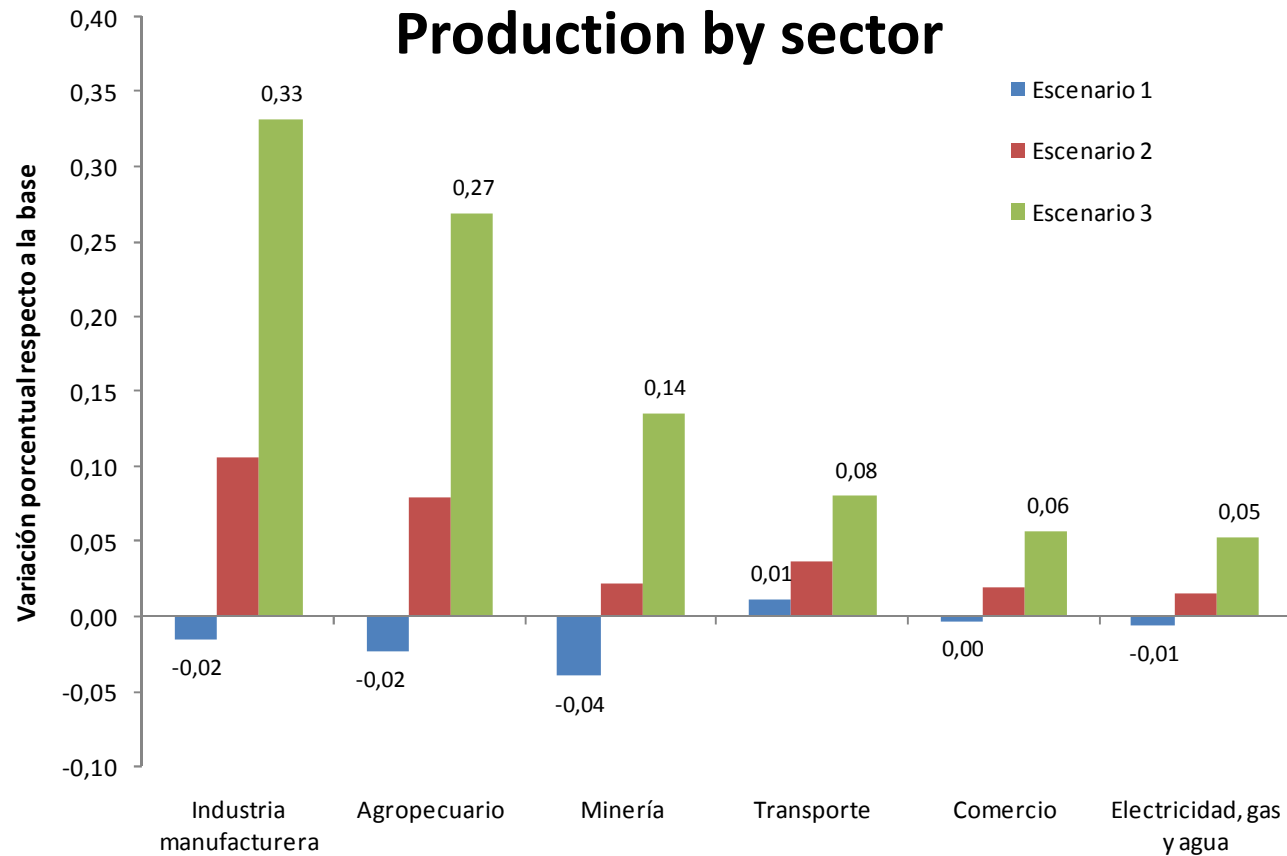
- **Scenario 1:** Impose a flat tariff equal to 2005 observed average (5.1%)
- **Scenario 2:** Impose a flat tariff of 4%
- **Scenario 3:** Impose a flat tariff of 2%

Results



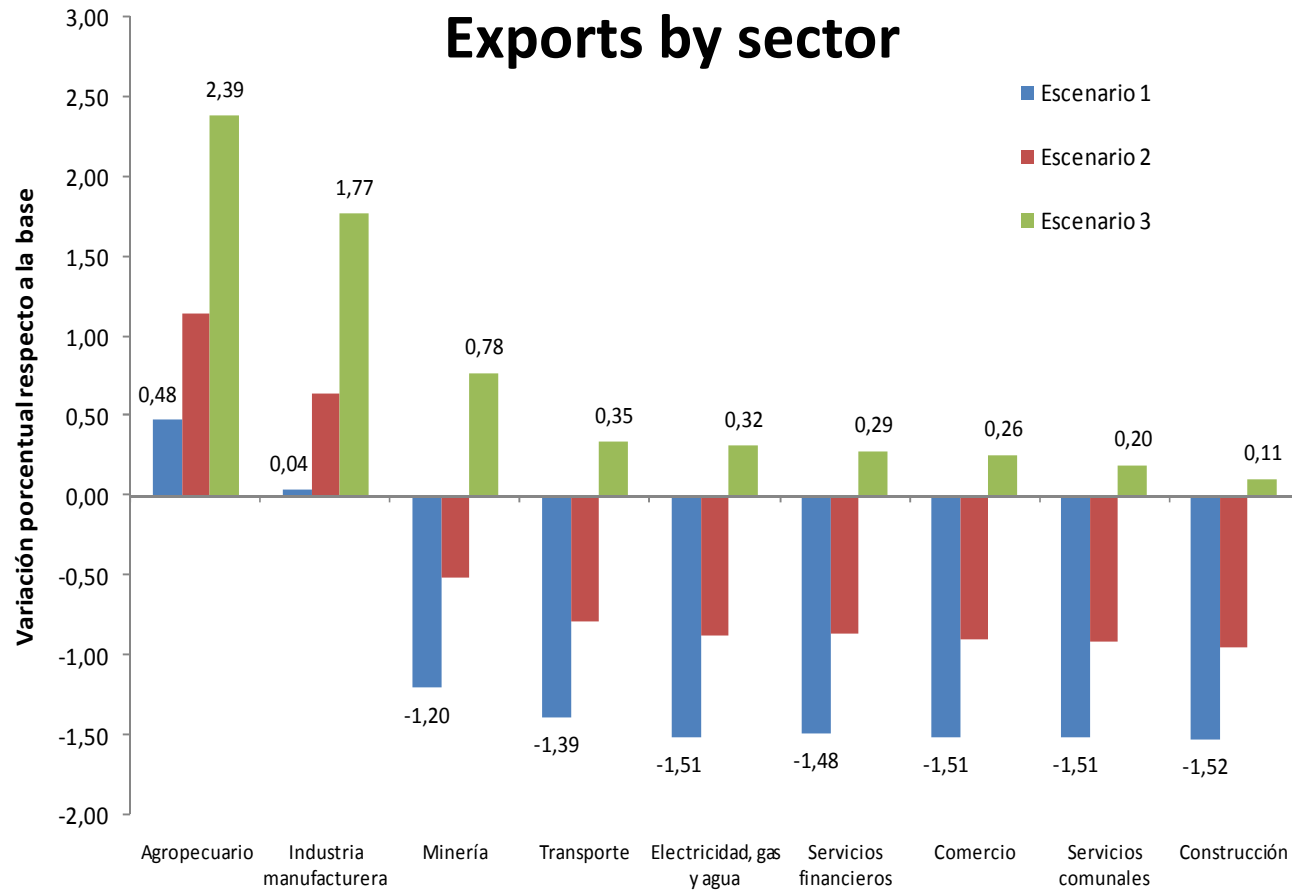
Besides, public savings fall precipitously as the flat tariff level is reduced. Private savings increases marginally and it can not counteract the fall in public savings.

Results (II)



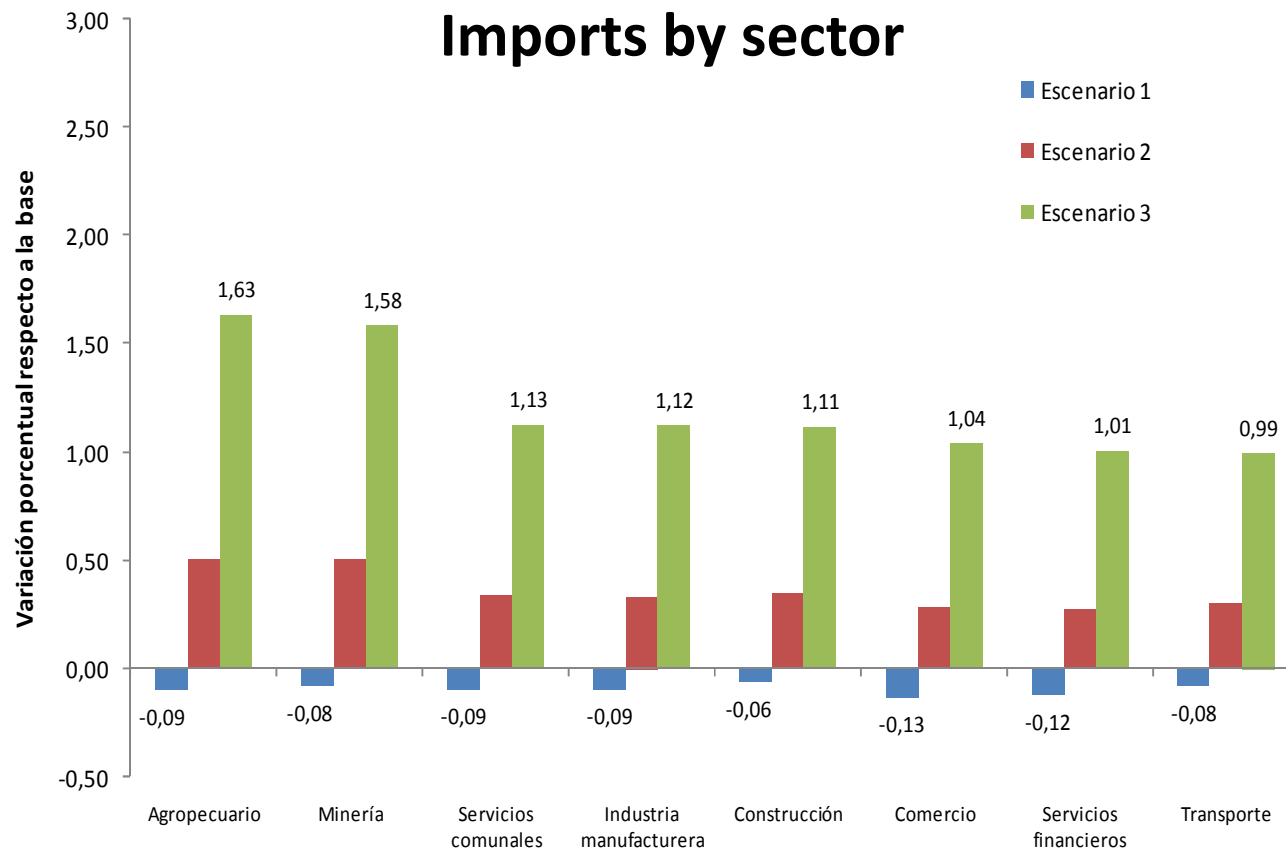
“Winner” sectors when a flat, low tariff rate is applied are those traditionally strong in the production of tradable goods within Colombia’s economy.

Results (III)



Again, traditional sectors show the greatest gains in terms of exports value.

Results (IV)



Imports value corresponding to the Colombian traditional sectors increase and generate greater competition with domestic goods. The growth of the production of these sectors is derived from this effect.

Results (V)

- As flat tariff level is reduced, exchange rate COP/US\$ increases (depreciation). This effect generates an increase in prices of both exports and imports, although the impact is greater in the latter because the tariff reduction effect is not enough to counteract the depreciation effect.
- These variations come only from this source because in the model there were assumed world prices as given due to the modelling of Colombia as a small economy.

Results (VI)

Effects of flat tariff application on fiscal variables (% change with respect to the base value)

Change in tax collections	Scenario 1	Scenario 2	Scenario 3
Direct taxes on domestic institutions	-0.02	0.22	0.67
Taxes on imports (tariffs)	3.24	-18.53	-58.81
Indirect taxes on sector's income	-0.04	0.16	0.52
Indirect taxes on domestic sales	0.00	0.08	0.22
Total taxes	0.13	-0.81	-2.56
Estimated fiscal cost [2008 COP million] (1)	(98,154)	592,848	1,872,280
Estimated fiscal cost [US\$ million]*	(49.9)	301.5	952.2
<i>Total tax collections [2008 COP million]</i>	<i>73,875,043</i>	<i>73,181,519</i>	<i>71,890,384</i>
<i>Total tax collections [US\$ million]*</i>	<i>37,571</i>	<i>37,219</i>	<i>36,562</i>

(1) Estimated as the change in total taxes multiplied by total tax collections according to the SAM 2005. This fiscal cost was converted to 2008 COP million with consumer price index data provided by DANE.

*Computed with average exchange rate for 2008: US\$1 = COP 1,966.26

- A flat tariff level equal to the SAM 2005 observed average generates gains in tax collection. As this level is reduced, tax collection reduces significantly reaching in the lowest level a reduction of US\$952 million, 2.5% of total tax collection.
- If the import of capital goods were generating technological improvements after the application of the tariff policy, the direct tax collection increases. This actually happens but does not reverse the effects of the tariff reduction.

Sensitivity analysis

(Elasticities proposed by Light and Rutherford, 2002)

- Clearly, fixing the Armington and exports elasticities used by Light and Rutherford, the effects are slightly stronger in each of these variables (except for Government consumption, wages for informal labor and fiscal cost), which could be over-estimating the effects and generating distortion. In addition, those authors do not distinguish elasticities by sector, which significantly restricts the analysis and does not reflect the particularities of Colombian productive and export structures.

	Base value (2008 US\$ million)*	% change with respect to the base		
		Scenario 1	Scenario 2	Scenario 3
Real GDP	154,028	0.01	0.08	0.21
Private consumption	108,511	0.02	0.14	0.37
Investment	34,366	-0.15	-0.14	-0.12
Government expenditure	29,572	-0.01	0.12	0.38
Exports	37,112	-0.41	0.65	2.64
Imports	38,524	-0.39	0.63	2.54
Exports price	1	-0.24	0.51	1.91
Imports price	1	4.85	4.53	3.95
Exchange rate	1	-0.24	0.51	1.91
Wages (formal labor)	46,004	0.08	0.36	0.87
Wages (informal labor)	48,807	-0.28	0.13	0.89
Capital gains	59,216	0.19	0.61	1.40
Total taxes	37,522	0.09	-0.78	-2.46
Estimated fiscal cost (1) [2008 US\$ million]*		(33.8)	292.7	923.1

(1) Estimated as the change in total taxes multiplied by total tax collections according to the SAM 2005. This fiscal cost was converted to 2008 COP million with consumer price index data provided by DANE.

*Computed with average exchange rate for 2008: US\$1 = COP 1,966.26

- Besides, values used by these two authors are not consistent with the estimations found in other papers about this issue. (See Hernández, 1998 y Lozano, 2004)

Concluding Remarks

- The implementation of a flat tariff close to the average effectively applied tariff generates slight improvements in macroeconomic variables, except investment, which decreases as the flat tariff level is reduced. The impact in GDP growth is consistent with the major findings made by Laens and Terra (2004), as well as increases in trade flows.
- Effects on investment may be caused by the fact that, as Peruvian experience suggests, many national and foreign companies seem to be stimulated to relocate their investment in countries with differential tariffs regime instead of a flat regime because it privileges the exploitation of comparative advantages and gives some grade of protection to their production within the country.

Concluding Remarks (II)

- The impact on exports is a little greater than the reported on imports, being again in the same line with the results obtained in Laens and Terra (2004).
- Private savings remain steady and public savings fall dramatically. The combination of these two effects is the theoretical cause for the decrease in investment, taking into account the condition $S=I$.
- Positive effects are evident in output and trade flows of Colombia's traditional sectors. This results reinforce the thesis that argues that a low, flat tariff applied by a commodity-producing economy as Colombia tends to deepen its specialization pattern.

Concluding Remarks (III)

- Colombia is a small country, therefore unilateral shocks on its trade policy does not affect world prices. Thus, increases on export and import prices are derived from the depreciation effect and because of the tariff changes, the latter only in the case of imports.
- Labor and capital wages increase significantly with lower tariffs, which is consistent with the arguments of Colombia's Ministry of Finance Juan Carlos Echeverry.
- Fiscal cost from the implementation of a flat tariff is very important but it depends on the chosen tariff level and on the parameters used in the calibration.

Concluding Remarks (IV)

- Flat tariff seems to adversely affect the savings-investment balance in Colombia and, therefore, it also affects to balance of payments and current account balance.
- As economic intuition suggests, Government is the most injured in terms of its income.
- The high fiscal cost generated by this measure could make it politically unfeasible despite the positive experiences in Peru and Chile, countries that show high improvements in productivity and competitiveness, sustained economic growth and stable trade policy. This is reinforced by the fact that Colombia does not register a positive fiscal balance from several decades ago, the debt remains high and the tax collection must be increased nearly by 4% of GDP (COP 20 trillion; US\$10 billion) to enter into a path of fiscal sustainability, although the lowest tariff reports a fiscal cost of near US\$1 billion.

Concluding Remarks (V)

- An unilateral measure like the one is proposed here seems to report positive but slight impact. Besides, it reduces the uncertainty and the creation of wrong expectations on the trade policy among economic agents. However, such measures are not fully comparable with those bilateral or multilateral.
- Criticisms on CGE models are several, so these results should be interpreted carefully because they are sensitive to changes in the parameters, in data and in the characteristics of the model. Despite this, results are consistent with a satisfactory economic behavior, taking into account the South American experiences, the opinion from experts and the economic literature on this subject.

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