

TRADE DIVERSIFICATION IN COLOMBIA, 1991-2011

Ricardo Argüello

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Ricardo Argüello*
Facultad de Economía
Universidad del Rosario

ABSTRACT

We describe the evolution of international trade and the behavior of export diversification in Colombia during the period 1991-2011. For measuring trade diversification and following up its behavior along the period, we employ alternative ways of decomposing trade flows along its intensive and extensive margins, using the latter as a measure of diversification. Results indicate that, in the short run, trade diversification in Colombia can be characterized as weak but that there is a modest trend for an increase in its importance. With some differences in degree, for both exports and imports, the number of partner countries increases faster than the number of products contained in the average basket traded and, simultaneously, the number of traded products increases faster than the average number of countries with which they are traded. Hence, trade diversification in Colombia seems to follow a pattern that implies that trade with new partners tends to be relatively slowly populated in terms of products or, from the opposite point of view, trade of new products is relatively sluggish in extending to new partner countries.

Key words: export diversification, import diversification, trade margins, Colombia, empirical trade studies

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* luis.arguello@urosario.edu.co; arguello.ricardo@gmail.com

1. Introduction

Export and import diversification have been the subject of increased interest in the literature, especially from the viewpoint of their contribution to economic growth. While there is a growing body of empirical work on the subject, there is a notorious shortage of work on the topic in the case of Colombia. As a first step in contributing to fill this void, this empirical research aims at measuring trade diversification in Colombia between 1991 and 2011 and at describing its behavior along this time period. For this, we resort to decomposing trade along its intensive and extensive margins and use various ways of defining the extensive margin of trade as a means to appraise trade diversification.

Results indicate that, from a partner country point of view, the bulk of trade is explained by the intensive margin (i.e. the average value of trade flows per product, linked to the average partner country) both in the cases of exports and imports, while at the extensive margin it is the number of trading partners what shows the more dynamic behavior. Hence, from this perspective, trade diversification mainly occurs through an increased number of partners rather than through more products traded. When a product perspective is adopted, the intensive margin is again the main force in driving the behavior of exports and imports; however, in this case trade diversification mainly occurs through an increased number of products traded.

From a cross-sectional definition of the margins, it follows that the intensive margin explains the bulk of the variation in trade flows values for exports and imports, although its importance is greater (i.e. trade diversification seems less important) when a product definition of the margins (as opposed to a partner country definition) is used. Nonetheless, in all cases a slight increase in the importance of the extensive margin is found along the time period observed.

The paper is structured as follows. Sections two and three provide an overview of recent work on export and import diversification at the international and Colombian levels, respectively. Section four describes the data used and presents the methodology employed for measuring trade diversification and following up its behavior along the 1991-2011 period. Section five discusses the most salient features of Colombian international trade during the period, providing a framework for appraising trade diversification. Section six presents and discusses the results, and section seven provides a summary of the results and some conclusions.

2. The Role of Trade Diversification

There is no unified treatment in the literature about trade diversification in general.¹ Research has focused on the issue separately examining export and import diversification, the former arising more clearly as a well defined topic. The study of export diversification has relatively recently evolved around its relationship with economic growth and with an accepted stylized fact according to which it increases with economic development up to a certain point to decline again. On the other hand, examination of the role of import diversification is linked to the increased availability of final goods, access to new or higher quality intermediate goods, and access to new technology (usually embodied in imported capital and intermediate goods, but also implied by

¹ While a few exceptions to this can be found, they are exactly that, exceptions that do not provide yet a consistent research focus.

Foreign Direct Investment). While these features imply import diversification, no proper stylized facts have been identified as describing the behavior of import diversification along the development path.

Export diversification, understood as either the change in the composition of a country's existing export product mix or destination markets, has been deemed important since the early years of the Import Substitution Industrialization strategy, especially when developing countries grew dependent on primary goods' exports. In this perspective, the arguments for export diversification came from different fronts: vulnerability to commodity shocks, price fluctuations, deterioration of the terms of trade, low income elasticity of demand, etc. (Prebisch, 1950; Singer, 1950). Based on portfolio theory, different approaches to export diversification may be proposed, according to perceived country needs. Ali, Alwang, and Siegel (1991), classify policy interventions according to specific policy goals as a result of the quest for income stability or income growth in the context of horizontal or vertical diversification. However, there are potential trade-offs between growth and stability of export earnings, that make export diversification no panacea. In effect, as Bertinelli, Heinen, and Strobl (2009) finds, there may be considerable welfare gains from getting closer to a more optimal export structure defined in terms of its mean-variance efficient frontier, but their magnitude varies widely across economies and increased openness, although associated with higher expected export earnings, results in greater export income variability.

This perspective on export diversification runs afoul of export specialization as dictated by comparative advantage trade theories. More nuanced, even in the context of New Trade Theory models, specialization arises as a consequence of scale economies (although the number of differentiated products produced and exported by an economy may increase as compared to autarky), and, by extension, the same happens with New New Trade Theory models.² In all cases, but most clearly from a comparative advantage perspective, attempting to diversify the economy's export base beyond what fundamentals dictate, results in an inefficient allocation of resources.

However, from a different standpoint, it has been argued that while export specialization may be important for efficiency and growth, it does matter what the nature of specialization is (Naude, Bosker, and Matthee, 2010). For instance, export specialization is positively related to growth and the strength of the link varies with the sector of specialization -favoring sectors as fuels, metals, and textiles (Greenaway, Morgan, and Wright, 1999). Also, export specialization in goods with a high technological content is important for long term growth (Crespo-Cuaresma and Wörz, 2005). Furthermore, when the process of discovery of local costs generates knowledge spillovers, the specialization pattern of an economy may become partly indeterminate and the resulting mix of exported products may have important consequences for growth (Hausmann, Hwang, and Rodrik, 2009).

The seminal work of Imbs and Wacziarg (2003) examines the evolution of sectoral concentration with respect to the level of per capita income, finding that several measures of it follow a U-

² In the case of New New Trade Theory models, there are two mechanisms for this. In one case, an exogenous technology driven shock increases firms' productivity and this induces entry (and specialization) into the international market. In the other, it is a trade related shock, like a decrease in trade costs, what drives entry (and specialization) into the international market. Also, the argument can be extended to New Economic Geography models, due to the role that demand externalities play in inducing concentration of economic activity in the context of an open economy region.

shaped pattern. That is, along the development process (the rise in per capita income) countries first diversify their economic activity and then, at a rather high income level, the economy tends to specialize again. As the structure of production is revealed through trade by any of the mechanisms posed by economic theory, the structure of trade has been explored in a similar way, and a hump-shaped pattern analogous to that found in Imbs and Wacziarg (2003) for production, has been found (Cadot, Carrere, and Strauss-Khan, 2011). Additionally, low and middle income countries mostly diversify by increasing the number of active trade lines, while high income countries diversify by spreading trade shares among active lines that then re-concentrate in fewer lines.

Several studies have tried to document the relationship between export diversification and growth. For instance, Funke and Ruhwedel (2001) finds a positive relationship between export diversification and per capita GDP and TFP growth in OECD countries. Also, variables that characterize the structure of trade have been found to be significant determinants of growth rates (Lederman and Maloney, 2007). Other strands of this literature take as a fact that the relationship between export diversification and growth exists, and focus on the determinants (or enhancers) of export diversification. The role of absorptive capacity is deemed important for export diversification, and there is evidence that it is subject to threshold effects (Habiyaremye and Ziesemer, 2006). The relationship between export discoveries and export diversification, believed key for export diversification, is sustained along the development path (Klinger and Lederman, 2011).

Another variant of this work relates to the heterogeneous firms theories of trade. In this case, the focus is on the extensive margin of trade, that is, on the surge of new export products or new export markets or a combination of both,³ and the role that fixed costs of exporting have on it. Hummels and Klenow (2005) argues that models with fixed costs of exporting to a given market (combined with Ricardian heterogeneity) might explain the fact that large economies tend to export a given product to more markets.⁴ Among the factors that affect growth at the extensive margin, variables such as those that affect export costs, international transport costs, and domestic market entry costs, have a negative impact on export diversification (Dennis and Shepherd, 2007). Ex-post recognition by firms of idiosyncratic costs related to exports of new products or to new destinations, introduces risk to export diversification and a key factor in understanding its dynamics in developing countries, is export survival once an export discovery is made (Besedes and Prusa, 2010).

Some of the literature on structural change has a bearing on the relationship between export diversification and growth and one of the avenues explored relates to a finding in Rodrik (2011), where evidence is found of unconditional convergence in labor productivity for a set of manufacturing industries in a large group of developed and developing countries. According to this, diversification of the production base (and of the structure of trade) in the 'appropriate' direction (that of convergence) should be good for growth. In a somehow related fashion, Hausmann, Hwang, and Rodrik (2009) construct an index of the 'income level of a country's

³ The definition extends to consider new export firms or the development of new export activities by existing firms.

⁴ It also finds that the extensive margin accounts for around 60% of the difference in export value between large and small economies and that richer economies tend to export higher quantities at modestly higher prices.

exports', which jointly can be regarded as a measure of the similarity between countries' export baskets. When a product has an index value tilted by higher income countries' exports it is deemed as more sophisticated than others. A higher share of high index value products in a country's export basket is found to be associated with higher future growth (i.e. countries for which the export basket is transitioning towards higher index products, grow more rapidly).

The study of the role of import diversification has taken a completely different route, heavily marked by the preeminence of research on the effects of trade reform (openness) on domestic productivity. While this does not mean that the behavior of import diversification in general is unexplored, it implies that there are no stylized facts around it that can compare to the finding of the U-shaped behavior of export diversification. Having pointed this out, there is some evidence that the degree of diversification of import sources (origins) rises monotonically along the growth path and that, as shown in Jaimovich (2012), the increase is related to a gradual growth in countries' share expenses in imports originating in more distant countries. Also, Parteka and Tamberi (2012) argues that import diversification follow a pattern similar to that of export diversification. In its view, relative diversification, that is with respect to the behavior of the rest of the world, for imports and exports increases with income levels.

Since imported goods can be used for different ends, it is not surprising that this distinction hinges upon the direction of research on this topic. The broadening of imports of final goods (combinations of products and origins)⁵ has two expected effects. On one hand, as follows from trade models based upon the love-for-variety type of preferences, it is expected that import diversification should have a positive impact on welfare. Although an extensively used feature in trade and other models, empirical evidence on this effect is still scarce. Feenstra (1994) is an early example of the way import diversification impacts on the perceived behavior of consumers. Starting from Feenstra's (1994) contribution, Broda and Weinstein (2006) shows that over a three decades period, the number of varieties (product-origin combinations) imported by the U.S. more than trebled (half of the increase due to a larger number of products and half due to an increase in origins) and that this translated in a 2.6 percent increase in welfare.

On the other hand, import diversification is expected to increase productivity due to greater competition for domestic firms. This happens as local producers of the like products are forced to be more efficient to stay in the market and also because the less productive firms are expelled from the market and average productivity rises. Evidence on this effect is more abundant than in the former case; for instance, Fernandes (2007) shows that changes in trade policy during the period leading to unilateral liberalization of the Colombian economy, resulted in positive changes in productivity that are neither attributable to plant or industry heterogeneity nor to endogeneity of protection or plant exit. There are several papers documenting a positive effect of increased import competition on domestic firms' productivity; an issue that has also been documented in the case of developed countries. For instance, Trefler (2004) analyzes the impact of the NAFTA on Canada's economy and finds that Canadian plants increased labor productivity by 14 per cent following implementation of the agreement.

The case of import diversification related to production inputs gives rise to a more varied picture and we limit ourselves to some of the most important issues. Productivity gains arising from a

⁵ We refer to 'broadening' to encompass the increase in imports of the same products from the same origins and the spring of new products or varieties and origins (import diversification).

greater variety of imported inputs are expected mainly due to lower input prices, higher quality of inputs, and access to embodied technology. These potential sources of productivity gains have been analyzed in several theoretical works and explored in a set of empirical papers. We concentrate our attention on the latter with the aim to provide a general idea of the topic.

As countries import final and intermediate goods simultaneously and trade policy changes usually affect both, it is important to distinguish the effects arising from the two types of goods. This is precisely what Amiti and Konings (2007) does for Indonesia, using manufacturing census data, finding that a 10 percentage point fall in tariffs on intermediates, increases productivity in 12 percentage points for firms importing their inputs; a figure around twice the gains derived from a similar drop in tariffs on the final good (which range from 1 to 6 percent depending on estimation technique). According to Keller (2004), the overall evidence supports the idea that importing is associated with technology spillovers (and higher productivity);⁶ however, it is not yet clear how strongly this transmission takes place through technology embodied in intermediate goods or through other types of diffusion associated with imports. From another side, the literature on Foreign Direct Investment (FDI) as a diffusion channel for technology, seems closer to a consensus: both case and micro-econometric studies suggest that there can be FDI spillovers, but their effect is heterogeneous across places (Keller, 2004). Differences in absorptive capacity as well as the presence of an intent to transfer the technology may make an important part of the story. Augier, Cadot, and Dervis (2011), using Spanish firm data, finds that importing firms with higher than average shares of skilled workers (a common measure of absorptive capacity) experience substantially higher productivity gains.

Among the mechanisms by which it is expected that imported inputs (and the increase in their variety) enhance productivity, higher quality and better complementarity are two of the ones that have been tested in empirical work. Access to higher quality inputs and the corresponding increase in variety arises as significant due to imperfect substitution among inputs, as happens in the love-of-variety setting, as in Ethier (1982). Complementarity comprises both elements from gains from variety and learning spillovers between foreign and domestic goods. Halpern, Koren, and Szeidl (2011) estimate that for Hungarian importers there are significant productivity gains arising from imports of inputs; if all foreign varieties were imported, a 12 percent productivity increase would be attained by the firm and almost two fifths of these gains would come from imperfect substitution between foreign and domestic goods.

Lastly, there is the issue of the increase in the number of domestic varieties produced and exported due to the use of imported inputs. Goldberg, Khandelwal, Pavcnik, and Topalova (2010) shows, based on Indian data, that the increase in the number of imported varieties of inputs, leads to a substantial increase in the number of domestic varieties produced. Additionally, Bas and Strauss-Kahn (2011) shows that increased imports of intermediates results in increases in the number of varieties exported by French firms and that the effect goes through an augment in firms' total factor productivity.

3. Studies on Trade Diversification in Colombia

Most work on trade diversification in Colombia has been done from the perspective of export diversification; particularly on the behavior and determinants of the so called non-traditional

⁶ A noted exception to this is Muendler (2004).

exports. GRECO (2002) reviews the behavior of non-traditional exports between 1970 and 1999,⁷ finding that from the second half of the 1980s the export concentration index shows levels (between 0.07 and 0.14, calculated as the Herfindahl-Hirschman index) that are approximately a third of those found between 1970 and 1986. Comparative advantage in terms of unskilled labor abundance and regional protectionism in the form of free trade agreements are credited as the main drivers of export performance for the handful of sectors that started exporting during the period.

GRECO (2002) reviews a set of fifteen econometric studies (made between 1971 and 2001) on the determinants of Colombian non-traditional exports performance. Based on different specifications and sometimes theoretical perspectives, it appears to be agreement in that the real effective exchange rate plays a significant and positive role in determining the general level of non-traditional exports.⁸ Besides the REER, the studies consider exogenous determinants (as imports by selected countries, global imports, and importing countries GDP), domestic supply and demand conditions, export experience, sectoral concentration of exports, and export sunk costs. As their interest on export diversification is implicit, in none of these studies a measure of export diversification is used (instead, different ways of measuring export levels are used as the dependent variable).

Volpe and Gomez (2009) examines the impact of tariffs and tariff preferences on the total number of products exported by Colombia to the United States and on the probability that the country exports a particular good to this destination. It finds that lower tariffs favor exports of new products up to point; in particular, once tariffs reach a sufficiently low level the diversification effect vanishes. Estimates of the impact of tariffs on the number of products exported are obtained by regressing a count variable (number of products exported) on a set of control variables that includes a measure of tariffs and tariff preferences faced by a product, in a random effects model with conditional maximum likelihood. Then, the probability of exporting a particular product is estimated by means of a dynamic random effects probit model. Lower average tariffs are shown to have a positive effect on the number of exported products, but larger average preferential margins do not seem to have a similar effect; the probability of exporting a product indicates potential gains in the number of exported products for a set of sectors (notably apparel and clothing accessories and man-made filaments) for a joint 10% increase in the number of products (around 200). Therefore, a one percent tariff decrease in the US (only for Colombian products) implies a 0.12 increase in the probability that a new good is exported there.

Following the same methodological approach, the National Planning Department (DNP, 2008) estimates the effect of the implementation of three Free Trade Agreements (Canada, EFTA, and European Community) on the number of products exported by Colombia. In all three cases, although with differences in levels, it is found that lower average tariffs translate in a larger number of products exported by sector and in a greater probability of exporting particular products, favoring export diversification. In the case of Canada the effect is low, a one percent decrease in the average tariff leads to an increase of 0.003 in the number of exported products. The same is true in the cases of EFTA and the EU (increases of 0.0001 and 0.0002 in the number of products exported, respectively). With respect to the probability of exporting a product, the

⁷ It actually reviews it since 1950, but only from 1970 with due detail.

⁸ However, at the sectoral level some insensitivity of exports before the REER is detected, especially in the cases of the chemical products, printing material, machinery, and food products sectors.

results show that a one percent decrease in the tariff levied on a product increases the probability of exporting it in between 2.1% and 2.4% in the case of Canada, and of 0.04% in the case of the EU (no figure is reported for the case of EFTA in the text).

A study by a Spanish bank with business in Colombia (BBVA, 2012), shows that between 1998 and 2011 Colombian exports show a decreasing trend in geographical concentration (destination shares), especially for non-traditional exports since 2008, and an increasing product concentration, mainly from 2007. Therefore, as the report puts it, the story is basically one of an increase in export markets but for the same products. The report notices the impact that the strain of trade relations with Venezuela had on export diversification as this country was host to about 25% of Colombian non-traditional exports in 2008 and in 2011 accounted for only 8%. Between 2000 and 2007, the rise in Colombian exports value was matched (and sometimes surpassed) by the rise in export quantum; however, between 2008 and 2011 there is a noticeable lag in export quantum.

Torres and Gilles (2012), examine the behavior of Colombian manufacturing exports between 1990 and 2010 in terms of technological complexity, sophistication, and diversification. For total exports it finds a heavy dependence on basic products and manufactures based on natural resources, while a slow and limited process of export diversification takes place, basically supported by medium and high complexity manufactures. The concentration index (Herfindahl-Hirschman) for manufacturing exports decreases from 0.45 in 1990 to 0.39 in 2010.

Lastly, Villarreal (2012) following Volpe and Gomez (2009) estimates the impact of further trade liberalization between Colombia and Mexico on export diversification and of Venezuela's withdrawal from the G-3 agreement (a free trade agreement between Colombia, Mexico, and Venezuela) and trade crisis with Colombia at the end of the 2000s. Results indicate that lower Mexican tariffs are associated with an increased number of products exported by Colombia, although the effect is contingent upon the economic cycle (and may be reversed if the model specification is changed); also, higher tariff preferences enjoyed by Colombia increase export diversification. However, diversification is dependent on initial conditions and the past structure of the Colombian export basket. On the other hand, Venezuela's withdrawal from the pact is shown to have no effect on Colombian export diversification to Mexico, while its bilateral trade crisis with Colombia had (under some model specifications) a positive impact on it.

GRECO (2002) also examines the behavior of imports. However neither its analysis nor that carried out in the studies it surveys refers to import diversification; rather, the focus is on the determinants of total imports or of imports by product type (capital goods, intermediates, and consumption goods). In a nutshell, it is found that output growth is the main determinant of imports and that imports of capital goods and intermediates dominate its behavior, while imports of consumption goods tend to rise with decreased levels of protection (or lower trade restrictions). Therefore, to the best of our knowledge there are no studies properly on import diversification in Colombia.

4. Data and methodology

As mentioned, the purpose of this research is to empirically appraise the evolution of trade diversification in Colombia during the period 1991-2011. For this, we use transaction level data originated in the Colombian Customs Agency (DIAN) covering all Colombian foreign trade in goods, aggregate them annually and use the harmonized system (HS) codification at 6 digits as our

product definition. Since several updates of the HS were made during the period, care is taken in using appropriate concordance tables to attain a uniform product codification, so as to avoid counting code changes as product entry and exit. Even though the database has information at the national nomenclature level (10 digits), we have chosen to aggregate to 6 digits for both having an easier way to compare with results from other studies and easiness of data handling. This decision has implications for measuring product diversification as it masks any changes in the product count that occur within a six-digit product group, but for our purposes it can be deemed appropriate as this aggregation makes it possible to distinguish products with enough detail to reflect changes in the economy's structure of production (both horizontally and vertically). Even though chapters 98 and 99 of the HS are reserved for national use (the first for special classification provisions and the second for temporary provisions arising from domestic legislation) and, as such, the codes within may be subject to modifications that make it difficult to ensure a unique product identification, we included them given that our focus is on total trade.

Several ways have been followed in the literature for measuring trade diversification, the more usual being concentration indexes such as the Herfindahl, Gini, and Theil indexes. However, with the development of trade theories with firm heterogeneity, the use of the intensive and extensive margins of trade have gained acceptance as measures of trade diversification. Even though the margins can be defined at different levels, in general the intensive margin measures changes in trade of existing trade lines while the extensive margin measures changes associated with new trade lines. If defined on the basis of export destinations, the extensive margin captures trade with new countries (whether or not in the same or new products), while when defined on the basis of products it captures trade in newly exported products (irrespective of its destination). A mapping can be made between the Theil index and the margins of trade, as the within variation of this index corresponds to the intensive margin and its between variation to the extensive margin.⁹

Simple product or country of destination counts are also used as measures of trade diversification. However, it has been pointed out that assigning equal weights to all products can be misleading (as not all products have the same economic significance) and alternative definitions have been proposed; for instance in Hummels and Klenow (2005) that defines the margins in relation to world exports or in Brenton and Newfarmer (2007) that uses the proportion of all potential trade flows that are active. While a simple concentration index, as the Theil index, can measure the concentration of trade in products or destination markets, the Hummels and Klenow (2005) margins allow having an idea of whether exporters are relatively big in relatively small markets or viceversa, while the Brenton and Newfarmer (2007) margins concentrate on geographical diversification. Given our focus in describing the behavior of international trade diversification along a 21-year period, we opt for using a measure of diversification based on the intensive and extensive margins of trade that allows us to define it either on the basis of products or destination markets and to capture both the destination and products dimensions simultaneously, as explained below, so as to have a more complete picture.

Therefore, we measure diversification by equating it to the extensive margin of trade in a simple decomposition based on Bernard, Bradford, Redding, and Schott (2009), as follows:

⁹ Provided the two product groups defined correspond to the exported and non-exported goods in a base year, as explained in Cadot, Carrere, and Strauss-Khan (2011).

where, T_t is total trade (exports or imports) of the economy in a given year, $N_{j,t}$ is the number of products or destinations in time t , $A_{i,t}$ is the average number of destinations in time t (when j is defined over the set of destinations) or the average number of products in time t (when j is defined over the set of destinations), and $F_{ij,t}$ is the average value of trade per $A_{i,t}$ given $N_{j,t}$.¹⁰

If we, for instance, consider exports and their destination markets, then $F_{ij,t}$ is the average value of trade, the intensive margin of trade, while $N_{j,t}$ and $A_{i,t}$ constitute the extensive margin; the first component measures trade diversification in terms of the number of destinations, while the second does it by measuring the average number of products exported to a market. This way, even though in this case we observe export diversification defined in geographic terms (destinations) we are able to decompose it in a geographical and in a product dimension simultaneously, enriching the analysis.

Furthermore, we can analyze margin variation within the destination and product dimensions by simply noting that equation (1) can also be written as:

Where, $C_{j,t}$ is total trade (exports or imports) with country j in time t , $a_{ij,t}$ is the number of products traded with country j in time t , and $f_{ij,t}$ is the average value of trade per product traded with country j in time t (so, that $C_{j,t} = a_{ij,t} \cdot f_{ij,t}$).

Given this, trade with a particular destination (or of a particular product) can be expressed as:

allowing for a decomposition of trade between the intensive (average value of trade) and extensive (number of destinations or products) margins. Having set the identity in (3), we can regress $C_{j,t}$ on $A_{i,t}$ and $N_{j,t}$ to obtain the relative contributions of the two margins to trade across destinations or products (or groups of products) for each year in the database.¹¹ This way we can trace the role of the extensive margin along the destination or the product spaces, as the coefficients in the above regressions can be read as a measure of how the intensive and extensive margins of trade explain the variation of trade across destinations or products.

For further exploring the behavior of the margins of trade, two alternative ways of classifying products are also used. First, we use the Broad Economic Categories (BEC) product classification, so we can distinguish goods as capital, intermediate or final consumption goods (a useful way to have a first sight appreciation of how the economy links to international value chains). Second, we make use of Lall's (2000) goods classification according to the complexity of their production process.

5. A primer on the Colombian trade structure and its evolution

¹⁰ Hence,

¹¹ This is done by OLS. For details see Bernard, Bradford, Redding, and Schott (2009).

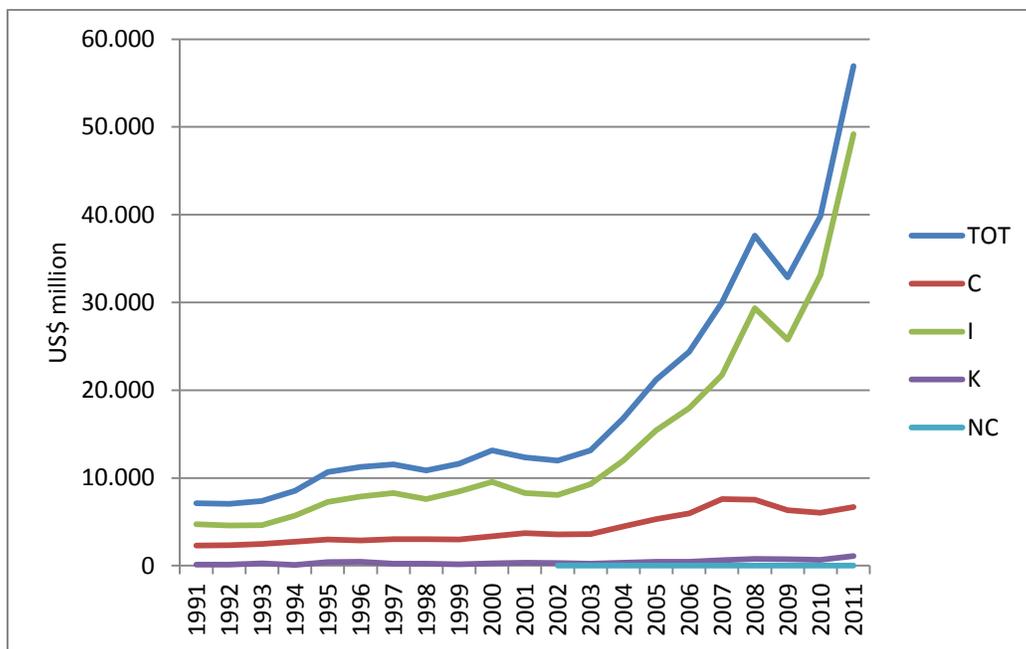
Colombian international trade has been relatively dynamic along the 1991-2011 period, especially from 2003 on. Exports grew at an annual compound rate of 10.9% during this time span, while imports did so at 12.7%, multiplying the base year value by almost eight in the case of exports and by 11 in the case of imports. Along the same period, world exports grew at an annual compound rate of 8.6% and imports at 8.5%, multiplying their base years by 5.2 and 5.1, respectively.¹² As for the trade balance, it has been negative for most years (15 out of the 21 observed) and its value has ranged from 18% to 0.1% of total trade (exports plus imports), the higher values belonging to the first half of the period (since 2003 the trade balance has represented 2% of total trade in average).

5.1 A product perspective

Graph 1 shows the evolution of Colombian total exports and of its components in terms of the BEC nomenclature. From there, it is clear that exports of intermediate goods have dominated the Colombian export structure and that the major dynamics experienced since 2003 is basically due to growth in this type of trade. The share of intermediates in total exports has gone from 66.2% in 1991 to 86.3% in 2011 with an almost permanently increasing trend. A complementary view of this behavior is provided in Graph 2 where export trade is decomposed according to Lall's (2000) classification. In this case, exports of primary goods (PG) dominate export trade, but they do it to a lesser extent than intermediates above; in effect, the 1991 share of basic goods exports was 58.1% while its 2011 share was 72.2%; additionally, this share fluctuates along most of the period, showing a markedly increasing trend from 2008 on (its value in 2007 was 51%, the second lowest within the whole period). On the other hand, the behavior of manufactures based on resources (RB), of low technology (LT), and of medium technology (MT), shows a similar pattern, with a trend for resource based manufactures for losing ground to the other two.

Graphs 3 and 4 provide a similar picture for the import side. From Graph 3 it follows that the majority of Colombian imports are intermediate goods; however, their share in total imports shows relatively high variability and a downward trend along the period; in 1991 the share for this product group was 67.7% while in 2011 it was 53.9%, with a low of 51.5% in 1994. On the other hand, capital goods imports show the second highest shares, going from 20.7% in 1991 to 26.5% in 2011, with a growing trend although with fluctuations. Lastly, consumption goods show the smallest but fastest growing shares, going from 10.6% in 1991 to 18.7% in 2011.

¹² World data from the World Trade Organization. The divergence between export and import values is due to well known characteristics of international trade data.

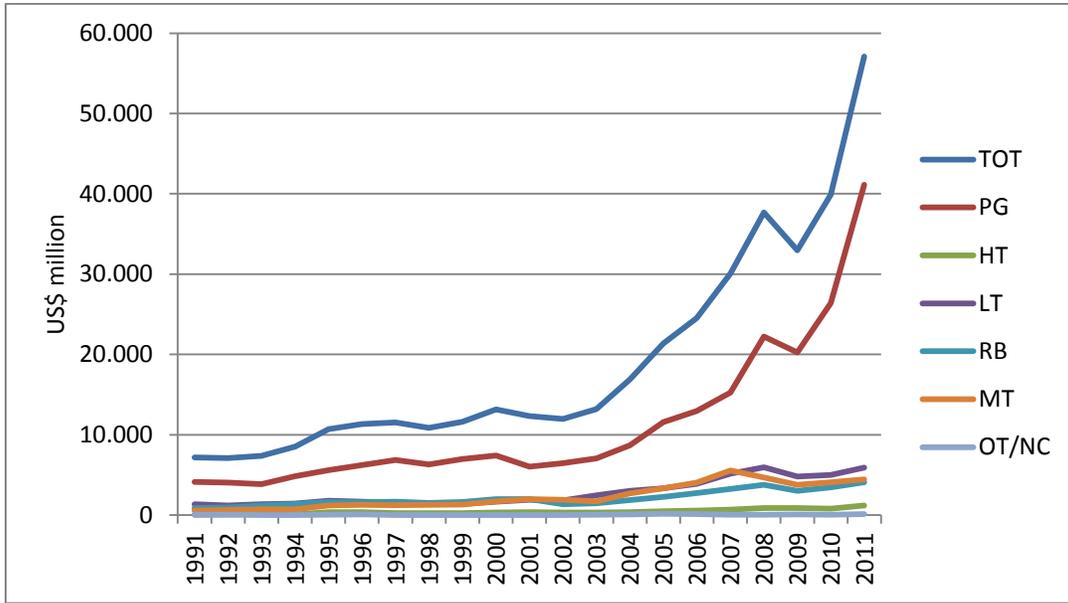


TOT = total exports; C = consumption goods; I = intermediate goods; K = capital goods; NC = goods not classified.

Source: Authors' calculations based on DIAN/DANE data

Graph 1. Colombian exports and its structure in terms of the BEC nomenclature

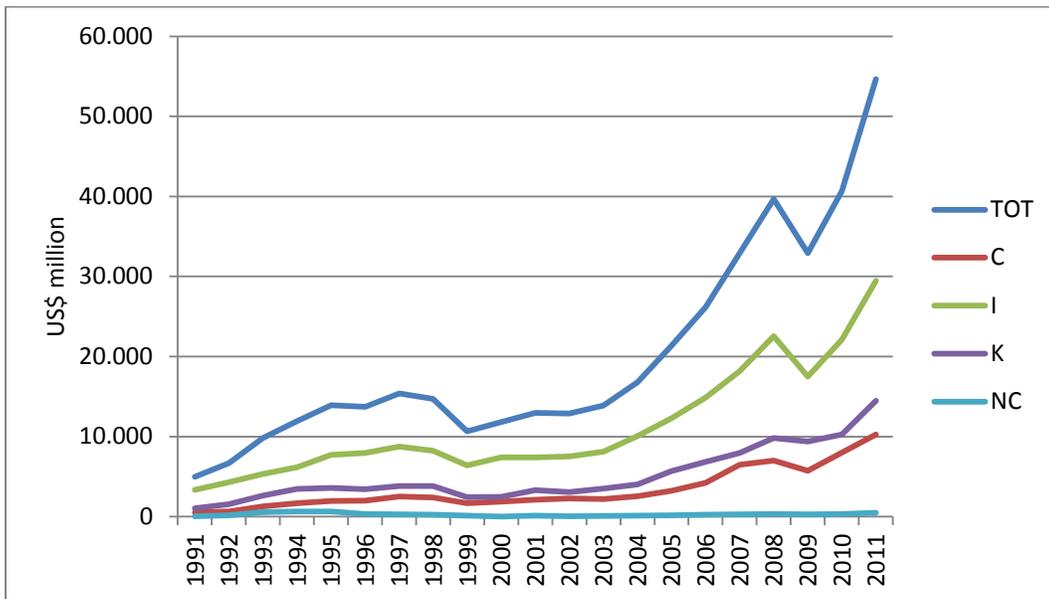
According to Graph 4, manufactures of medium level technology account for the majority of imports, with values that in the last years are almost double the following product group (high technology goods). Import shares for medium technology goods have gone from 40.2% in 1991 to 37.9% in 2011, and in spite of this drop, and due to the variability in their values, the overall trend for the period is slightly increasing since there was a clear downward trend until 1999 and then an increasing one from that year on (with a drop between 2008 and 2009). As mentioned, the second largest shares belong to high technology manufactures, which accounted for 14.5% of total imports in 1991 and for 20% in 2011, showing a clear increasing trend in spite of its fluctuations. The third largest import share in 2011 belongs to primary goods, which represented 8.8% of total exports in 1991 and 15.3% in 2011, with a positive linear trend of a magnitude similar to that found for high technology goods. An interesting case is provided by imports of resource based manufactures, as the group starts in 1991 with a 24.9% import share (the second largest after medium technology manufactures) and ends with a 13% share (the second to last if we disregard other transaction/not classified goods). Lastly, imports of low technology manufactures tend to show the lowest shares; they begun in 1991 with a 10.6% share and end in 2011 with a 12.9% share and a moderate increasing trend.



TOT = total exports; PG = primary goods, HT = high technology manuf., LT = low technology manuf.; RB = resource based manuf.; MT = medium technology manuf.; OT/NC = other transactions and goods not classified.

Source: Authors' calculations based on DIAN/DANE data

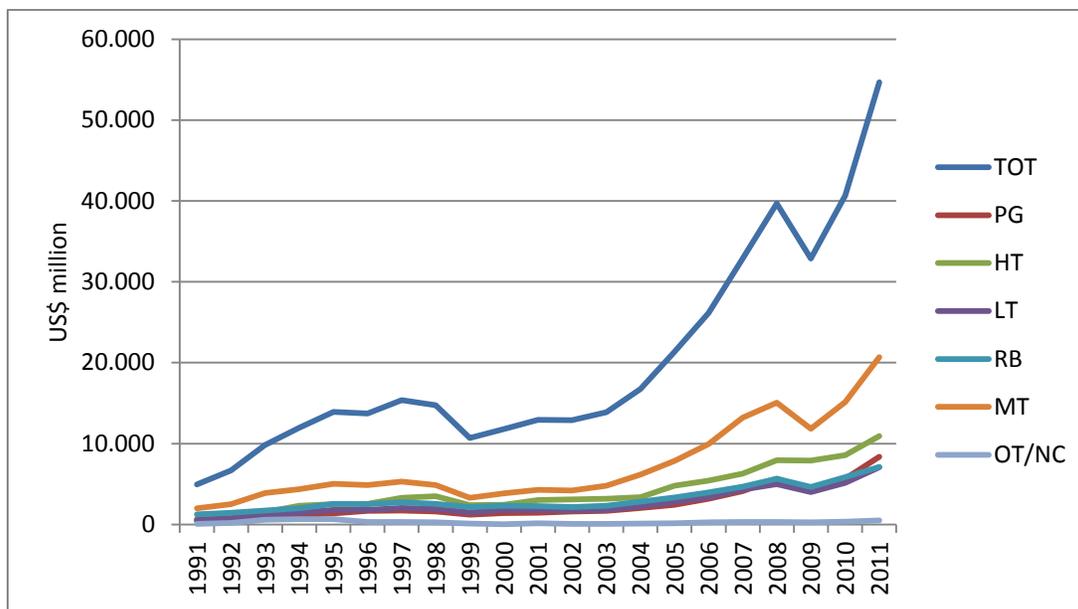
Graph 2. Colombian exports and its structure in terms of Lall's (2000) nomenclature



TOT = total imports; C = consumption goods; I = intermediate goods; K = capital goods; NC = goods not classified.

Source: Authors' calculations based on DIAN/DANE data

Graph 3. Colombian imports and its structure in terms of the BEC nomenclature



TOT = total imports; PG = primary goods, HT = high technology manuf., LT = low technology manuf.; RB = resource based manuf.; MT = medium technology manuf.; OT/NC = other transactions and goods not classified.

Source: Authors' calculations based on DIAN/DANE data

Graph 4. Colombian imports and its structure in terms of Lall's (2000) nomenclature

For completeness, we now comment on the composition from the viewpoint of Lall's classification of exports and imports categorized according to the BEC nomenclature. We begin with the behavior of exports of intermediate goods (which, as shown above, account for the majority of Colombian exports) that, as shown in Graph 5, are basically composed of primary goods at both the beginning and the end of the period observed. As a matter of fact, primary goods' share in intermediate exports ranges between 56.9% and 78.8%, and after systematically fluctuating between 1991 and 2007, shows an upward trend from then until the end of the period (consolidating an overall upward trend). The increase in primary goods exports has partly been at the expense of resource based manufactures, which in 1991 showed a 14.9% share of exports of intermediates and that, with a few exceptions, has been declining along the period to end at 5.3%. For the rest, the more important changes come from a slight increase in the share of low technology manufactures and a slight decrease in the one corresponding to medium technology manufactures. However, in both cases the shares are characterized by fluctuations and relatively large decreases towards the end of the period; for low technology manufactures this drop starts in 2010 and brings the share from 12.2% in 2009 to 8.5% in 2011, while for medium technology manufactures it started in 2008, decreasing the share from 17.5% in 2007 (the highest in the series) to 6.2% in 2011 (the lowest in the series).

In the case of exports of consumption goods, it first has to be noticed that their share in total exports has been decreasing (from 32.2% in 1991 to 11.7% in 2011). At the beginning of the period, low technology manufactures accounted for 47.5% and rapidly declined until 1999, to then experience a relative recovery until 2007, and finally fall until the end of the period, reaching their lowest share at 24.4% in 2011. Exports of primary goods, the second largest group, show a small change in share value from the beginning to the end of the period; however, this seeming stability hides fluctuations along the period, with a marked decrease until 2007 and then a sharp recovery

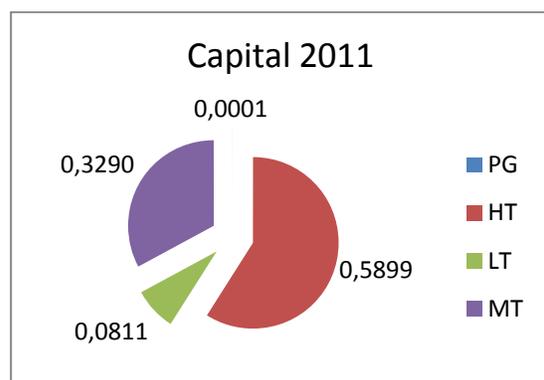
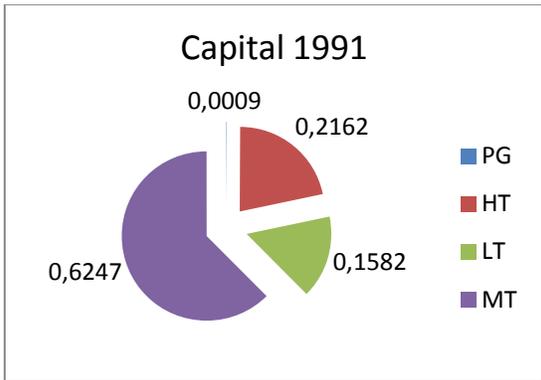
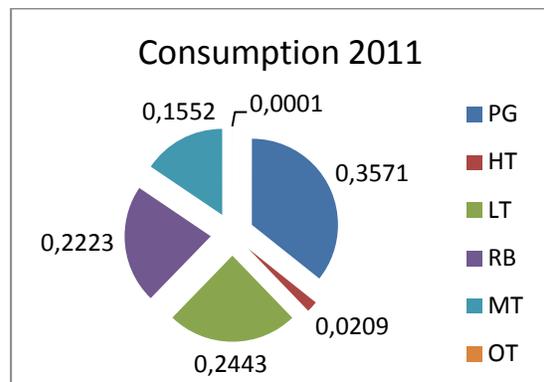
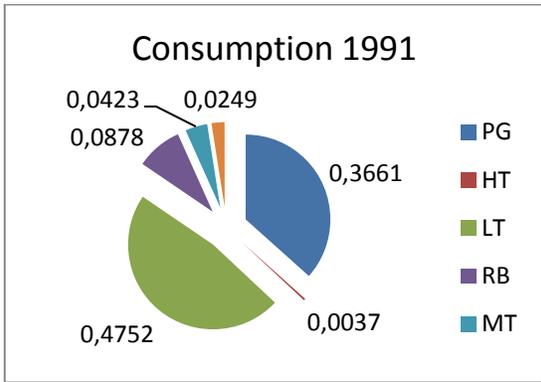
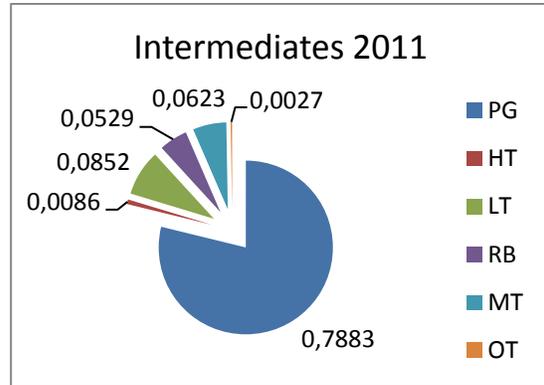
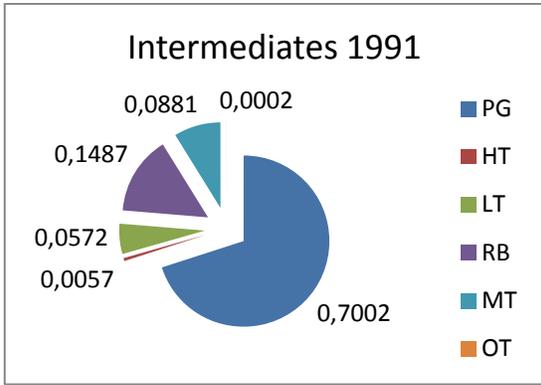
until 2009, to end the period with a new fall, for an overall decreasing trend. Lastly, it is worth noticing that export shares of resource based and medium technology manufactures show an upward trend, slightly more pronounced in the case of medium technology manufactures.

The share of exports of capital goods has been basically flat along the period, which means that exports have kept pace with the overall export dynamics. The share fluctuated between a low of 1.2% and a high of 4.2; the beginning and end of period shares were 1.6% and 1.9%, respectively. The composition of the sector changed in a dramatic way along the 21 years observed. First, the share of exports of medium technology manufactures shrank from 62.5% to 32.9%, with, although large fluctuations, a continuous downward trend. Second, the share of exports of high technology manufactures went from 21.6% in 1991 to 59% in 2011, showing high fluctuations but a clearly and pronounced increasing trend from 2005 on. Third, less dramatically, the share of exports of low technology manufactures also shrunk; going from 15.8% in 1991 to 8.1% in 2011; however, given the way this share fluctuates, for the whole period a practically flat trend is attained.

Turning now to imports, we first describe the behavior of intermediate goods which account for the majority of Colombian imports. Resource based manufactures accounted for most intermediate goods imports in 1991 with a 35.3% share, but its importance almost systematically declined along the period to end with a 20.1% share. In contrast, the second largest contributor to imports of intermediates, medium technology manufactures, shows scant share variation from the beginning to the end of the period, and kept a relatively stable behavior along it. Given this, the basic change characterizing this import group is due to the increase in the share of primary goods imports, which grew from 11.3% in 1991 to 26.2% in 2011, making up for most of the drop in resource based manufactures. The remaining product groups, low technology and high technology manufactures, show modest changes in import shares, both slightly increasing. However, in the case of low technology manufactures, the share of imports increased at the beginning of the period (until 1993) and stayed around the 15.5% level, to then decrease from 2000 to the end of the period. A similar pattern emerges in the case of high technology manufactures; the share increases at the beginning of the period, reaching the 10% level, to then decrease from 2003 on.

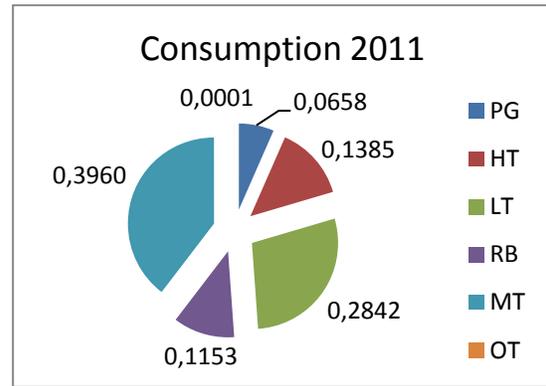
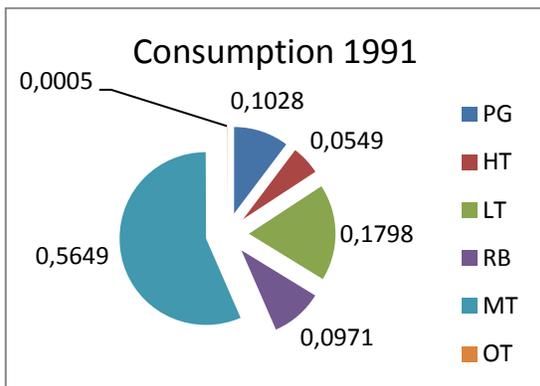
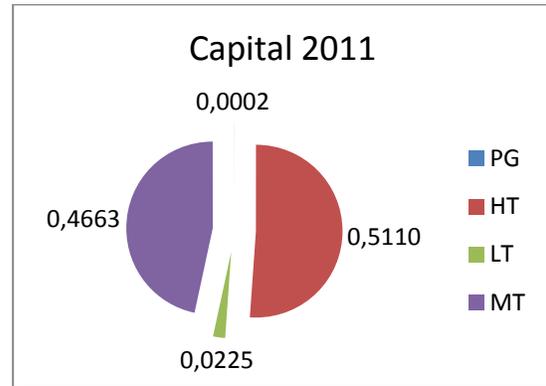
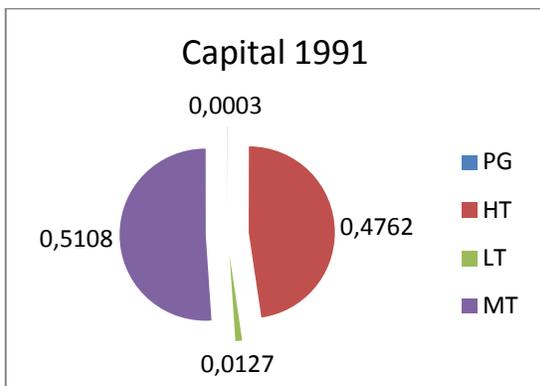
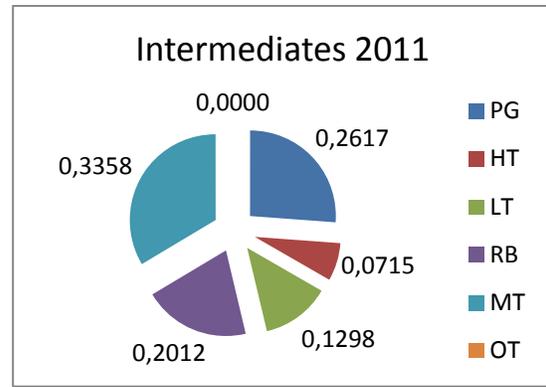
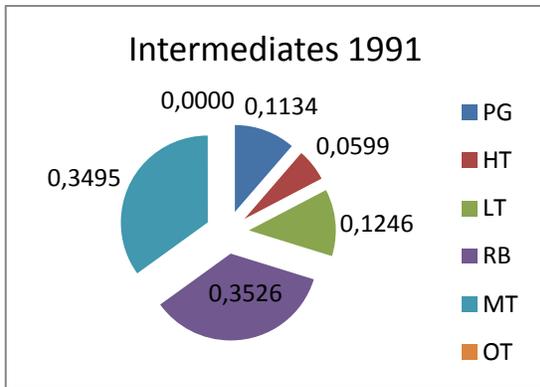
Imports of capital goods have represented around 25% of total imports during the period and are basically composed of high and medium technology manufactures. The share of high technology manufactures started at 47.6% in 1991 and ended at 51.1% in 2011, showing a modest upward trend along the period; however, their share increased from 43% in 1993 to 70.1% in 2002 (its peak) to then fall with relatively prolonged fluctuations until the end of the period. On the other hand, the share of medium technology manufactures started at 51.1% in 1991 and ended at 46.6% in 2011, showing a downward trend during the period; as both product groups constitute almost all capital goods imports, their behavior basically mirrors those of the high technology group.

The evolution of consumption goods imports is more varied. Most imports in 1991 corresponded to medium technology manufactures, with a 56.5% share, and continue being so in 2011, with a 39.6% share. This downward trend, however, masks a steep decrease until 1999 (when the share reaches 29.2%, the lowest for the whole period) and then an increase until 2006 followed by a new but less drastic fall.



Source: Authors' calculations based on DIAN/DANE data

Graph 5. Composition by Lall's classification of Colombian exports categorized according to the BEC nomenclature



Source: Authors' calculations based on DIAN/DANE data

Graph 6. Composition by Lall's classification of Colombian imports categorized according to the BEC nomenclature

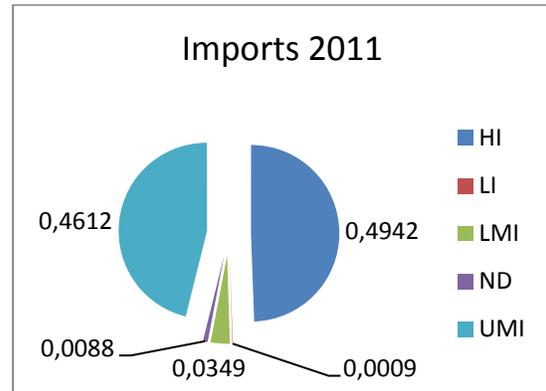
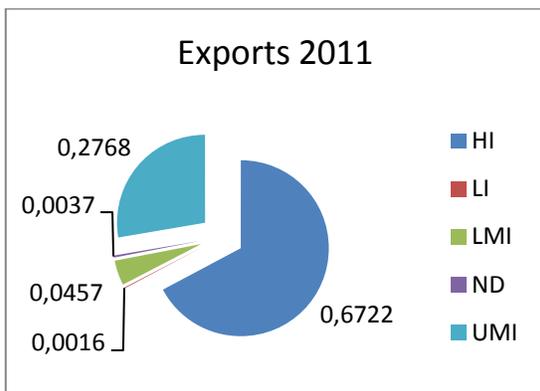
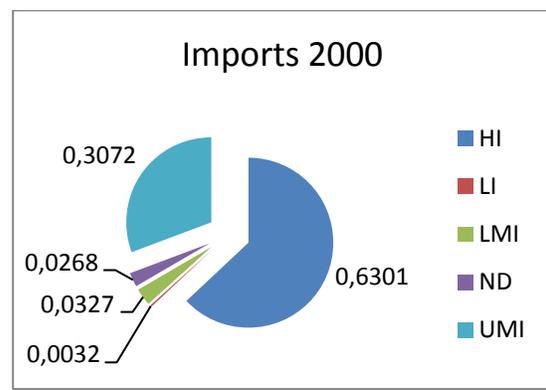
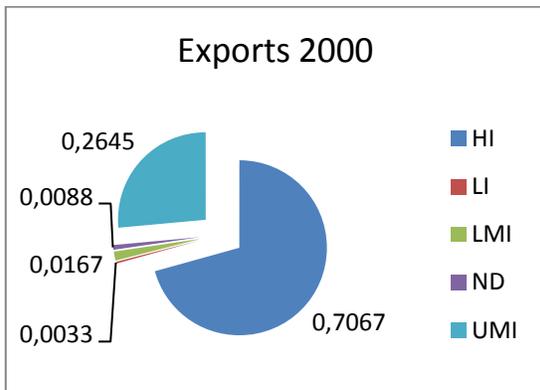
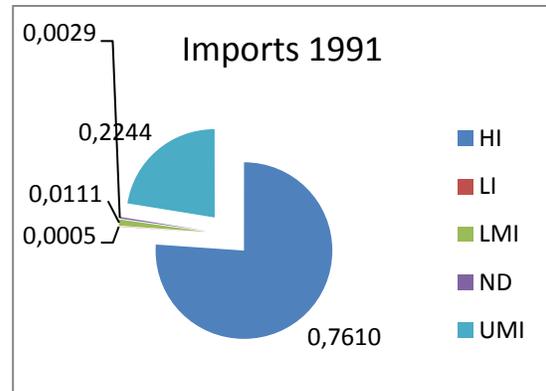
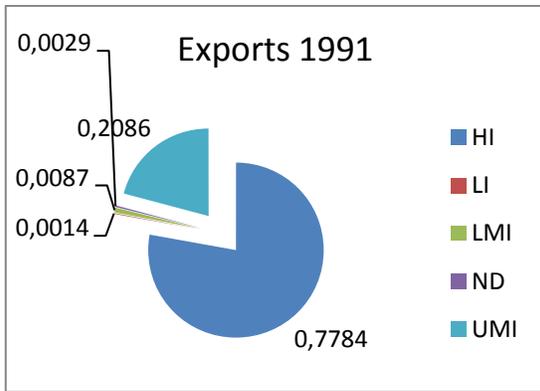
Part of the share drop in medium technology manufactures is made up by imports of low technology manufactures, that go from 18% in 1991 to 28.4% in 2011. Although the share of this type of imports shows some variation along the period, it mostly keeps an increasing trend, especially since 2008. The other significant offset to the fall in the share of medium technology manufactures imports comes from high technology manufactures, whose share goes from 5.5% in 1991 to 13.9% in 2011. While during most years these import shares increased, in 2007 there was a jump in this type of imports, bringing their share from 6.4% to 19.6%, to then fall back to the level registered at the end of the period. Import shares for resource based manufactures show a slight increase when the first and final years of the period are compared; however, this change is the result of an early increase, that brought the share from 9.7% in 1991 to 21.5% in 1999, to then fall back to 10.6% in 2007. Import shares for primary goods, on the contrary, show a moderate decrease: 10.3% in 1991 and 6.6% in 2011. In this case, after relatively steep fluctuations between 1991 and 1994, changes in shares have been more nuanced, generating a downward trend until the end of the period.

5.2 A trade partner perspective

We now briefly provide a depiction of the behavior of trade from the standpoint of trade partners, which we classify in terms of their current income level (using the World Bank classification). Graph 7 shows the composition of Colombian trade for three points in time along the period considered. From the panels at the left, it follows that the main types of export destinations are High Income (HI) and Upper-Middle Income countries (UMI) (the last being the country grouping to which Colombia belongs). It also follows that the export share of UMIs has shown an increasing trend while that of HIs shows a decreasing one; these trends seem sustained along the period although the corresponding shares show fluctuations and since 2008 the opposite behavior is observed in both cases. Beyond this, the other stylized fact that emerges is the modest increase in export shares to Low-Middle Income countries (LMI), that has accelerated from 2009 on for a 3.1 percentage point increase during the last 3 years.

On the import side, it is observed that, again, it is trade with HIs and UMIs which accounts for most trade. Also in this case, a downward trend in import shares corresponding to HIs is observed, compensated by an upward trend in UMIs import share; however, differently from exports, the decrease in HIs' import shares is basically systematic and more pronounced and the same can be said, in the opposite direction, of UMIs' import shares. As these two shares almost exactly offset each other, there is little room for trade with other country types to show changes; the slight increase in LMIs import shares was basically attained until 2004.

With respect to the product composition of trade with each type of partner, Graph 8 illustrates the situation for the case of exports. From there, it can be appreciated that trade in intermediates contributes the largest shares to all partner types (with the exception of Low Income countries (LI), which are not shown in the graph) and that these shares have increased during the period. In the case of HIs, the increase has basically been steady and represents a 21 percentage point increase during the period, while in the case of UMIs the share gain is due to the dynamics of the last four years that brought it from 55.7% in 2007 to 76.9% in 2011. For LMIs, the increase in the export share of intermediates has essentially been steady, although between 2008 and 2009 it had a 12 percentage point jump. Lastly, the export share of intermediates for LIs decreased (to the advantage of consumption goods), losing, after some fluctuations, 14 percentage points to end at 35.5%.



Source: Authors' calculations based on DIAN/DANE data

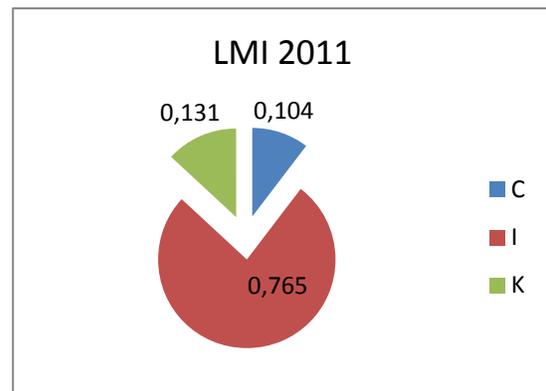
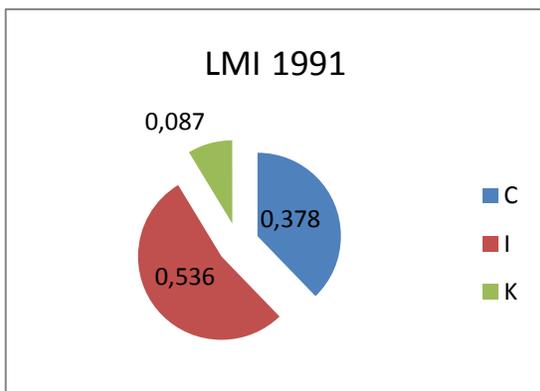
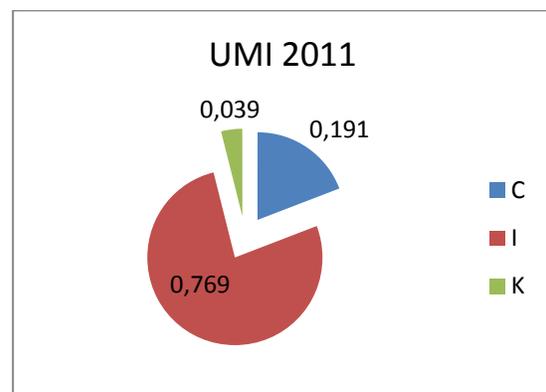
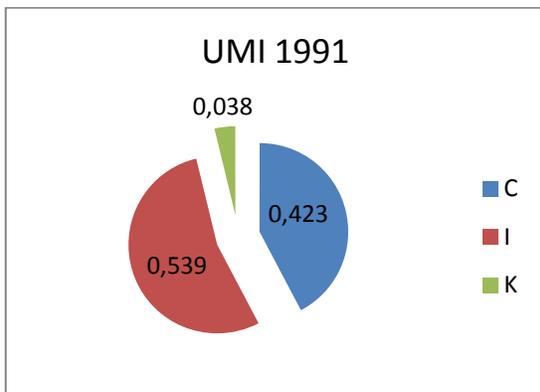
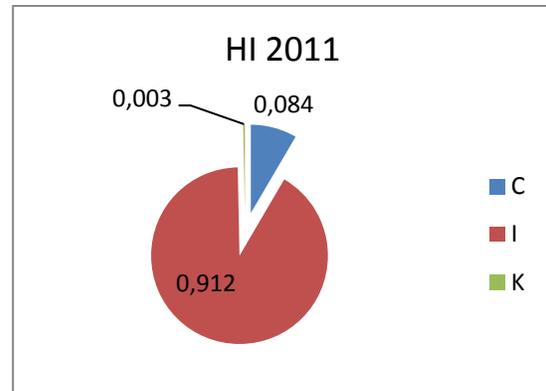
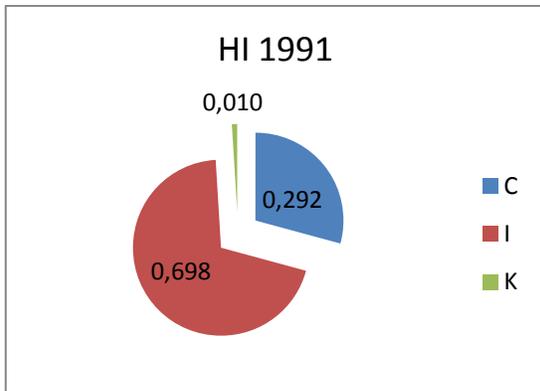
Graph 7. Composition of Colombian exports and imports according to type of trade partner

With the mentioned exception of LIs, the second largest exports to all destination types correspond to consumption goods. In the case of HIs, the decline has been almost continuous and has led to a 20 percentage points shrinkage, which is slightly less than the decrease the product group experienced in the case of UMIs; the latter case, a 23 percentage point diminution, basically took place between 2008 and 2011 (*vis a vis* the increase in the export share of intermediates). In the case of LMIs, after some fluctuations at the beginning of the period, the export share of consumption goods continuously declines, going from 46% in 1996 to 10.4% in 2011.

As can be recalled, export shares of capital goods are the smallest among all product groupings. From 1997 on they are essentially nil in the case of HIs and have relatively more importance in the case of UMIs, with shares ranging from 3.7% to 7.3% and a decreasing trend after the share picks of 1998 and 2002. Shares of this product group are relatively more important in trade with LMIs (8.5% as an average with a maximum of 23.4% in 1992 and a minimum of 3.7% in 2009) but have shown a decreasing trend for the overall period.

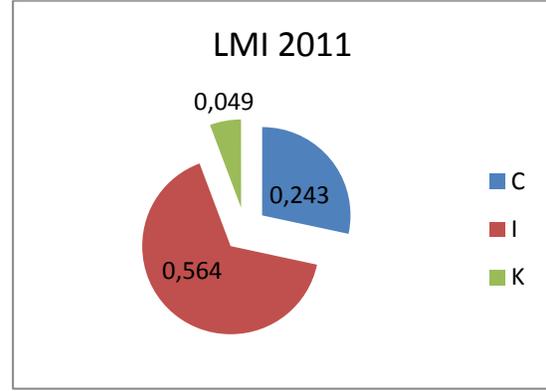
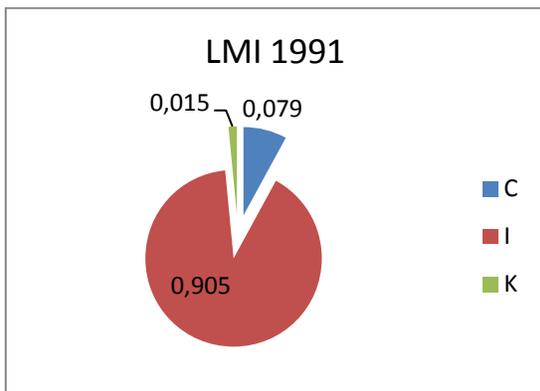
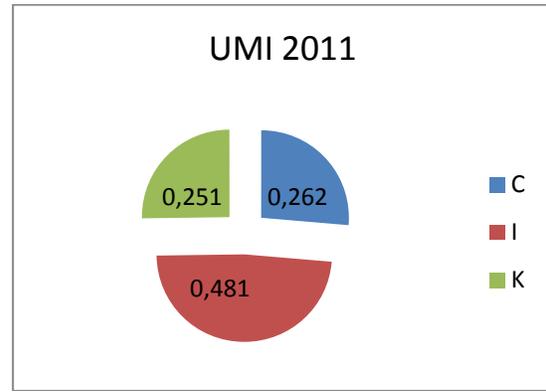
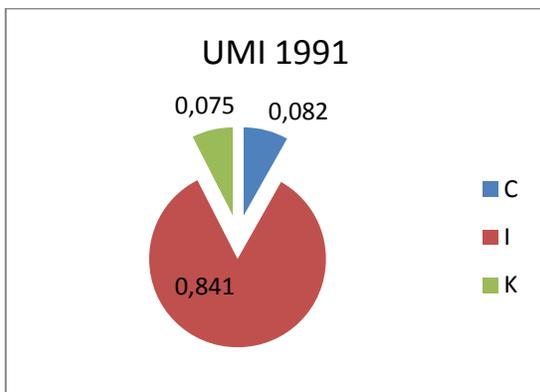
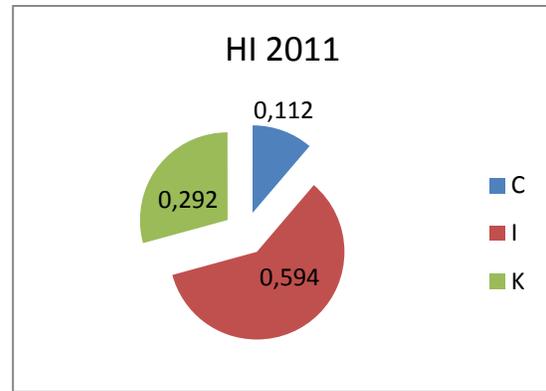
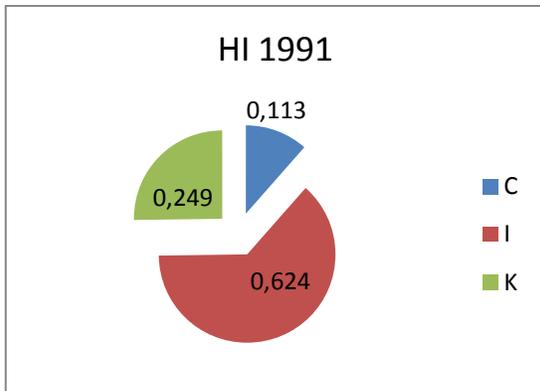
Turning now to imports, Graph 9 shows the product composition of imports for the main types of trade partners for the beginning and end of the period. As suggested by the graphs at the top, import shares for product groups incoming from HIs tend to be stable; although they fluctuate, they do so in a moderate manner as shown by the 0.09, 0.08, and 0.11 values for the coefficient of variation for intermediates, consumption, and capital goods, respectively. A very different picture emerges in the case of UMIs. Here there has been a clear re-composition of imports as the share of consumption goods goes from 8.2% in 1991 to 26.2% in 2011; however, all the increase took place from the beginning of the period to 2001 and then the share has fluctuated around 25%. Conversely, the import share of intermediates has decreased from 84% in 1991 to 48.1% in 2011 and the decrease was basically continuous until 2007, after which it has stabilized around 49.3%. Finally, the rest of the decrease in the share of intermediates was offset by the increase in the import share of capital goods that increased from 7.5% in 1991 to 25.1% in 2011 and did so in a relatively stable way.

Imports from LMIs also show a distinctive compositional change, essentially favoring consumption goods, and to a lesser extent capital goods, at the expense of intermediates that, nonetheless, continue being the most important import group from this type of countries. In this process, the import share of intermediates lost 34.2 percentage points, to end at 56.4%, the corresponding to consumption goods won 16.3 percentage points, and the one belonging to capital goods won 3.4 percentage points. In all cases, import shares fluctuated markedly until 1995 and showed a smoother behavior afterwards. Finally, the situation for imports from LIs (not shown in the graph) is also of marked changes. In this case the evolution of the import structure has favored consumption goods over intermediates and capital goods, but changes in import shares show the widest fluctuations among all partner types, to the point that it is difficult to surely point what the trends are (however, those just mentioned apply to the whole period and seem stable between 2008 and 2011).



Source: Authors' calculations based on DIAN/DANE data

Graph 8. Composition of Colombian exports to main types of trade partners, according to the BEC classification



Source: Authors' calculations based on DIAN/DANE data

Graph 9. Composition of Colombian imports from main types of trade partners, according to the BEC classification

6. Results

As they provide information in two different, but related, dimensions, we split the discussion of results in two parts. First, results for exports and imports diversification as derived from equation (1) are presented and then, in a second subsection, we move to the results corresponding to the cross-section given by equation (3). It should be noted that, in both cases, the margins are calculated for each year with independence of the others; that is, we deal with ‘static’ margins in the sense that there is no consideration of cumulative effects through time. Therefore, when we refer to the evolution or the behavior of the margins, the reference is to the series of yearly calculations.

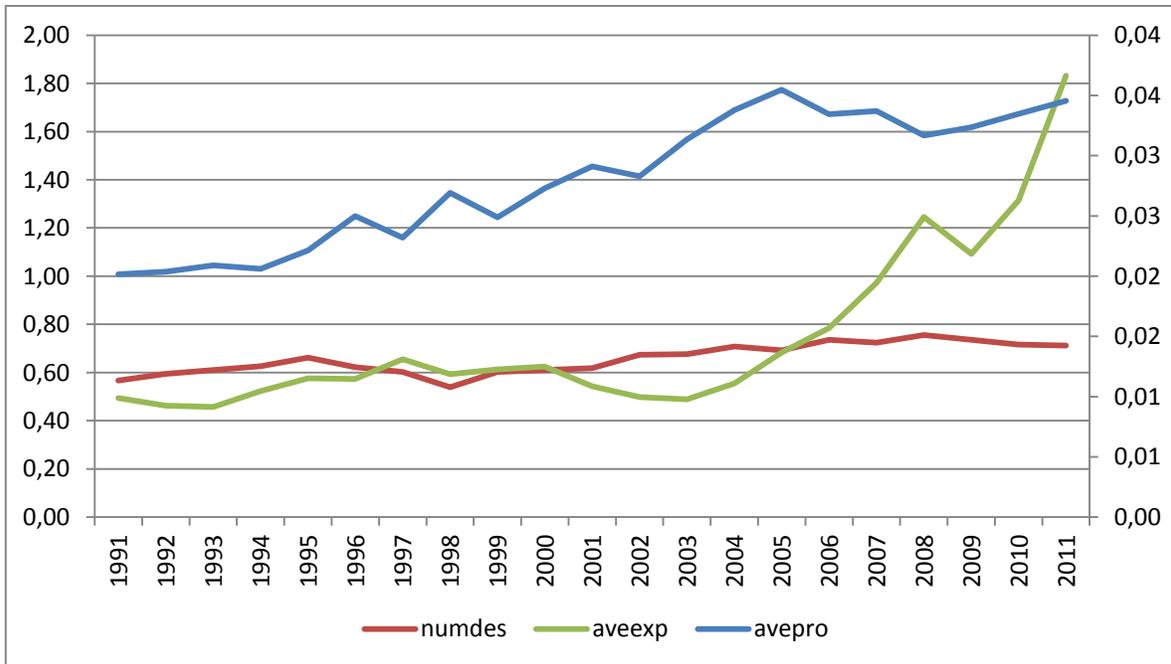
6.1 Year to year follow-up of the margins

Calculation of the margins of trade as given by equation (1), provides an absolute ‘measure’ of their importance but it is not significant in itself as there is no benchmark against which to compare their values. This limitation is partly overcome if we trace the behavior of the margins over time, since this allows for getting an appreciation of their evolution and with it of the significance of trade diversification. Also, to better appraise the values for the margins there is need to express them in relative terms, so that their reading avoids comparing absolute values belonging to different sets (for instance the change in the destination or product count by one unit or the change in the average number of destinations for a product or in the average number of products to a destination).

Considering the above, all margins have been ‘normalized’ to proportions; that is, each is expressed as a percentage of the corresponding total. For instance, the number of destinations is expressed not as the destination count but as the percentage of destinations *vis a vis* the total number of destinations. The only exception to this is the value of the average trade flow (in these cases, exports or imports of the average product to a destination or exports or imports of a product to the average destination). Hence, the extensive margin is measured in terms of its progression (or lack of) towards a hypothetical full diversification.¹³

Graph 10 shows the path followed by the export margins when measured from the standpoint of destinations. In this case, the intensive margin is given by the value of exports of the average product to the average destination (aveexp), while the extensive margin has two components; one related to the relative number of export destinations (numdes) and one related to the relative average number of products exported to the average destination (avepro). From there, it can be appreciated that the extensive destination margin (numdes, read on the left scale) goes from 56.7% of all possible destinations in 1991 to 71.3% in 2011, for a 14.6 percentage point increase, and that the extensive product margin (avepro, read on the right scale) goes from 2% of all possible products to 3.5%, for a 1.5 percentage point increase. On its part, the intensive margin (aveexp, read on the left scale) goes from US\$0.49 million in 1991 to US\$1.83 million in 2011, for a 270% increase.

¹³ In principle no economy would ever get to this full diversification as none would neither produce all possible goods, nor export all of them to all possible destinations.



Source: Authors' calculations based on DIAN/DANE data

Graph 10. Export margins from the destination viewpoint

Therefore, it is the intensive margin of trade who dominates Colombian exports along the period, while at the extensive margin it is the increase in the number of destinations who accounts for most of the action, as the increase in the relative average number of products exported to a given market is nil (a 0.03% average compound rate of increase over the period).

When distinguished by type of product according to the BEC classification, the extensive destination margin increases 15.8 percentage points in the case of intermediates, 13.8 percentage points in the case of consumption goods, and 16.9 percentage points in the case of capital goods. The extensive product margin increases 1.1, 1.7, and 1.4 percentage points for intermediates, consumption, and capital goods, respectively, and the intensive margin increases 349% for intermediates, 53.2% for consumption goods, and 283% for capital goods.

As follows, the general picture finds itself reflected at the product group level with minor qualifications. While the intensive margin is by large the dominant force in the evolution of intermediate and capital goods exports, in the case of consumption goods its role is notoriously less important. For the latter product group, also, the extensive destination margin is less important than in the other cases and the extensive product margin is just slightly more significant; these characteristics are consistent with the behavior of its exports as the product group loses almost two thirds of its share in total imports during the period.

From the above, it is clear that the main contributor to the overall increase in the intensive margin is the intermediates group and that export diversification basically operates through the increase in destinations rather than through the number of goods exported to each destination.

From another viewpoint, when distinguished by type of trade partner, the export margins of trade show the behavior illustrated in Table 1. As expected, the intensive margin is the largest

contributor to trade changes, taking its extreme values in the cases of the two least important (by export share) types of trade partners. Also, within the extensive margin, it is diversification by country of destination that proves being the main driver and the contribution arising from UMIs is the leading force determining this result. As for product diversification, results are basically nil everywhere, the relatively more 'dynamic' belonging to the UMIs group.

Table 1. Changes in margins of trade for Colombian exports between 1991 and 2011; destination perspective

Partner type	Extensive margin*		Intensive margin**
	Product	Destination	
High Income	1.1	8.3	287.0
Low Income	0.2	22.0	92.7
Lower-Middle Income	1.2	15.3	1,456.8
Upper-Middle Income	2.8	21.8	366.6

*Percentage point changes

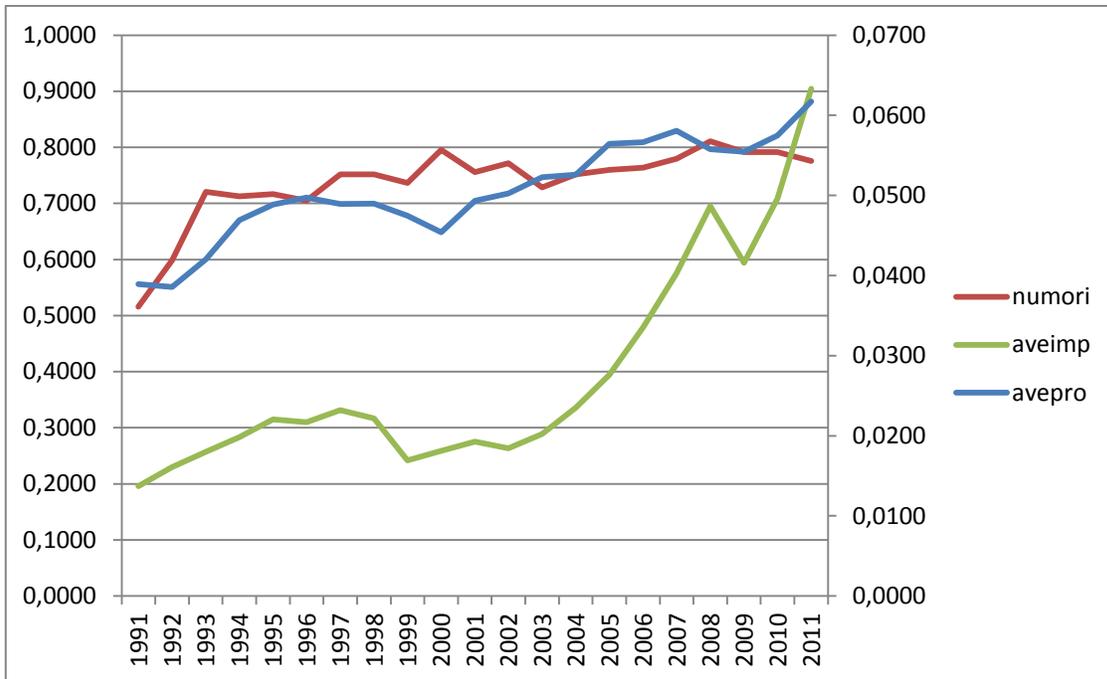
**Percentage change

Source: Authors' calculations based on DIAN/DANE data

Hence, from the perspective of countries types, both HIs and UMIs contribute to the increase in the intensive margin while at the extensive destination margin it is UMIs that contribute the most. As changes in the extensive product margin are quite modest, it is worth noticing that exports to UMIs do marginally better.

The evolution of the margins of trade from the perspective of imports, illustrated in Graph 11, is similar to the one found in the case of exports, with a few caveats. First, the intensive margin (aveimp, read on the left scale) increases 362 times during the period, being the most important force in shaping the behavior of imports; however, its increase starts from a considerably lower base than in the case of exports and in spite of its high variation at the end of the period does not reach the level of average exports (the relationship between the two is slightly higher than 1:2 in favor of average exports). Second, the extensive origin margin (relative change in the number of origin countries, named numori and read on the left scale) contributes the vast majority to import diversification with a 26 percentage point grow. This change is a bit more than 10 percentage points above the one registered in the case of exports, leading the margin from below to above the one corresponding to exports along the period. Third, the extensive product margin (avepro, read on the right scale) contributes the least to import changes and therefore to import diversification; however, its behavior is marginally better than in the case of exports, increasing from 3.9% of products to 6.2% along the period. This way the extensive product margin is not only slightly higher in the case of imports, since the beginning of the period, but also more dynamic.

Differently from the case of exports, when distinguished by type of product distinctive patterns emerge. The largest import product group, intermediates, shows a below average increase in the extensive product margin, with a 1.4 percentage point increase, and a slightly below average change in the extensive origin margin, with a 24.8 percentage point increase. The noticeable feature in this case is a decrease in the intensive margin, equivalent to an annual compound rate of -0.2%, which determines that changes in imports of intermediates are largely dominated by the extensive margin (the extensive origin margin in particular in this case).



Source: Authors' calculations based on DIAN/DANE data

Graph 11. Import margins from the origin viewpoint

In the case of capital goods, the second largest product group imported, the change in the extensive product margin situates below the average for the whole imports with a 1.1 percentage point increase, the change in the extensive origin margin is set slightly above the average with a 26.8 percentage point increase, and the change in the intensive margin situates substantially below the average with a 41% increase. Therefore, even though this case is not alike that of intermediates, here too the extensive margin, the origin margin in particular, plays an important role in determining the behavior of imports along the period.

As for consumption goods, the picture that emerges also favors the role of the extensive margin. Both the extensive product and extensive origin margins are above the figures for the whole imports, with increases in the order of 3.5 and 28 percentage points for the product and origin margins, respectively. On the other side, the intensive margin increases just 9.8%, a result that is partly due to the relatively wide fluctuations in the average value of imports for this product group. Hence, in this case also, the extensive margin plays an important role in determining import changes.

From the above, it follows that, even though in the aggregate the intensive margin dominates changes in imports along the period, the extensive origin margin plays a more significant role than in the case of exports. Furthermore, when observed at the product group level, the significance of the extensive origin margin is even greater, indicating that its relatively less important role at the aggregate level is determined by a composition effect and that, overall, trade diversification is of larger significance for imports than it is for exports.

In a complementary fashion, Table 2 shows changes in the margins of trade when imports are disaggregated by type of country of origin. Recalling the importance of HIs as a source of imports diminished during the period while that of UMIs increased, from the data in the table it follows

that it is import trade with UMIs what basically determines the aggregate behavior of imports. The intensive margin plays a very important role in the evolution of imports from UMIs, reflecting the ascent in trade with this type of countries; however, as can be appreciated from the table, the role of the extensive margin is relevant too: the average number of products imported increases almost 5 percentage points (about 233 products) and the number of countries of origin increases 29.1 percentage points (about 16 countries). The story with HIs is similar in that the intensive margin dominates; though, it does it in a less stringent way and, as a matter of fact, significantly below what it does for the whole set of imports. Also, the pace of change in the extensive margin, both at the product and origin dimensions, is lesser than in the case of UMIs. The behavior of imports from LMIs is somehow midway between UMIs and HIs with respect to the extensive margin and substantially below them in regard to the intensive margin. Therefore, in the relatively modest increase in import share for this type of countries, the extensive origin margin plays an important role and the same can be said of import trade with LIs.

Table 2. Changes in margins of trade for Colombian imports between 1991 and 2011; destination perspective

Partner type	Extensive margin*		Intensive margin**
	Product	Origin	
High Income	2.9	16.7	286.5
Low Income	0.3	46.3	117.2
Lower-Middle Income	2.4	25.4	126.5
Upper-Middle Income	4.7	29.1	511.2

*Percentage point changes

**Percentage change

Source: Authors' calculations based on DIAN/DANE data

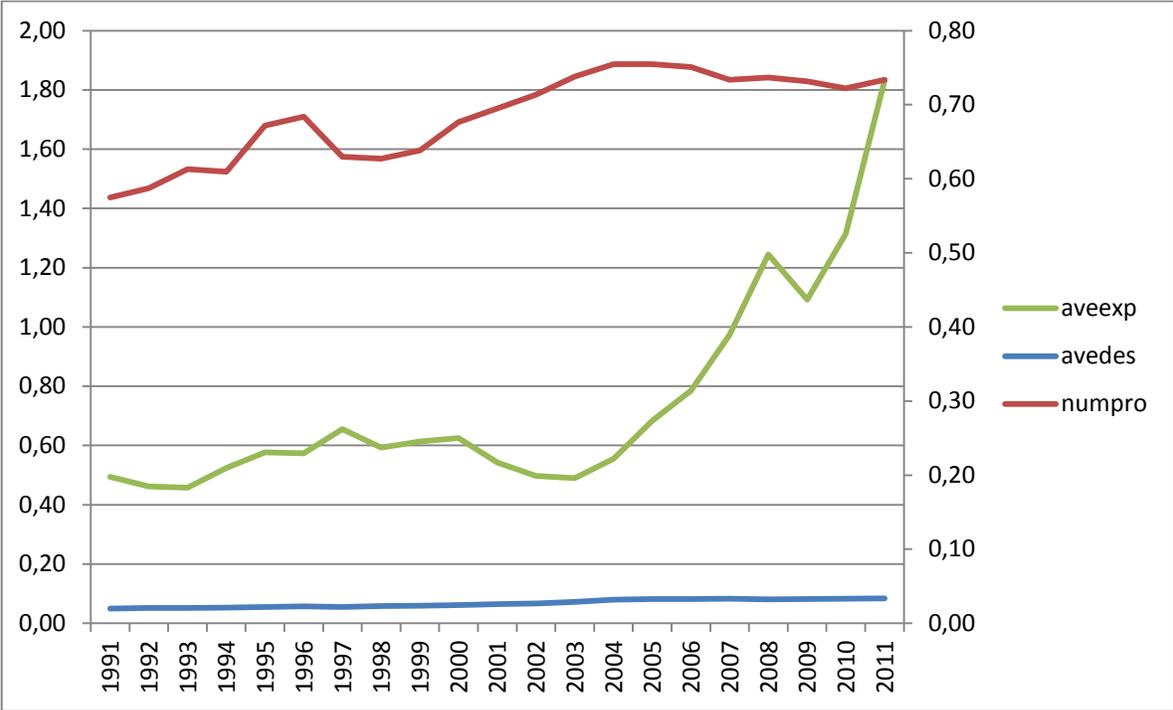
So far we have examined the evolution of exports and imports from the perspective of trade diversification as defined by trade partners, and have disaggregated them based upon products and countries categories. We now do the same exercise from the perspective of products, that is, we define trade diversification in terms of the change in the relative number of product lines.

Graph 12 shows the evolution of the margins of trade for exports from the product viewpoint. In this case, the intensive margin is defined as the average value of exports to the average destination of a given product (*aveexp*, read on the left scale), while the extensive margin has two components. The extensive destination margin is the average number of destination countries to which a product is exported (*avedes*, read on the right scale) and the extensive product margin is the number of products exported by the country (*numpro*, read on the right scale).

By construction, the value of the intensive margin is the same as in the case of the partner country perspective; therefore, what it is different here is the calculation for the two components of the extensive margin. As follows from the graph, the extensive destination margin increases 1.4 percentage points, which is equivalent to an increase of 3.5 destinations for the average product, and the extensive product margin increases 15.7 percentage points, equivalent to a 789 units increase in the number of products exported along the period.¹⁴ As the increase in the intensive margin amounts to 270%, it is the intensive margin which largely determines the behavior of

¹⁴ Net of churning.

exports along the period; nonetheless, it should be noticed that the increase in the relative number of products is slightly higher than the one observed for destinations, and that the increase in the average number of destinations is slightly lower than the increase in the average number of products, leading to a situation in which the extensive margin roughly operates in the same direction and with the same effort than in the case where trade partners are used as the criterion for constructing the trade margins.



Source: Authors' calculations based on DIAN/DANE data

Graph 12. Export margins from the product viewpoint

By looking at the export margins when products are classified according to the BEC classification, it becomes clear that it is trade in intermediates which largely determines the result for the aggregate. In effect, the intensive margin increases 349% in the case of intermediates while it does so 283% and 53% in the cases of capital and consumption goods, respectively. On the other hand, the extensive product margin increases by 10.9 percentage points for intermediates, 2.2 percentage points for capital goods, and 2.7 percentage points for consumption goods. As for the extensive destination margin the corresponding percentage increases are 1.2, 1.3, and 1.2 for intermediates, capital, and consumption goods. Hence, in referring to the increase in the number of products exported, it is the intermediates group the one that exerts the largest influence.

When classified by country type, the margins for export trade show the changes presented in Table 3. Changes in the intensive and extensive destination margins for HIs are close to those corresponding to the whole set of exports, while the change in the extensive product margin is more than four percentage points below, indicating that trade with this type of country is not the most dynamic force behind product diversification. This role corresponds to trade with UMLs, that not only shows a relatively dynamic intensive margin, but specially a relatively high extensive product margin (the percentage point increase for this country type represents a rise of 908 products *vis a vis* 798 for the whole set of exports). LMLs, which is the other country type of

significance, show a large increase in the intensive margin and lower than average changes in the extensive margins, contributing marginally to the general behavior of exports.

Table 3. Changes in margins of trade for Colombian exports between 1991 and 2011; product perspective

Partner type	Extensive margin*		Intensive margin**
	Destination	Product	
High Income	1.2	11.2	287.0
Low Income	0.4	4.3	92.7
Lower-Middle Income	1.2	15.7	1,456.8
Upper-Middle Income	3.5	18.3	366.6

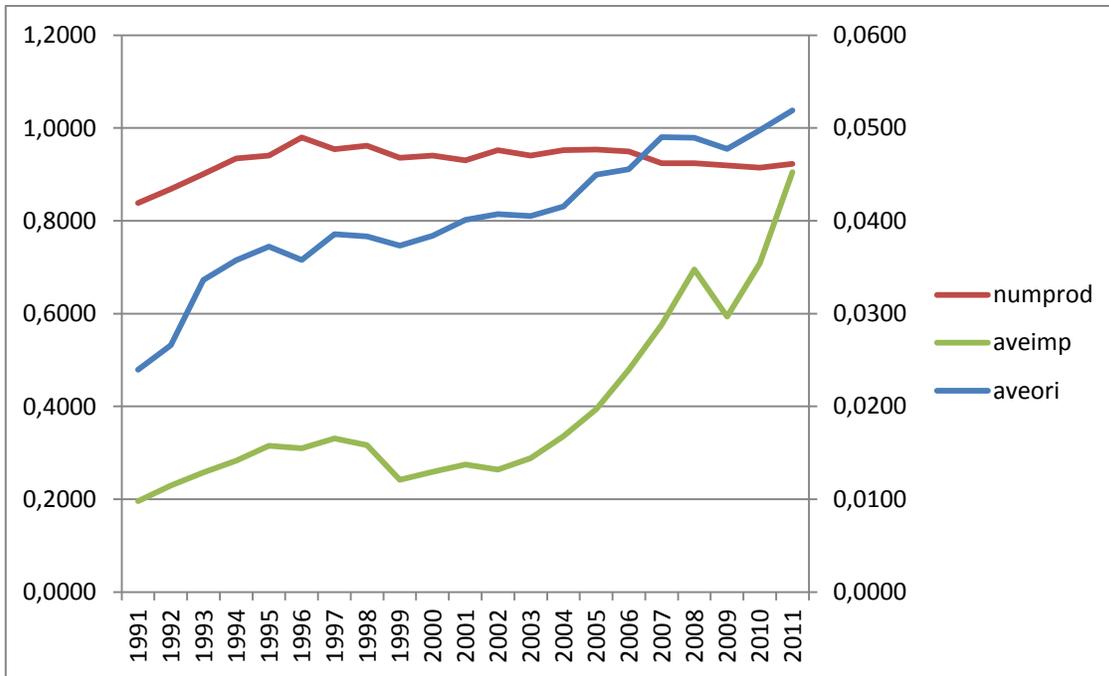
*Percentage point changes

**Percentage change

Source: Authors' calculations based on DIAN/DANE data

Turning now to imports, Graph 13 shows the evolution of trade margins along the period, where the intensive margin is coded as aveimp (read on the left scale), the extensive origin margin is coded as aveori (read on the right scale), and the extensive product margin is coded as numprod (read on the left scale). The extensive origin margin increases 2.8 percentage points along the period, while the extensive product margin does it 8.4 percentage points; compared to the extensive margins when trade partners are used as the criterion for constructing the margins it turns out that the first exceeds by a little the increase in the extensive product margin and that the second is almost three times lower than the extensive destination margin. Therefore, overall, the extensive margin is less important for explaining the behavior of imports when the number of products is used as the criterion to define the margins. However, it is important to notice that this result is very likely influenced by the fact that import product diversification is already very high as the relative number of products imported increases from 83.6% in 1991 to 92.2% in 2011 and, as a consequence, imports growth should very likely be accommodated either through the extensive origin margin or the intensive margin (or both).

If imports are classified according to product type, intermediates and consumption goods show the largest changes in the extensive product margin (4.6 and 3.7 percentage point increases, respectively), but still below the result found for the whole set of imports. In contrast, there is basically no change in this margin for capital goods, whose increase is 0.3 percentage points over the period. The behavior of the extensive origin margin is relatively more homogeneous among product types; it increases 2.3, 3.4, and 3.7 percentage points in the cases of intermediates, capital and consumption goods. As for the intensive margin, all product groups show increases around the datum for the whole set of imports; in the case of intermediates there is an increase of 317%, in the case of capital goods 551%, and in the case of consumption goods 407%. Therefore, the two major divergences between the result for all imports and the results at the product group level are found in the extensive product margin in all cases and in the intensive margin for capital and consumption goods.



Source: Authors' calculations based on DIAN/DANE data

Graph 13. Import margins from the product viewpoint

With imports classified according to the type of country of origin, the most striking result, as shown in Table 4, is the large contribution of import trade with UMIs to all margins. The extensive origin margin increases almost 1.7 times more than the general result, while the extensive product margin increases almost 4 times more, and the intensive margin increases 1.4 times more. In the case of HIs, the largest source of Colombian imports, extensive margin changes are relatively close to the general values, while the intensive margin increases just 0.8 times the value corresponding to the general case. These results are consistent with the relative decline in import trade with HIs in a fashion that does not imply a shift in the trade pattern in the sense of altering its product or country of origin composition. In the picture for LMIs, the third largest type of import partner, changes in the extensive origin and intensive margins are below the general result; the first in a relatively moderated manner and the second in a very significant way, while the extensive product margin shows the highest dynamics among all cases (implying that, on average, import trade with LMIs grows importantly through new product lines).

6.2 Evolution of margins in the cross-section

Results arising from use of equation (3) provide a complement to the findings presented above, in the sense that they explore the intensive and extensive margins of trade across trade partners or products, and help in assessing the importance of trade diversification (the extensive margin). Use of equation (3) allows us to calculate the contribution of each margin of trade for explaining the variation in trade values across trade partners or products (depending on how trade flows are observed) for a given year. Therefore, low contributions of the extensive margin imply that either the number of products traded with a trade partner or the number of countries with which a product is traded, explain a small percentage of the variation in trade across countries or products, implying that the extensive margin is of low importance.

Table 4. Changes in margins of trade for Colombian imports between 1991 and 2011; product perspective

Partner type	Extensive margin*		Intensive margin**
	Origin	Product	
High Income	3.4	7.6	286.5
Low Income	0.9	9.1	117.2
Lower-Middle Income	2.0	39.8	126.5
Upper-Middle Income	4.7	33.1	511.2

*Percentage point changes

**Percentage change

Source: Authors' calculations based on DIAN/DANE data

Lets first use trade partners as the criterion for observing the evolution of trade, where the number of exported products to a destination is the extensive margin (i.e. trade diversification) and the average value of exports per product is the intensive margin. In the case of exports, the relative contributions of the intensive and extensive margins are notoriously stable during the period, yielding an overall average of 77.9% for the intensive margin (with a coefficient of variation of 1.33) and of 22.1% for the extensive margin (with a coefficient of variation of 4.7). Hence, the average value exported explains more than three quarters of the variation in exports among destinations, while the number of products exported explains less than a quarter, a value that is indicative of a modest weight of trade diversification. Nonetheless, there is a humble trend for the extensive margin to gain importance along the time period, increasing on average 0.14% per year. This means that in spite of the intensive margin explaining most of the variation in exports across destinations, there is evidence of a slightly more dynamic role of the extensive margin through time.

When countries are broken by type, it turns out that the two largest country types, HIs and UMIs, show the largest declines in the contribution of the intensive margin. In the case of HIs, the average annual decrease is 0.18% and in the case of UMIs is 0.15%, however, it must be noticed that the contribution of the intensive margin is larger in the case of HIs (77.6% in average) than in the case of UMIs (74.1% in average). The case for LMIs and LIs differs in two respects; first, the contribution of the intensive margin is larger for them (79.7% and 89.9%, respectively, in average), and second, the increase in the importance of the extensive margin is higher in the case of LMIs and lower in the case of LIs, when compared to the ones of the other two groupings (0.1% and 0.3%, annual average decreases, respectively). Therefore, even though the share of the intensive margin is relatively high, export diversification tends to be more significant among exports to HIs and UMIs.

The contribution of trade margins to the variation of imports across countries of origin does not differ much from what was found in the case of exports. The intensive margin averages 74.6% during the period while the extensive margin averages 25.4%, both with relatively low coefficients of variation (1.42 and 4.17, respectively). Also, as happens in the case of exports, there is a modest trend towards the decrease in the contribution of the intensive margin, at an annual average rate of 0.14%. Hence, although imports are more diversified than exports, the difference is of lesser significance and the increase in the importance of trade diversification does not differ from the case of exports.

Observation of imports broken by country type shows that the two main source types, HIs and UMIs, have lower than average contributions for the intensive margin (a 2.9 and a 1.6 percentage points difference between their averages over the period and the general average, respectively), with marked stability, and slightly increasing shares for the extensive margin. However, while in the case of HIs the increase is nil (0.06% per year) in the case of UMIs the increase is moderately above the general result (0.15% per year). The two remaining country categories, LMIs and LIs, show higher contributions of the intensive margin and stronger trends towards the increase in the share of the extensive margin. Taking into account the important shuffle in import shares that took place along the period, the above figures indicate that in the ascent of UMIs as an import source, the extensive margin played an interesting role as it explains a bigger and increasing proportion of the variation across countries of origin, than in the case of imports from HIs.

The other way to make use of equation (3) is defining the margins of trade in terms of products, which implies that the number of countries to which a product is exported or from which it is imported measures the extensive margin, while the average value of trade (export or import) with a country is the intensive margin. The situation in the case of exports indicates that the intensive margin explains, in average over the period, 86.7% of the variation of export values across products while the extensive margin explains the remaining 13.3%. Also, there is a slight downward trend in the importance of the intensive margin, whose contribution decreases at an annual compound rate of 0.18%. Therefore, in contrast to the case of export margins defined on the basis of partner countries, when defined on the basis of products export diversification is both less significant and tends to gain importance at a higher rate.

Exports of intermediate goods show an above average contribution of the intensive margin (a one percentage point higher) and the average downward trend value found for the general case. In the case of consumption goods, the group shows a below average contribution of the intensive margin (2.5 percentage points lower) and an above average trend toward its diminution (at a rate of 0.19% per year). Lastly, in the case of capital goods we find the higher contribution of the intensive margin (1.5 percentage points above the general case) and the strongest rate of decrease of its importance (0.2% per year).

On the side of imports, a similar picture is obtained although in this case the intensive margin shows a lower contribution, explaining 84.6% of the variation in imports across products (2.1 percentage points less than in the case of exports) and a decreasing trend (0.11% per year). Both the contributions of the intensive and extensive margins to variation in product imports are relatively stable during the period, with coefficients of variation of 1.03 and 5.7, respectively. Hence, the importance of the extensive margin is somewhat larger in the case of imports than in that of exports, but the increase in its significance through time is lower.

Comparing the results at the product group level, the highest importance of the intensive margin is found in the case of intermediates, with an average contribution of 85.1% to import variation across products. In the cases of consumption and capital goods, the contribution of the intensive margin is lower than in the general case, being more so for consumption goods (1.1 percentage points versus 0.6 percentage points). In all cases it is found the downward trend in the contribution of the intensive margin, with the same annual average rate.

7. Conclusions

We have described the evolution of international trade and the behavior of export diversification in Colombia during the period 1991-2011. As for the evolution of trade, our main findings can be summarized as follows.

From the export perspective: (i) there is a continuous and increasing predominance of intermediate goods among Colombian exports and within this product type primary goods make the bulk; (ii) the largest export share belong to high income countries, although the export share of upper middle income countries have increased through time; and (iii) in both cases (high income and upper middle income countries), intermediate goods account for the majority of exports.

From the import perspective: (i) there is a continuous and decreasing predominance of imports of intermediate goods along the period; (ii) most imports within the intermediates group are resource-based manufactures; (iii) as in the case of exports, the largest import share belong to high income countries; however, the increase in imports from upper middle income countries has been important to the point that at the end of the period its share is close to that of the former country type; and, (iv) imports from high income countries are mostly intermediate goods and this behavior has been stable, while, on the other hand, imports from upper middle countries were initially basically intermediates, but through time its composition has varied in favor of consumption and capital goods (roughly 50% intermediates, 25% consumption, and 25% capital goods).

Trade diversification was measured through the extensive margin of trade, which, at the year-to-year follow up, has two components. One measuring the number of characteristics (either partner countries or products) and one measuring the average number of the complementary characteristic (either average number of products traded by partner or average number of partner countries by product). Within this set up, the behavior of trade diversification can be portrait as follows.

From the geographical point of view (partner countries), the intensive margin (i.e. changes in the value exported of the average product to a market) is the driving force, while the extent of export diversification tends to be scant. The number of countries to which exports take place is the most important component of export diversification. When calculated at the product group level, there are no significant changes in the results (with the exception of consumption goods, for which the intensive margin is less important), so export diversification essentially takes place through a greater number of export destinations with scarce product diversification taking place. Interestingly, the role of upper middle income countries is not significant in determining this dimension of the extensive margin.

As in the case of exports, the intensive margin is also the driving force in determining import changes, although to a lesser extent than in that case. Also, the extensive origin margin (the number of import sources) is the most important import diversification source and its role is of greater significance than in the case of exports; given that import diversification is more significant than export diversification, there is space for the extensive product margin (average number of products sourced from the average origin) to also play a bigger role. When calculated at the product group level, it is noticeable that for intermediate goods the intensive margin decreases

during the time period, while in the cases of capital and consumption goods it increases with moderation. In all three cases the extensive origin margin is the most dynamic component of import diversification. If broke up by country type, the importance of the intensive margin is greater for upper middle income countries, but the extensive origin margin is significant too; and the roles of the intensive and extensive origin margins are comparatively less important in the case of high income countries.

When a product perspective is adopted, the intensive margin of trade is, again, predominant and within the extensive margin (export diversification) the number of products exported plays a more important role than the average number of destinations. Calculated at the product group level, it is found that the general result is largely determined by the behavior of intermediate goods. Also, the behavior of exports to high income countries is similar to the general result, with the exception that the relevance of the number of products exported is lower. On the other hand, exports to upper middle income countries show a more dynamic intensive margin than in the general result and, specially a more dynamic role of the number of products exported.

Imports are peculiar in that product diversification is high (more than 90% of the product universe is imported) and nonetheless the extensive margin is in general less important than in the case of exports, with greater significance of the extensive product margin. When imports are classified by product group, the main feature arising is that the extensive product margin is more important in the case of intermediate goods, while when classified according to country type the salient characteristic is the large contribution of upper middle income countries to all margins, especially to the extensive product margin.

Results from the cross-sectional analysis from a partner country perspective show that the intensive margin explains around 78% of the variance of exports across destinations and that this figure is relatively stable through time. However, there is a modest trend toward an increasing role for the extensive margin, which is slightly higher for high income countries. On the side of imports, the intensive margin explains around 75% of the variance in imports across sources. As in the former case, here too there is a meek tendency for a greater role of the extensive margin, which is basically confined to trade with upper middle income countries.

From a product perspective, it follows that the intensive margin explains, in average, 87% of the variance of exports across products and that there is almost no increase in the importance of the extensive margin. With respect to imports, the intensive margin explains 85% of the variation in flows values across products and, again, there is a meager tendency to a greater role for the extensive margin. When observed by product type, intermediate goods show average values for the margins of trade in the case of exports, while higher than average values for the intensive margin in the case of imports.

From the above summary, it follows that in the short run trade diversification in Colombia can be characterized as weak but that, nonetheless, along the time period observed there is a modest tendency towards an increase in its importance. With some differences in degree, for both exports and imports the increase in the number of partner countries is the most important component of trade diversification, when a partner country perspective is adopted for measuring diversification, while the increase in the number of products traded plays this role when a product perspective is used. This implies that the number of partner countries increases faster than the number of products contained in the average basket traded and, simultaneously, that the number

of products traded increases faster than the average number of countries with which they are traded. Hence, trade diversification in Colombia seems to follow a pattern that implies that trade with new partners tends to be relatively slowly populated in terms of products or, from the opposite point of view, trade of new products is relatively sluggish in extending to new partner countries.

The suggested proclivity of trade diversification to occur mainly through changes in the number of trading partners is verified by the cross-sectional results. As mentioned, when a partner country perspective is adopted, the proportion of the trade variation among countries that is explained by the intensive margin is lower than when a product perspective is used. Therefore, the number of products traded with a partner is more important in explaining trade variation among partners than the number of partner countries is in explaining trade variation among products. So, from a partner country perspective, differences among them in trade with Colombia are due to a higher degree to differences in the number of products traded, than differences among the value of products' trade flows are due to differences in the number of countries with which trade takes place. As an approximation, it can be said that geographical trade diversification (increases in the number of trading partners) contributes nine percentage points more to trade variation than product diversification.

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