IMPACTO DE LOS TRATADOS DE LIBRE COMERICIO (TLC) EN LA ESTRUCTURA PRODUCTIVA DE COLOMBIA: ANÁLISIS A PARTIR DEL MODELO INSUMO-PRODUCTO

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Resumen

Los Tratados de Libre Comercio (TLC) pueden ser entendidos como estructuras institucionales paralelas que afectan las reglas del comercio internacional, protección de la propiedad intelectual, y la inversión. Este artículo analiza los impactos en la estructura productiva domestica generada por una profundización de la apertura economica, con particular enfasis en los tratados de libre comercio suscritos por la Republica de Colombia con Estados Unidos de America y la Unión Europea. Esta investigación cuantifica los efectos directos e indirectos en los principales sectores economicos de Colombia, como resultados del choque generado por los TLCs, a partir de un modelo insumo-producto. Los resultados indican impactos negativos en el sector manufacturero principalmente debido al incremento en las importaciones de bienes intermedios.

Palabras clave: Crecimiento Económico, Política Macroeconómica, Modelos Insumo-Producto, Tratados de Libre Comercio.

Clasificación JEL: C67, F13, F15, F47, R15

The impact of Free Trade Agreements (FTAs) in the productive structure of Colombia: An analysis based on the Input-Output model

Abstract

Free Trade Agreements (FTAs) could be assumed as parallel institutional structures that implicate changes in rules of international trade, intellectual property protection and investment. This paper just analyses the impacts in the domestic productive structure by the influence of trade openness deepening, particularly with the case of the FTAs between Colombia and the United States (US) and the European Union (EU). This research aims to quantify the direct and indirect effects in the main economic sectors of the Colombian economy, as a result of the shock caused by these FTAs. For that purpose, the methodological structure of input-output model is used. The results of the model indicate negative impacts in the manufacturing sector mainly due to the increase of intermediate goods imports.

Keywords: Economic growth, macroeconomic policy, Input Output models, Free Trade Agreements.

JEL Classification: C67, F13, F15, F47, R15

L'impact des accords de libre-échange (ALE) sur la structure de production en Colombie: une analyse fondée sur le modèle entrées-sorties

Résumé

Les accords de libre-échange (ALE) pourraient être considérés comme des structures institutionnelles parallèles impliquant des modifications des règles du commerce international, de la protection de la propriété intellectuelle et des investissements. Ce document ne fait qu'analyser les impacts sur la structure de production nationale de l'influence de l'approfondissement de l'ouverture des échanges, en particulier avec le cas des accords de libre-échange entre la Colombie et les États-Unis et l'Union européenne. Cette recherche vise à quantifier les effets directs et indirects dans les principaux secteurs économiques de l'économie colombienne, à la suite du choc provoqué par ces accords de libre-échange. À cette fin, la structure méthodologique du modèle entrées-sorties est utilisée. Les résultats du modèle indiquent des impacts négatifs sur le secteur manufacturier principalement dus à l'augmentation des importations de biens intermédiaires.

Mots-clés: Croissance économique, politique macroéconomique, modèles d'entrées-sorties, accords de libre-échange.

Nomenclature JEL: C67, F13, F15, F47, R15

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INTRODUCTION

Colombia is a country with a very concentrated economic profile as commodity exporter. This profile of Colombia (and could be associated to majority of countries of Latin America) was acquired since colonial times, with some short transitions in the republican phase. Maybe the exception of this productive profile characterization, was the period known as "imports' substitution" (1930-1970). In this period, the Colombian economy experimented an important growth of its base industries. However, even in that period the dependence to primary exports was important (Garay, 1998).

On the other hand, the commitment of successive governments in Colombia for almost four decades has been the generation of growth and economic development, through greater exposure to international competition. These policies correspond with the implementation of structural reforms in the 1980s. In the 1990s, these reforms were deepened by trade and financial opening, an acceleration of privatization process and reforms in social rights and wage policies (Giraldo, 2001). Thus, international competitiveness became a prior state's policy, based on a premise with very simple arithmetic: lower costs and greater market interference lead to better competitiveness. In this way, states are assimilated with companies, seeking to obtain favorable results from their internationalization, becoming the policy makers in individuals trapped on a dangerous obsession Krugman (1994).

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This premise of internal and external competitiveness has generated many discussions in theoretical and political instances, ranging from its defense for price stability to its refutation based in potential negative impacts in income distribution, employment stability and productive capacity (Martin & Ramírez, 2005).

These kind of discussions are becoming more relevant due to the entry into force of the several Free Trade Agreements (FTAs) that Colombia has signed with other countries since the beginning of the current decade. These FTA have been defended by successive governments founded on the expectation of more wealth and enlargement of potential production. This expectation have been based in the possibility of conquest of external markets with higher demographic indicators and high purchasing power. However, under such premises, some facts are underestimated, i.e. the opportunity of greater exports is something reciprocal in an abstract level, but in the reality serious inequities in productive and social terms break through the parts. But the problem is even worse if are considered other issues involved in this agreements like investment protection, intellectual property rights and other provisions that could deep the inequities.

Furthermore, each FTA means a long-term contract and each part could lead serious difficulties in autonomy and control of effective instruments at the macroeconomic level (Wade, 20013). Nevertheless, limitations in control of macroeconomic instruments is crossed by hierarchical structures in many institutional forms (currency, negotiation influence, innovation capacities, productivity, etcetera), that lead consequences for the weakest part of contract. Thus, while it is true that a na-

tion isolated from world trade does not have opportunities to generate effective development, innovations and productive capacities, it is also necessary to evaluate the convenience of this exposure to global markets based in a defense of a "pure free trade approach".

There are multiple factors to analyze in the context of deepening of free trade policies in Colombia. However, this article only focuses on the potential impacts on national production of Colombia by effect of the FTA signed by Colombia with the US and EU, two of the major players in world trade. For this purpose, the input-output model is used as a tool to analyze the economic shock generated by the entry into force of these FTA, particularly in what corresponds to increase in imported intermediary consumption.

This article is divided into three main sections, in addition to this introduction. The first section briefly characterizes the processes of adoption of free trade policies in Colombia and its consequences in economic growth. The second section presents the methodology and results of the input-output model estimated for the period of entry into force of the FTA with the United States (US) and the European Union (EU), taking as reference the productive structure defined in the most recent input-output table available for Colombia (year 2010). Finally, the third section presents the main conclusions.

1. FROM THE ECONOMIC OPENNESS TO FREE TRADE APPROACH

A distinctive feature of the trajectory of economic growth in Colombia after the implementation of structural reforms (the Washington consensus) is the slowing down of economic growth and a greater

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volatility compared with the preceding period. In other words, the economy grows to a lower rate and pick up the external shocks.

Figure 1 shows the growth rate of the Gross Domestic Product (GDP) from 1950 to 2016. This graph illustrates that between 1950 and 1980, a period in which "outward growth" was not predominant, on the contrary, the economy had a greater regulatory and interventionist power of the State, the average GDP growth rate fluctuated around 5.1%. For the subsequent period (1980-2016), the average GDP growth rate fell to 3.6%.
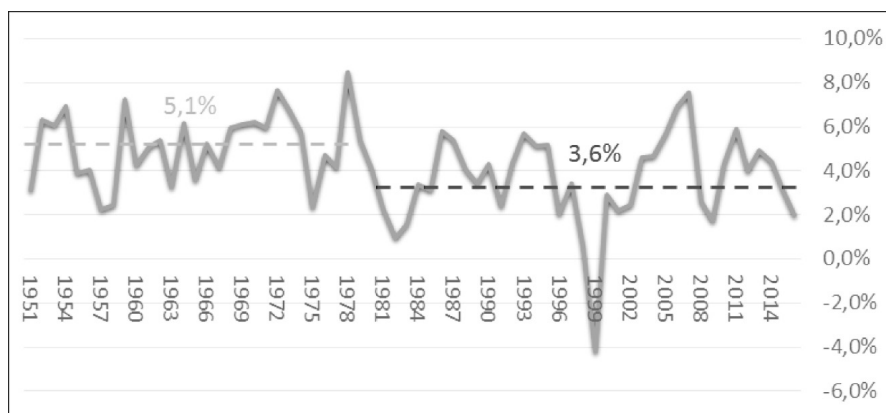
This cannot be interpreted strictly as a coincidence, and in fact could be interpreted as one consequence of *free trade fever* in countries with economic weakness inherited of the 80's decade which was well-marked by debt crises and hyperinflation, particularly in America Latina (Dornbusch, 1993). In the same way, Sarmiento (1996) points out that opening process in a country without

a strong productive structure achieves productivity gains in the short term due to the massive entry of intermediate goods, however this could lead an onerous result in the medium term by own adjustments.

Thus, structural reforms implemented in past decades undoubtedly have had a great impact in economic growth of Colombia. In that sense, according to Restrepo (2003), the adjustment policies significantly modified the aggregate demand of the economy, and at the productive level several of the intermediate and consumption goods granted by national production were replaced by foreign production. This occurred mainly in industry and agriculture (Suárez, 2015). In fact, the timeline of the implementation of economic opening policies and the adoption of free trade approach coincide with the increase of the country's trade deficit. Figure 2 illustrates this relationship for the period 1980-2016.
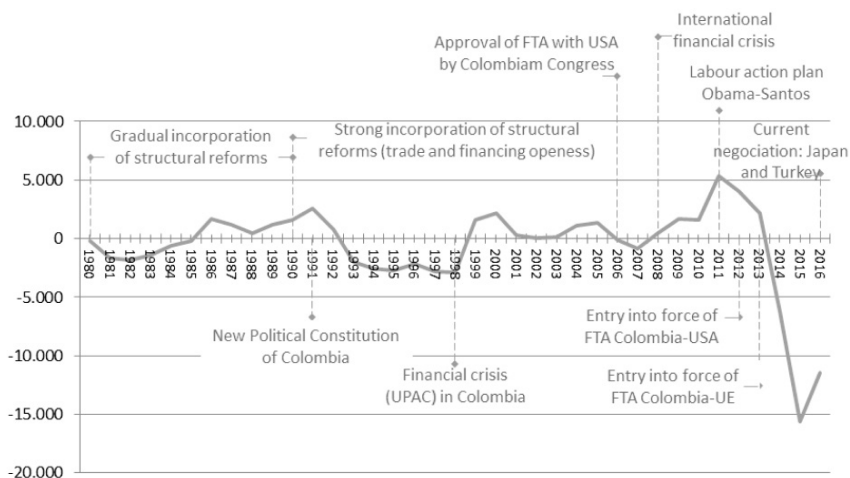
The regularities in each of the initial stages of deepening of free trade are remarkable. For example, after the

**Figure 1: Gross Domestic Product (GDP)
growth rate (1951-2016)**

Source: Own elaboration based on DANE and CEPAL data.

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Figure 2: Timeline of free trade policies and net exports

Source: Own elaboration based on database of the Central Bank of Colombia.

strong incorporation phase of trade liberalization (1990 onwards), the trade balance in the first years was an increase of deficit. This path was in parallel with a progressive deterioration of the terms of trade, increase of credit imbalances and other factors that led to a tragic outcome: the financial crisis of 1999, when GDP contracted -4.2 % (Arango, 2006). Something similar could be shown in the period of "pure incorporation of free trade policy approach" (2007 onwards). Furthermore, after the entry into force of the most important FTAs[1], coupled with the accumulation of persistent trade deficits, is noteworthy

a delineation of a decreasing trend in production.

Most of these recent trade imbalances were due to the entry into force of the FTA with the US and the EU. This is because, according to the Ministry of Commerce, Industry and Tourism (MCIT, 2017), about half of Colombia's foreign trade is concentrated in these two markets, representing 47.8% of the total in 2016. The dependence of international trade of Colombia by FTA's is so important that only 27.6% of Colombian exports are made to another countries with which there are no bilateral agreements.

The profile of Colombia as exporter of commodities is characterized by its exports basket: foreign trade mainly consists of exports of primary goods (mining, energy and agriculture), which represent 72.3% in value terms in 2016 (and 96.8% in volume terms). Indeed, exports with little value added (agribusiness, basic industry and others) represent only 27.7% of the

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1 According to the Ministry of Commerce, Industry and Tourism, currently Colombia has bilateral trade agreements with 12 countries or blocks of countries, which correspond to: United States, European Union, Andean Community of Nations (CAN) (including Colombia, Bolivia, Ecuador and Peru), Mercosur (including Argentina, Brazil, Paraguay, Uruguay y Venezuela), Mexico, Chile, Venezuela, North Triangle of Central America (including El Salvador, Guatemala and Honduras), EFTA (including Switzerland, Liechtenstein, Norway and Iceland), South Korea, Canada and Costa Rica.

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exported value and less than 4% of the total volume.

On the other hand, according to MCIT 68.6% of the total value of imported goods were not produced in Colombia, and therefore only 31.6% of total imports could be considered direct competition with national production. However, when imports are described by groups of product, raw materials and intermediate goods, represents approximately 52% of the total imported value.

Figure 3: Imported value by groups of products in FTA of Colombia (2016)
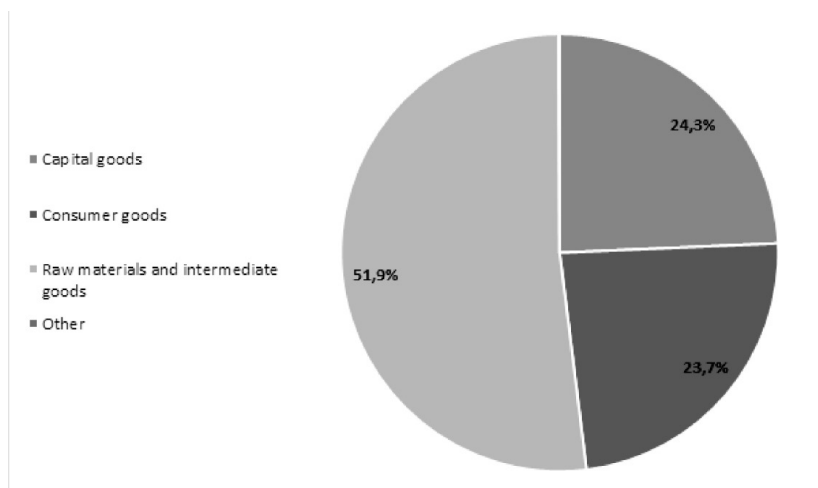
Source: Own elaboration based on MICT data.

There is a picture at a fairly aggregate level of productive structure of Colombia and some of the effects of FTAs in trade matters, however, specific impacts at the product and sector levels cannot be established. The next step in this work that corresponds to input-output analyses will allow us to describe the impacts in domestic production of a substitution of domestic intermediary consumption by foreign production after entry into force of most important FTA's signed by Colombia in last decade.

2. METHODOLOGY AND ANALYSIS BASED IN INPUT-OUTPUT MODEL

With the aim to understand the dynamics of the influence of free trade policies in the Colombian productive structure, the input-output model was used as a tool to estimate the direct and indirect effects of the external shocks caused by the entry into force of the FTAs with the US (2012) and the EU (2013).

The official input-output tables published by the National Administrative Department of Statistics (DANE) in 2005 and 2010 were consulted. These matrices disaggregate the production into 61 different products, which can be aggregated in 6 economic sectors: agriculture, petroleum and mining, industry, public services, construction and building, and commerce and services. Table 1 shows a summary of the aggregate input-output table (year 2010).

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Table 1: Aggregated input-output table (2010) by economic sectors
(US$ Billions, 2010)

Sector	Total intermediate consumption	Total final consumption	Gross fixed capital formation	Exp.	Imp.	Adjustment (FOB)	Total production
Agricultural	16,39	7,11	1,63	2,14	-2,14	0,00	25,13
Petroleum and mining	9,86	0,00	0,04	20,28	-0,13	0,00	30,05
Industry	71,98	47,66	15,63	18,26	-41,60	0,00	111,94
Public services	11,18	6,74	0,00	0,32	-0,07	0,00	18,18
Construction and building	3,60	0,00	39,22	0,00	0,00	0,00	42,81
Commerce and Services	96,91	155,62	4,40	2,38	-7,21	2,20	254,33
Total	209,92	217,12	60,92	43,38	-51,14	2,20	482,41
Gross Domestic Product of Colombia (2010)							261,15

Source: Own elaboration based on DANE data.

Is necessary to remember that the value of production is bigger than GDP, because the last measure do not includes the intermediary consumption. In that way, the input-output model can capture the direct and indirect effects in the total production, not only in domestic production of goods and services.

Figure 4: Gross Domestic Product
by economic sectors
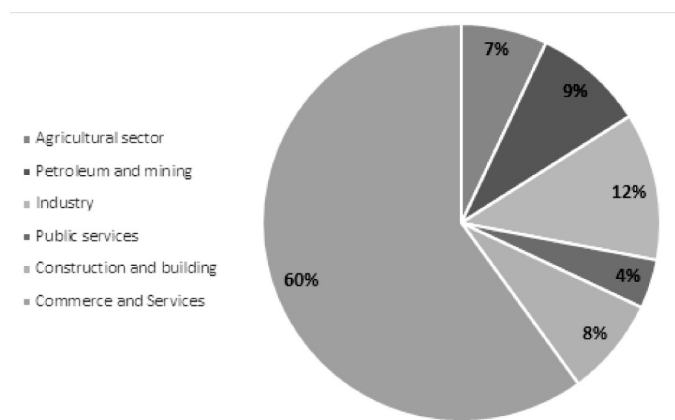
Source: Own elaboration based on DANE data.

Figure 4 shows the distribution of GDP of Colombia in 2010 by economic sectors. The sector of commerce and services had a notable participation of 60% (USD $ 156.81 Billions) in GDP. The products of this sector with major contributions (about 50% of the sector) were:

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financial intermediation services, insurance and related services, real-estate and housing rental services and services to companies. The second sector more representative to the GDP was the industry with USD $ 33.11 Billion, which has suffered a progressive deterioration in its participation since the 70s. Among the outstanding products of this sector were: oil (petroleum) refinery, nuclear fuel (19% of the sector) and chemicals products (12% of the sector). The agricultural sector, on the other hand, only participated with 7%, which reflects the great impact produced by the economic liberalization (Suárez, 2015).

In application of methodology was necessary to adjust the imports tables by product, published by DANE for the period 2006 – 2014, that showed a greater disaggregation than the resources and uses tables contend in the input-output structure. Therefore it was necessary to classify products to establish congruence between both kinds of tables.

On the other hand, the input-output model, according to Miller & Blair (2009), corresponds to the equation [1]:

$$X = Ly \qquad [1]$$

Where X is the total production of the country, L the Leontief's matrix and y the final demand.

The final demand corresponds to the sum of the different expenditures at the macroeconomic level:

$$y = C + GFCF + G + x \qquad [2]$$

Where C is the consumption of households, $FBKF$ is the gross fixed capital formation, G government expenditure, and x the net exports. Is necessary to say that in the Colombian input-output table the expenses C and G are aggregated in a single item (final consumption).

From equations [1] and [2], the analyses of impact is summarized in the equation [3]:

$$\Delta X = L\,(RFD - \Delta imports) \qquad [3]$$

Where *RFD* is the sum of the rest of final demand. In this way, *ceteris paribus*, is estimated the impact of increased imported inputs, based on the domestic input-output table of the year 2010.

As mentioned in the previous section, the impact on national production caused by FTA has not been homogeneous (Suárez, 2015). For this purpose, a selection of the products with the greatest impacts by the FTA was carried out according to three interrelated criteria:

- Dependence criterion: established as the degree of linkage of any product as input of others. The products that presented a productive linkage equal to or greater than 20% were selected.

- Reversibility criterion: were selected the products that previously to the entry into force of the FTA's had a decrease in imports, but afterwards showed considerable increase.

- Substitution criterion: were selected those products that revealed an increase in imports greater or equal to 100% in the posterior period to the entry into force of the FTA's.

Applying the above criteria, were found 17 products with significant substitution potential[2], they are listed in Table 2:

2 The product denominated "Generation, capture and distribution of electric energy" meets the criteria of reversibility and substitution. However, because its aggregation, it was not considered in the impact analysis. Furthermore, according to the Ministry of

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Table 2: Products subject to impact analysis

Sector	Product	ΔImp. (2011-2014)
Agricultural sector	Other agricultural products	11,1%
	Living animals, animal products and products of hunting	14,6%
Petroleum and mining	Mineral coal	8,2%
	Non-metallic minerals	20%
Industry	Fish and meat	100%
	Dairy products	12%
	Beverage products	39,8%
	Natural textile fibers, yarns and threads and similar	13,5%
	Wood, cork, straw and plaiting materials	41,3%
	Paper products, paperboard and their products	11,1%
	Chemical products	16,9%
	Rubber and plastic products	18,11%
	Non-metallic products	25,7%
	Basic metallurgical products (except machinery and equipment)	12,4%
	Machinery and equipment	3,6%
	Other machinery and products for electrical supply	32%
	Another manufactured products	29%

Source: Own elaboration based on DANE data.

In line with the table of resources and uses, there are listed 61 products, and in the period 2011-2014, only 7 showed a decrease in the value of imports, while 33 increased their imports[3].

According to Table 2, industry was the sector with the highest growth in imports. The products of this sector with the greatest variations were: meat and fish (100%), products of wood, cork, straw and plaiting materials (41.3%), beverage products (39.8%) and other machinery and products for electricity supply (32%). Chemical products, as mentioned in previous paragraphs, is one of the products with important contribution to the GDP of the industry, and according to previous criteria it has been exposed to a high risk of substitution of domestic inputs for foreign production.

Additionally the products that presented a reduction in imports in the period 2011-2014 are described in Table 3. In relation to the remaining 31 products without varia-tion, these correspond to the services sec-tor (commonly classified as non-tradable).

Mining and Energy (MME), imports of electricity in the period of analysis correspond essentially with international exchanges (Ecuador and Venezuela).

3 The assumptions made in the analyses of input-output model do not considered changes in investment regulations, property rights protection and other mainly factors related with FTA. At the same time, is necessary to clarify that the internal or external shocks in final demand befallen in the United States or in the European Union are not considered.

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Table 3: Products with reduction in imports

Sector	Product	ΔImp. (2011-2014)
Agricultural sector	Coffee crops	-40%
	Forestry, logging and related activities	-15%
Petroleum and mining	Extraction of metallic minerals	-2%
Industry	Manufacture of animal and vegetable oils and fats	-8%
	Sugar mills and sugar refineries	-32%
	Manufacture of automobiles, trailers and semi-trailers; Manufacture of other types of transport equipment	-6%
Commerce and services	Financial intermediation	-41%

Source: Own elaboration based on DANE data.

To calculate the impact on production based on equation (1) was considered the real growth rate of imports of intermediate products[4] for the period 2012-2014, i.e. after the entry into force of the FTAs from Colombia with US and EU. The estimated effects of the impact in imports is presented in Table 4.
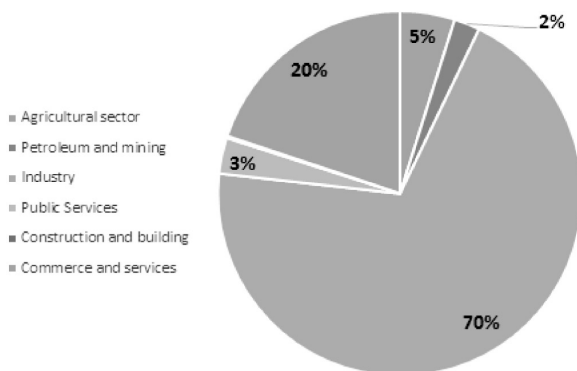
Table 4: Impact analysis by sectors (US$ Billions 2016)

Sectors	Impact in FD (M)	ΔTotal prod.	Direct Eff.	Indirect Eff.	%Direct Eff.	%Indirect Eff.
Agricultural sector	-0,075	-0,163	-0,143	-0,020	87,70%	12,30%
Petroleum and mining	-0,007	-0,077	-0,037	-0,040	48,40%	51,60%
Industry	-1,776	-2,340	-2,163	-0,176	92,50%	7,50%
Public Services	0,000	-0,107	-0,052	-0,055	48,80%	51,20%
Construction and building	0,000	-0,006	-0,001	-0,005	18,20%	81,80%
Commerce and services	0,000	-0,668	-0,381	-0,287	57,00%	43,00%
Total		-3,360	-2,777	-0,583	82,70%	17,30%

Source: Own elaboration based on estimated results of input-output model.

4 Based on the tables of official imports were calculated the growth rates of imports by product for the period under study. In this work was identified a constant share of intermediate consumption (43.1%) in each of the products. This share was assumed constant. This value corresponds to the average of the intermediate consumption in the total of the imports during the period 2006-2014.

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Figure 5: Participation by sector in the variation of production (%)

The results of input-output model showed in Table 4 indicate that the total production would be affected by US$ -3.360 Billion, which would represent approximately 1.9% of GDP in 2016 (USD 178.38 Billion). This impact potentially was absorbed mainly by industry (70%) and by the commerce and services sector (20%).

Table 4 also shows the importance of the productive linkage (indirect effects), with a percentage higher than 50% in 4 of the 6 sectors, with the exception of the agricultural sector and industry, for which the direct impact of the import shock is the most representative.

The input-output analyses allows to identify the products more affected by the external shock. According to the classification of Table 5, only 3 products absorbed 65% of the total reduction of domestic production: "Other machinery and products for electrical supply" (32%), "Chemical products" (23.2%) and "Basic metallurgical products (except machinery and equipment)" (10%).

From the above, it is hasty to conclude that the FTAs would have contributed to deep the deindustrialization problem that suffer the Colombian economy. Two

results of the estimation of input-output model allow us to affirm this: 1. the biggest reduction in domestic production was in product classified in the industry; and 2. the reduction in imports (included intermediary consumption) occurred in just seven products, three of them classified in the industry, however, these products have poor productive linkage and reveal lack in added value capacity[5].

It is evident the interdependence nature of the production in this model, because although none of the products that were subject to the shock belonged to the sector of commerce and services, this sector was the second with more affectation. However, only one product classified in the commerce and services sector presented positive impact, this corresponds to "financial intermediation services, insurance and related services".

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5 An exercise of structural decomposition analysis (SDA) was performed comparing the input-output tables of the years 2005 and 2010. The result of this exercise showed that products selected for the impact analysis exhibited high sensitivity to changes in technology due to the increase in the imported component of the intermediate consumption. This means that an increase in imports, in the period prior to the entry into force of the FTAs, reflects either a higher technical intensity (negative values) or a substitution of domestic inputs.

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Table 5: Impact Analysis by products (US$ Billiones 2016)

Products	ΔTotal Prod.	% Total variation	%Direct Eff.	%Indirect Eff.
Other agricultural products	-0,09	3,7%	89,2%	10,80%
Living animals, animal products and products of hunting	-0,07	2,9%	87,4%	12,60%
Mineral coal	0,00	0,0%	37,0%	63,00%
Non-metallic minerals	-0,01	0,4%	86,0%	14,00%
Meat and fish	-0,11	4,6%	98,1%	1,90%
Dairy products	0,00	0,0%	51,2%	48,80%
Beverage products	-0,05	2,1%	96,6%	3,40%
Natural textile fibers, yarns and threads and similar	-0,04	1,7%	95,5%	4,50%
Wood, cork, straw and plaiting materials	-0,03	1,2%	93,4%	6,60%
Paper products, paperboard and their products	-0,07	2,9%	77,0%	23,00%
Chemical products	-0,56	23,2%	91,0	9,00%
Rubber and plastic products	-0,17	7,1%	91,4%	8,60%
Non-metallic products	-0,07	2,9%	94,5%	5,50%
Basic metallurgical products (except machinery and equipment)	-0,24	10,0%	91,9%	8,10%
Machinery and equipment	-0,07	2,9%	96,2%	3,80%
Other machinery and products for electrical supply	-0,77	32,0%	99,7%	0,30%
Another manufactured products	-0,07	2,9%	99,9%	0,10%
TOTAL	**-2,41**	**100%**	**94,3%**	**5,70%**

Source: Own elaboration based on estimated results of input-output model.

Table 5 shows the results of the variation of the production obtained for the products subject to the shock in the imports. Also is showed the weight of the direct and indirect effects for each product. It can be seen that the direct effects are representative in most cases with the exception of mineral coal, dairy products and paper products. This last result just demonstrated that the impact of external shock was assumed mainly by every kind of product, and at the same time illustrates the scarcity in production linkage of the actual productive structure, especially in industry and agriculture which were the economic sectors most affected by the external shock.

3. CONCLUSIONS AND RECOMMENDATIONS

The policies implemented in Colombia at the recent time confirm that successive governments have been seeking growth and economic development through greater integration in international markets. This kind of public policies was introduced the 80s-90s with trade and financial opening and afterwards has been ratified and deepened in actual century with the entry into force of multiple Free Trade Agreements (FTA). This economic policy has generated impacts on the profile of economic growth,

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which continues being represented by productive specialization in commodities. In that way, we can be concluded that increased exposure to free trade policies has generated lower growth rates of GPD and greater volatility.

The entry into force of the FTAs with the US and EU generated a marked impact on the productive structure due to the increase in the trade deficit and the potential substitution of products of domestic intermediate consumption by foreign inputs.

The impact analysis on the input-output model shows that the entry into force of the FTAs produced a decrease (substitution) in domestic production of USD $ 3.360 Billion. The most affected sector was industry which absorbed 70% of the total variation. Within this sector, the most affected products were "other machinery and products for electrical supply" (32%) and "chemical products" (23.2%). On the other hand, the commerce and services sector presents a negative variation of 20%, which could

be explained by its important degree of productive linkage, that is, because of the indirect effects.

In this sense, in terms of economic policy, it would be advisable to carry out a review of the convenience of the progressive implementation of FTA by Colombian state, especially because actual government have considered to sign this kind of agreements with other big players in global production such as China.

Finally, we suggest a review of the negotiating terms of the current FTA in order to protect national production. At the same time we propose the necessity of public support to specific industries most affected (or potentially affected) by free trade policies. Such actions are indispensable to achieve fairer agreements, becoming international trade as an instrument to provide potential gains for human and economic development and not just remains as a source of risks and negative effects on domestic productive structures, especially for undeveloped countries.

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