

# Analysis of Central American trade integration from the perspective of intraregional value added

Roberto Orozco and Ramón Padilla Pérez

## Abstract

The aim of this article is to study trade integration in Central America from a value added perspective, using the first regional input-output table, a tool developed by the Economic Commission for Latin America and the Caribbean (ECLAC) in close cooperation with the central banks and statistical institutes of the region. The strategy of open regionalism employed by the countries of Central America has resulted in significant subregional trade integration with regard to gross exports; however, these exports include a significant share of intermediate inputs from outside the subregion. The vertical specialization indicators (exports and imports) estimated in this article show that exports within Central America create less domestic value added than total exports and incorporate considerable intermediate inputs from outside the subregion, creating little value added in the subregion itself.

---

## Keywords

Economic integration, foreign trade, intraregional trade, exports, imports, production specialization, value, input-output analysis, Central America

## JEL classification

F14, F15, C67

## Authors

Ramón Padilla Pérez is the Chief of the Economic Development Unit at the ECLAC subregional headquarters in Mexico. Email: [ramon.padilla@cepal.org](mailto:ramon.padilla@cepal.org).

Roberto Carlos Orozco Morales is a Research Assistant with the Economic Development Unit at the ECLAC subregional headquarters in Mexico. Email: [roberto.orozco@cepal.org](mailto:roberto.orozco@cepal.org).

# I. Introduction

Central America is the most integrated subregion in Latin America and the Caribbean in terms of trade: exports within the subregion<sup>1</sup> account for nearly 30% of total exports, and after the United States, the subregion is the main destination for its own exports. Recent data show that in 2020, in the context of the severe economic crisis caused by the coronavirus disease (COVID-19) pandemic, trade within Central America was more resilient than in other regions of Latin America (ECLAC, 2021).

Central American countries have the longest tradition of integration in Latin America: the process began in 1951 with the Charter of the Organization of Central American States and continued in 1960 with the creation of the Central American Common Market (CACM) (Martínez Piva, 2019a). In the 1980s, in a context of profound economic and political crisis, Central American countries enacted drastic reforms to the development model aimed at deregulating markets, reducing State intervention in economic activities and promoting trade and finance liberalization. This was the dawn of what the Economic Commission for Latin America and the Caribbean (ECLAC) called “open regionalism”: the reconciling of regional interdependence with growing integration with markets outside the region (Martínez Piva, 2019b; ECLAC, 1994). That strategy has shaped the international integration of Central America, including for example with regard to the incorporation of value added from within and outside the subregion and in terms of sectoral export structures.

Thus far, trade between Central American countries has been analysed on the basis of national and regional balance of payments statistics, through the measurement of total import and export flows at current prices. In 2020, ECLAC concluded a technical cooperation exercise with the central banks and national statistical offices of Central America, Mexico and the Dominican Republic to create the first subregional input-output table. As a result, the analysis of integration can be complemented by indicators for the national and subregional value added from exports; in other words, it becomes possible to determine the share of purchases of domestic intermediate inputs and of those from within and outside the subregion in the final export value.

This article aims to study trade integration in Central America in terms of value added on the basis of the first subregional input-output table. In particular, this article will examine whether the Central American integration strategy, which has been successful with regard to gross exports, has also been effective in incorporating intermediate inputs from within the subregion itself.

Indicators for value added from trade within Central America, based on the subregional input-output table, enable an innovative analysis that is unprecedented in economic literature. To conduct a comprehensive assessment of trade integration, the methodology used for this study considers both the flow of exports between economies and the imported inputs for the production of exports. This is achieved by using the indicators proposed by Stehrer (2013) and Stehrer, Forter and Vries (2012), which generalize the calculation of vertical specialization by simultaneously estimating the value added created by exports and imports. The method consists of determining the flows of exports and imports from a given country, called the anchor country, and then estimating the value added created by those flows using the Leontief model.

From a regional perspective, the size and composition of value added created by trade show to what degree economies interact in regional productive processes and their dependency on them, making it possible to measure trade integration in terms of value added.

This article is organized into four sections. Section II, which follows, gives an overview of the development of the first subregional input-output table and describes the main elements of a regional

<sup>1</sup> For the purposes of this study, the Central America subregion is deemed to comprise Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama.

table. Section III presents stylized facts of external trade in Central America, which serve as a starting point for analysing the indicators of the subregional input-output table. Section IV examines the indicators for Central American trade integration on the basis of vertical specialization indicators. Section V sets out conclusions, areas for further research based on the subregional table and public policy recommendations.

## II. Developing the first subregional input-output table

In recent years, a number of exercises have been conducted to develop regional input-output tables, such as the World Input-Output Database (WIOD) and the Trade in Value Added (TiVA) database created by the Organisation for Economic Co-operation and Development (OECD). Other examples include the tables published by the Global Trade Analysis Project (GTAP) and the UNCTAD-Eora Global Value Chain (GVC) database of indicators for value added of trade.<sup>2</sup> However, while there have been recent efforts to develop national input-output tables, the countries of Central America are not represented in these databases.<sup>3</sup>

Between 2016 and 2019, ECLAC worked in close cooperation with the central banks and national statistical offices of the region to build and standardize national tables and a regional table, an initiative financed by the United Nations Secretariat as part of the United Nations Development Account.

The ECLAC subregional headquarters in Mexico coordinated the preparation of the first input-output table for Central America, Mexico and the Dominican Republic, while the ECLAC headquarters in Santiago and the ECLAC office in Buenos Aires<sup>4</sup> coordinated the preparation of the South American input-output table. During the first phase, tables were prepared through subregional exercises. The tables were then combined to make one regional table (18 countries).<sup>5</sup>

In order to create a table for 40 homogenous economic sectors for each of the countries, it was necessary to harmonize the supply and use tables of each country, and thus their input-output tables.<sup>6</sup> To quantify the trade interactions between the countries selected, a trade table describing the international trade flows (imports and exports) between these countries was developed. An employment vector was also created to estimate the impact of trade on direct and indirect job creation. As the background data (supply and use tables) required to create the national tables were available, a regional table was created with figures from 2011.<sup>7</sup>

A regional input-output table provides a snapshot of the economy of a region, in which domestic and international trade in goods and services are recorded for a standardized set of sectors for the countries that comprise the region. In addition, a regional table includes data on intraregional and extraregional final demand, intermediate imports from outside the region and the different components of value added. A regional table, like a national input-output table, is square and symmetrical.

<sup>2</sup> Multiregional input-output tables published by these organizations address a variety of levels of sectoral aggregation and different time periods, regions and countries. Details on the methodology employed to develop these tables and their specific characteristics are available at [online] <http://www.wiod.org/home>; <https://www.oecd.org/sti/ind/measuring-trade-in-value-added.htm>; <https://www.worldmrio.com/>; and <https://www.gtap.agecon.purdue.edu/>.

<sup>3</sup> In particular, the work done by the central banks of Costa Rica, El Salvador, Honduras and the Dominican Republic stands out. They have developed their own input-output tables using supply and use tables created by their national accounts divisions.

<sup>4</sup> This has been renamed the ECLAC office in Argentina.

<sup>5</sup> A preliminary version of the regional table for Latin America, from 2011, is available [online] at <https://www.cepal.org/es/eventos/matrices-insumo-producto-como-herramienta-politicas-comerciales-industriales-america-latina>.

<sup>6</sup> The eight countries included in the subregional table are Costa Rica, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama.

<sup>7</sup> It is important to note that input-output tables present structural economic characteristics that evolve slowly; for that reason, although the first table was created using data from 2011, it remains extremely relevant.

A regional input-output table comprises the following elements:

- (i) Intraregional intermediate consumption matrix, which shows purchases by the various sectors of the different countries of the region.
- (ii) Extraregional intermediate imports matrices, which show the consumption of imported intermediate inputs acquired by the countries of the region and produced by trading partners from outside the region.
- (iii) A production tax vector, which records the payment of taxes on production, by economic sector and country of the region.
- (iv) A transport and insurance vector, which records the amounts paid for these items, by economic sector and country of the region.
- (v) A national value added vector, which records payments made for productive factors (wages, gross operating surplus, mixed revenue and net taxes) by each sector and country of the region.
- (vi) Final intraregional demand matrix, which is made up of a set of rectangular submatrices that show domestic purchases and imports of final goods by and from countries of the region, by demand factor (final consumption and gross capital formation).
- (vii) A total extraregional exports vector, in which each element shows the flow of goods and services (intermediate and final) that each country of the region exports to trading partners outside the region.
- (viii) A gross production value vector, which shows the gross production value for each economic sector and country of the region.

In short, a regional input-output table is a double-entry table representing trade between the countries of a specific region. The sum of purchases (columns) is equal to the sum of sales (rows) and corresponds to the gross production value. As such, it represents a balanced economic system in which everything that is produced is consumed (Orozco, 2020).

### III. Stylized facts of international trade in Central America

Between 1995 and 2019, the combined exports of Central American countries grew by 300%, an annual growth rate of 6.3%. In 1995, Costa Rica was the Central American subregion's leading exporter in gross value terms, accounting for 34% of all exports; the region's three main exporters (Costa Rica, El Salvador and Guatemala) accounted for 71% of all shipments from the subregion. In 2019, Costa Rica remained the leading exporter, with 35.5% of all exports, and the combined share of the abovementioned three countries had increased to 76.3%.

Exports within the subregion as a share of all Central American exports grew from 22.2% in 1995 to 31% in 2019, with marked differences across countries.<sup>8</sup> In 2019, El Salvador had the highest concentration of exports in the Central American market, with exports thereto accounting for 54.5% of its exports, compared with 40% for Guatemala, around 22% for Costa Rica, Honduras and Nicaragua, and around 14% for Panama. Central American trade was also highly concentrated in the United States market, which accounted for between 26% and 43% of total exports in 2019. A significant share also went to the European market, which received 24% of the subregion's exports, with a smaller share going to Mexico (4%) and to Canada, China, the Dominican Republic and Japan (around 2% each).

<sup>8</sup> In 2015 and 2016, the share of exports to the subregion itself hit an all-time high of 33%.

In gross value terms, exports from Central American countries have been in line with the abovementioned strategy of open regionalism. The importance of trade within Central America is firmly established; the subregion is the most integrated trade bloc in Latin America, ahead of others such as the Southern Common Market (MERCOSUR) and the Andean Community (CAN), whose exports of goods to Central America as a share of total exports in 2019 were 10.9% and 7.2%, respectively. In addition, Central American countries have also entered some global value chains —including textiles and clothing, electronic components, and medical equipment and devices— that are heavily oriented to the United States market. Trade destinations have also diversified and there has been strong growth in shipments to China and Europe, in particular to Germany, the United Kingdom and the Netherlands.

Eight countries were included for the construction of the first subregional input-output table: the six countries of Central America, the Dominican Republic and Mexico. An additional table comprising only the six countries of Central America was developed for a more focused study of Central American integration, the subject of this article. The data below are drawn from the Central American table (six countries).<sup>9</sup>

Table 1 presents total gross exports from the six countries included in this study, with data from 2011, the year of the regional input-output table. The columns distinguish between gross exports to other Central American countries and exports to countries outside the subregion. On average, 25.4% of total gross exports remained in Central America, with significant differences across countries: the highest coefficient is in El Salvador (48.4%), while the lowest is in Panama (9.1%).

**Table 1**  
Central America: gross exports within and outside the subregion  
and total goods and services exports, by country, 2011  
(Millions of dollars and percentages of total gross exports)

Country	Total gross exports (Millions of dollars)	Total gross exports within the subregion		Total gross exports outside the subregion	
		(Millions of dollars)	(Percentages of total gross exports)	(Millions of dollars)	(Percentages of total gross exports)
Costa Rica	12 702	2 602	20.5	10 100	79.5
El Salvador	5 032	2 437	48.4	2 594	51.6
Guatemala	10 119	3 072	30.4	7 047	69.6
Honduras	7 806	2 869	36.8	4 937	63.2
Nicaragua	3 540	789	22.3	2 751	77.7
Panama	11 065	1 003	9.1	10 062	90.9
Total	50 263	12 772	25.4	37 491	74.6

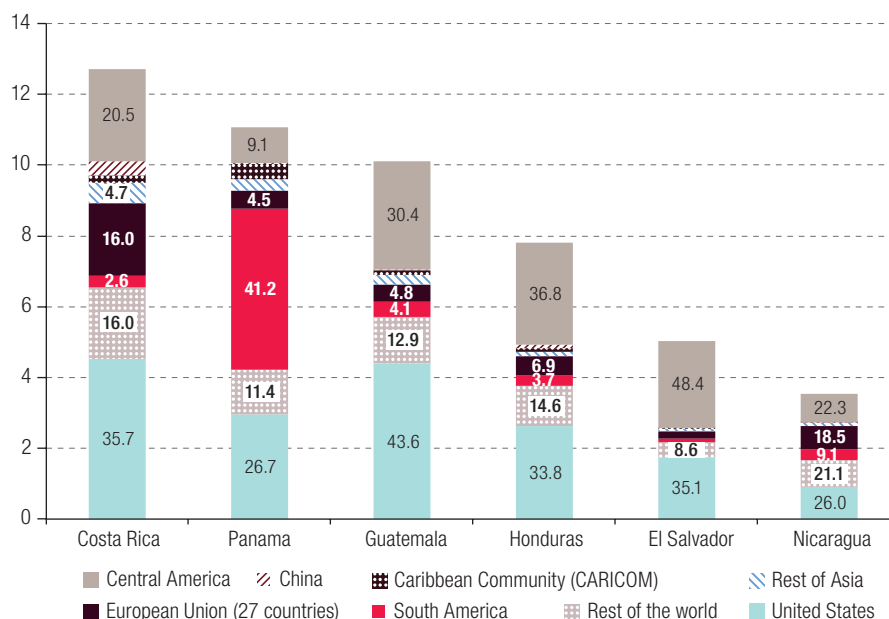
**Source:** Prepared by the authors on the basis of the Central American input-output table developed by the Economic Commission for Latin America and the Caribbean (ECLAC).

Figure 1 shows the composition of gross exports by trade destination. The United States is the single largest destination for the exports of all countries in the subregion. Guatemala is the country with the highest concentration of exports to the United States market (43.6%), while Nicaragua has the lowest concentration (26.0%). In contrast with other Central American countries, Panama sends 41.2% of its exports to South America.

Figure 2 presents the composition of total gross exports between Central American countries by destination country. The highest coefficients are in bilateral trade between the three countries of northern Central America (El Salvador, Guatemala and Honduras); in the exports from Panama to Costa Rica; and in the exports from Nicaragua to El Salvador. However, export distribution is uneven and there are no marked concentrations in any particular market in the subregion.

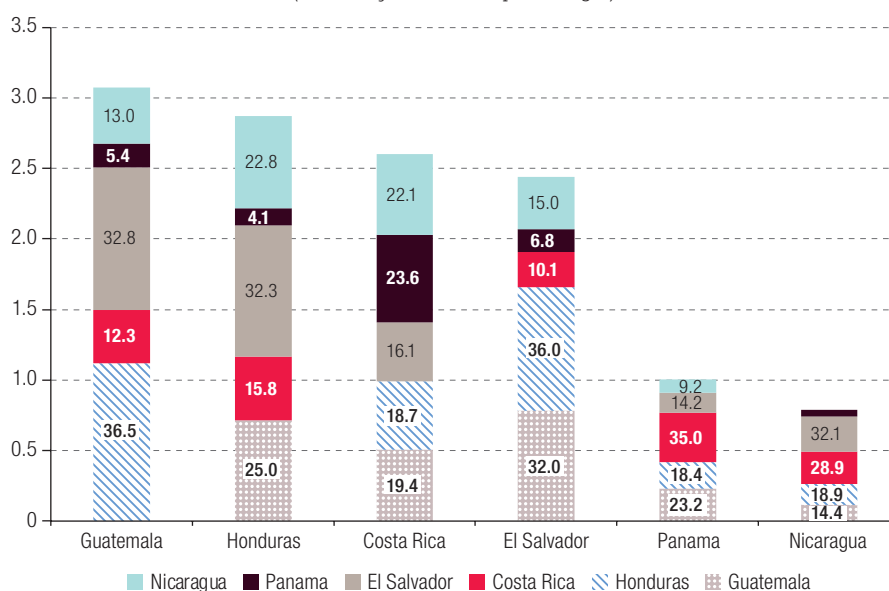
<sup>9</sup> ECLAC has published several studies of regional integration on the basis of the input-output table for Central America, the Dominican Republic and Mexico (eight countries). For example, see Orozco (2020), Torres and García (2020) and Orozco and Torres (2021).

**Figure 1**  
Central America: breakdown of total gross goods and services exports,  
by trading partner or group of destination countries, 2011  
(Billions of dollars and percentages)



**Source:** Prepared by the authors on the basis of the Central American input-output table developed by the Economic Commission for Latin America and the Caribbean (ECLAC).

**Figure 2**  
Central America: composition of gross goods and services exports  
within the subregion, by destination country, 2011  
(Billions of dollars and percentages)



**Source:** Prepared by the authors on the basis of the Central American input-output table developed by the Economic Commission for Latin America and the Caribbean (ECLAC).

## IV. Trade -induced value added within Central America

As mentioned in the introduction, this article examines both the flow of exports between Central American economies and the imports of intermediate inputs and goods used in the production of those exports with a view to conducting a comprehensive analysis of trade-induced value added that goes beyond the traditional measurement based on gross export values. This analysis is made possible by the development of the first subregional input-output table. The methodology is based on the proposal of Stehrer (2013) and Stehrer, Forter and Vries (2012), according to which the value added created by exports and imports is estimated simultaneously.

The indicators for the value added created by trade proposed by Stehrer, Forter and Vries (2012) are derived by simultaneously considering the role of imports and exports when determining the specialization indicators for international trade for a given country. In that sense, the vertical specialization index proposed by Hummels, Ishii and Yi (2001) is generalized in the methodology, as is the calculation method proposed by Koopman and others (2011), since that index and method are based solely on export flows.<sup>10</sup>

The trade-induced value added is calculated by determining the value added created by the exports and imports of a given country, called the anchor country, for which the traditional specialization indicators, domestic value added and the foreign value added embodied in exports are estimated. The value added contained in the imports of the anchor country is also determined. It is made up of three elements: bilateral value added, multilateral value added and reimported value added.

Building on Stehrer, Foster and de Vries (2012) and Stehrer (2013), the following equation is used to calculate the value added contributed by trade:

$$Tv = \hat{v}L\hat{t}$$

where  $\hat{v}$  is the diagonalized vector of the coefficients for value added, meaning the share of value added in gross production;  $L$  is the matrix of production multipliers (or Leontief inverse table); and  $\hat{t}$  is a diagonalized vector whose elements contain exports and imports between the anchor country and the rest of the countries in the regional table.

In  $Tv = \hat{v}L\hat{t}$ , the specific elements for  $\hat{v}$  and  $\hat{t}$  are the following:

$$\hat{v} = \begin{bmatrix} va_1^r/x_1^r & 0 & 0 & 0 & 0 & 0 \\ 0 & va_2^r/x_2^r & 0 & 0 & 0 & 0 \\ 0 & 0 & va_1^s/x_1^s & 0 & 0 & 0 \\ 0 & 0 & 0 & va_2^s/x_2^s & 0 & 0 \\ 0 & 0 & 0 & 0 & va_1^q/x_1^q & 0 \\ 0 & 0 & 0 & 0 & 0 & va_2^q/x_2^q \end{bmatrix} = \begin{bmatrix} v_1^r & 0 & 0 & 0 & 0 & 0 \\ 0 & v_2^r & 0 & 0 & 0 & 0 \\ 0 & 0 & v_1^s & 0 & 0 & 0 \\ 0 & 0 & 0 & v_2^s & 0 & 0 \\ 0 & 0 & 0 & 0 & v_1^q & 0 \\ 0 & 0 & 0 & 0 & 0 & v_2^q \end{bmatrix}$$

$$\hat{t} = \begin{bmatrix} e_1^{r*} & 0 & 0 & 0 & 0 & 0 \\ 0 & e_2^{r*} & 0 & 0 & 0 & 0 \\ 0 & 0 & m_1^{sr} & 0 & 0 & 0 \\ 0 & 0 & 0 & m_2^{sr} & 0 & 0 \\ 0 & 0 & 0 & 0 & m_1^{sq} & 0 \\ 0 & 0 & 0 & 0 & 0 & m_2^{sq} \end{bmatrix}$$

<sup>10</sup> The vertical specialization index is defined as the proportion of imported intermediate inputs incorporated into exports. Using multiregional tables, the content of imported intermediate inputs included in exports can be estimated by trading partner.

Each element of matrix  $\hat{v}$  represents the coefficient for value added by sector (1, 2) and by country ( $r, s, q$ ); for example,  $v_2^r = va_2^r/x_2^r$  is the coefficient for value added for sector 2 of country  $r$ .

In matrix  $\hat{t}$ , the expression  $e_{i=j}^{r*}$  represents the total exports (intermediate and final) of each sector of anchor country ( $r^*$ ) to other countries ( $s$  and  $q$ , respectively). Equations  $m_{i=j}^{sr}$  and  $m_{i=j}^{qr}$  represent the total imports (intermediate and final) for each sector of the anchor country, coming from countries  $s$  and  $q$ , respectively.

The matrix derived from  $Tv = \hat{v}L\hat{t}$  is defined as a matrix of value added created by bilateral trade between anchor country  $r$  and trading partners  $s$  and  $q$ . It is expressed as follows:

$$Tv = \begin{pmatrix} v_1^r l_{11}^{rr} e_1^{r*} & v_1^r l_{12}^{rr} e_2^{r*} & v_1^r l_{11}^{rs} m_1^{sr} & v_1^r l_{12}^{rs} m_2^{sr} & \text{III} & v_1^r l_{11}^{rq} m_1^{qr} & v_1^r l_{12}^{rq} m_2^{qr} \\ v_2^r l_{21}^{rr} e_1^{r*} & v_2^r l_{22}^{rr} e_2^{r*} & v_2^r l_{21}^{rs} m_1^{sr} & v_2^r l_{22}^{rs} m_2^{sr} & & v_2^r l_{21}^{rq} m_1^{qr} & v_2^r l_{22}^{rq} m_2^{qr} \\ v_1^s l_{11}^{sr} e_1^{r*} & v_1^s l_{12}^{sr} e_2^{r*} & v_1^s l_{11}^{ss} m_1^{sr} & v_1^s l_{12}^{ss} m_2^{sr} & & v_1^s l_{11}^{sq} m_1^{qr} & v_1^s l_{12}^{sq} m_2^{qr} \\ v_2^s l_{21}^{sr} e_1^{r*} & v_2^s l_{22}^{sr} e_2^{r*} & v_2^s l_{21}^{ss} m_1^{sr} & v_2^s l_{22}^{ss} m_2^{sr} & \text{IV} & v_2^s l_{21}^{sq} m_1^{qr} & v_2^s l_{22}^{sq} m_2^{qr} \\ v_1^q l_{11}^{qr} e_1^{r*} & v_1^q l_{12}^{qr} e_2^{r*} & v_1^q l_{11}^{qs} m_1^{sr} & v_1^q l_{12}^{qs} m_2^{sr} & & v_1^q l_{11}^{qq} m_1^{qr} & v_1^q l_{12}^{qq} m_2^{qr} \\ v_2^q l_{21}^{qr} e_1^{r*} & v_2^q l_{22}^{qr} e_2^{r*} & v_2^q l_{21}^{qs} m_1^{sr} & v_2^q l_{22}^{qs} m_2^{sr} & & v_2^q l_{21}^{qq} m_1^{qr} & v_2^q l_{22}^{qq} m_2^{qr} \end{pmatrix}$$

The following indicators can be identified in the matrix above:

- (i) Domestic value added embodied in the exports of the anchor country to its trading partners (section I). For example,  $v_1^r l_{11}^{rr} e_1^{r*}$  represents the value added created in sector 1 of country  $r$  and embodied in the total exports of sector 1 from country  $r$  to its partners  $s$  and  $q$ . The sum of all elements that make up section I represents the total domestic value added embodied in the total exports of the anchor country to its partners  $s$  and  $q$ .
- (ii) Foreign value added embodied in the exports of the anchor country to its trading partners (section II). For example,  $v_1^s l_{11}^{sr} e_1^{r*}$  represents the value added of sector 1 of country  $s$  embodied in the total exports of sector 1 of country  $r$  to its partners  $s$  and  $q$ . The sum of all the elements that make up section II is the total foreign value added embodied in the total exports of the anchor country to its partners  $s$  and  $q$ .
- (iii) Reimported value added embodied in the imports of the anchor country that come from its trading partners (section III). For example,  $v_1^r l_{11}^{rs} m_1^{sr}$  represents the value added of sector 1 of country  $r$  embodied in the imports of country  $r$  itself coming from sector 1 of country  $s$ . The sum of all elements that make up section III represents the total reimported value added embodied in the total imports of the anchor country that come from its trading partners  $s$  and  $q$ . The logic behind this indicator is as follows: first, country  $r$  adds value in its exports to countries  $s$  and  $q$ . Then, those exports are incorporated into the productive processes of trading partners and become new products, which, farther down the line, are imported by country  $r$ . In this manner, the anchor country reimports value added.
- (iv) Bilateral value added embodied in the imports of the anchor country that come from its trading partners (sections IV). For example,  $v_1^s l_{11}^{ss} m_1^{sr}$  represents the value added of sector 1 of country  $s$  embodied in the imports of country  $r$  that come from sector 1 of country  $s$ . The sum of all elements that make up the sections labelled IV is the bilateral value added embodied in the total imports of country  $r$  that come from its partners  $s$  and  $q$ .
- (v) Multilateral value added embodied in the imports of the anchor country that come from its trading partners (sections V). For example,  $v_1^q l_{11}^{qs} m_1^{sr}$  represents the value added of sector 1 of country  $q$  embodied in the imports of country  $r$  that come from sector 1 of country  $s$ . The sum of all elements that make up the sections labelled V is the multilateral value added embodied



in the total imports of country  $r$  that come from its partners  $s$  and  $q$ . Multilateral value added is created as follows: country  $q$  provides inputs to country  $s$ ; country  $s$  incorporates the productive inputs of country  $q$  to create new goods; and anchor country  $r$  imports those goods. In this way, anchor country  $r$  indirectly creates value added in country  $q$  (through its imports from country  $s$ ).

The indicators described in (i) and (ii) correspond to the traditional indicators for vertical specialization, meaning national and foreign value added embodied in exports. The indicators in (iii), (iv) and (v) refer to the value added created by imports, meaning reimported value added, both bilateral and multilateral. These five indicators enable the estimation of the value added contributed by the trade of the anchor country with its trading partners.

In table 2, gross export value is broken down into three factors: domestic value added, intermediate imports and trade and transport margins. As an illustration of the data in the table, in 2011, the gross value of exports of goods and services from Costa Rica was US\$ 12.702 billion, of which 77.1% corresponded to domestic value added, 21.8% to intermediate imports and the remaining 1.1% to trade and transport margins.

**Table 2**  
Central America: domestic value added and intermediate imports embodied  
in total gross exports of goods and services, 2011  
(Millions of dollars and percentages of total gross exports)

Country	Total gross exports (Millions of dollars)	Domestic value added embodied in total gross exports		Total intermediate imports embodied in total gross exports		Trade and transport margins embodied in total gross exports	
		(Millions of dollars)	(Percentages of total gross exports)	(Millions of dollars)	(Percentages of total gross exports)	(Millions of dollars)	(Percentages of total gross exports)
Costa Rica	12 702	9 794	77.1	2 765	21.8	143	1.1
El Salvador	5 032	3 213	63.9	1 700	33.8	118	2.4
Guatemala	10 119	7 697	76.1	2 252	22.3	170	1.7
Honduras	7 806	4 248	54.4	3 277	42.0	281	3.6
Nicaragua	3 540	2 728	77.1	770	21.8	42	1.2
Panama	11 065	9 375	84.7	1 561	14.1	130	1.2
Total	50 263	37 054	73.7	12 325	24.5	884	1.8

**Source:** Prepared by the authors on the basis of the Central American input-output table developed by the Economic Commission for Latin America and the Caribbean (ECLAC).

There are marked differences across the countries of the subregion with respect to the share of domestic value added in exports. Honduras and El Salvador have the lowest coefficients (54.4% and 63.9%, respectively). Panama has the highest (84.7%), followed by Costa Rica and Nicaragua (both 77.1%).

For the purpose of comparison, according to 2011 data from the OECD TiVA database, the share of domestic value added embodied in the exports of some South American countries, such as Argentina, Brazil, Chile and Peru, is over 85%. In the region covered by the United States-Mexico-Canada Agreement (USMCA), the average is 90%; and in the European Union, 87%.

The above figures correspond in large part to the open regionalism model of Central America, which was intended to ensure compatibility between specific integration policies and those aimed at boosting international competitiveness (ECLAC, 1994). In recent decades, this model has been characterized by the strengthening of subregional trade integration and the broadening of its areas of focus, while it has fostered trade liberalization, the signing of trade agreements with various partners from outside the region and the promotion of foreign direct investment (Martínez Piva, 2019a). Trade integration

between the countries of Central America, which stands out in Latin America, has thus coincided with participation in trade with countries outside the subregion, which is dominated by intermediate and final manufactured goods and aided by preferential tax regimes such as those governing free trade zones, maquilas and inward processing.<sup>11</sup>

The sectoral composition of exports affects the proportions set out in table 2 with regard to domestic value added and the intermediate imports embodied in exports. For example, because of their very structure, manufactured goods exports tend to contain more imported intermediate inputs than do exports of services. In El Salvador, Honduras and Nicaragua, the highest absolute values for gross exports and domestic value added correspond to secondary sector exports, but they are also the most intensive in the use of intermediate imports. In Costa Rica, the secondary and tertiary sectors create the greatest value added of exports, while in Guatemala, the distribution of value added exported is relatively similar across the primary, secondary and tertiary sectors. In Panama, however, tertiary sector exports create most of the value added from trade, primarily through transport and tourism exports, which are less dependent on imported inputs.

In table 3, gross exports within the subregion are disaggregated into four components: domestic value added, foreign value added from countries within the subregion, intermediate imports from countries outside the subregion, and trade and transport margins incorporated into gross exports to the subregion. Each variable is presented for the country and the economic sector (primary, secondary and tertiary), in both absolute and relative terms, with respect to the total subregional exports of each country. In all Central American countries except Honduras, the share of domestic value added produced by subregional exports is lower than the share produced by total exports: for the subregion as a whole, the total share of the former is 64.7% (see table 3), compared with 73.7% for the latter (see table 2). The widest gaps between the two indicators are found in Guatemala (11 percentage points) and Costa Rica (6.8 percentage points). The fact that the share of domestic value added in subregional exports is lower than that of total exports could be related to the composition of the intraregional export basket of Central America.

Intermediate imports from outside the subregion, meaning inputs that are purchased from trading partners outside Central America and then incorporated into subregional exports, represent 30% of gross subregional exports. The highest share of intermediate imports from outside Central America in total subregional exports is observed in Honduras (35.8%), and the lowest, in Panama (14.9%).

There are also significant differences between sectors. On average, the share of domestic value added embodied in exports within the subregion for both the primary and tertiary sectors is more than 80%. In the secondary sector, in contrast, it averages 60.9%. In other words, although secondary sector subregional exports contribute the most to the creation of domestic value added in absolute terms, the content of domestic value added per dollar for secondary sector exports is US\$ 0.61, while for the primary and tertiary sectors, it is US\$ 0.81.

The fact that a smaller share of domestic value added is embodied in subregional secondary sector exports necessarily means that intermediate imports from outside the subregion account for a greater share: in the secondary sector, the figure is 33% on average, compared to 15.7% and 15.2% on average for the primary and tertiary sectors, respectively.

<sup>11</sup> The international trade strategy of Central America, based on free trade zone, maquila and inward processing regimes, has been widely studied. See Buitelaar, Padilla and Urrutia (1999), Granados (2003), Padilla and others (2008), Vargas Hernández (2010), Granados and Ramos Martínez (2012), ILO (2016) and Bamber and Frederick (2018).

**Table 3**  
Central America: domestic value added, foreign value added from the subregion, and intermediate imports  
from outside the subregion embodied in gross exports of goods and services within the subregion, 2011  
(Millions of dollars and percentages)

Country	Sector	Gross exports within the subregion		Domestic value added embodied in gross exports within the subregion		Foreign value added from the subregion embodied in gross exports within the subregion		Intermediate imports from outside the subregion embodied in gross exports within the subregion		Trade and transport margins embodied in gross exports within the subregion	
		(Millions of dollars)	(Percentages of total gross exports)	(Millions of dollars)	(Percentages of gross exports within the subregion)	(Millions of dollars)	(Percentages of gross exports within the subregion)	(Millions of dollars)	(Percentages of gross exports within the subregion)	(Millions of dollars)	(Percentages of gross exports within the subregion)
Costa Rica	Primary	30	1.7	24	80.3	0	1.1	5	17.6	0	1.1
	Secondary	1 932	29.7	1 246	64.5	33	1.7	617	32.0	36	1.8
	Tertiary	641	14.2	560	87.4	4	0.6	74	11.6	3	0.4
	Total	2 602	20.5	1 830	70.3	37	1.4	697	26.8	39	1.5
El Salvador	Primary	34	19.7	26	78.7	1	2.1	6	17.2	1	2.0
	Secondary	1 738	53.3	921	53.0	70	4.0	684	39.4	63	3.6
	Tertiary	665	41.6	476	71.5	21	3.2	153	22.9	16	2.4
	Total	2 437	48.4	1 423	58.4	92	3.8	842	34.6	80	3.3
Guatemala	Primary	109	3.8	94	85.5	0	0.4	14	13.0	1	1.1
	Secondary	2 280	50.8	1 329	58.3	29	1.3	853	37.4	69	3.0
	Tertiary	683	24.8	577	84.4	5	0.7	95	13.9	7	1.0
	Total	3 072	30.4	1 999	65.1	34	1.1	962	31.3	77	2.5
Honduras	Primary	19	3.3	14	73.8	1	3.4	4	20.7	0	2.1
	Secondary	2 364	39.4	1 224	51.8	136	5.8	912	38.6	91	3.8
	Tertiary	487	38.9	356	73.1	12	2.4	110	22.6	9	1.9
	Total	2 869	36.8	1 594	55.5	149	5.2	1 027	35.8	100	3.5
Nicaragua	Primary	56	10.0	48	86.0	1	2.0	6	11.0	1	1.1
	Secondary	496	22.6	323	65.1	31	6.3	132	26.6	10	2.0
	Tertiary	237	30.1	210	88.7	6	2.7	19	8.1	1	0.4
	Total	789	22.3	581	73.7	39	4.9	157	19.9	12	1.5
Panama	Primary	9	3.3	8	83.3	0	0.6	1	14.7	0	1.4
	Secondary	212	18.7	154	72.7	2	0.9	51	24.1	5	2.3
	Tertiary	782	8.1	673	86.1	4	0.5	97	12.4	8	1.0
	Total	1 003	9.1	835	83.2	6	0.6	149	14.9	13	1.3
Overall total	12 772	25.4	8 261	64.7	356	2.8	3 834	30.0	321	2.5	

Source: Prepared by the authors on the basis of the Central American input-output table developed by the Economic Commission for Latin America and the Caribbean (ECLAC).

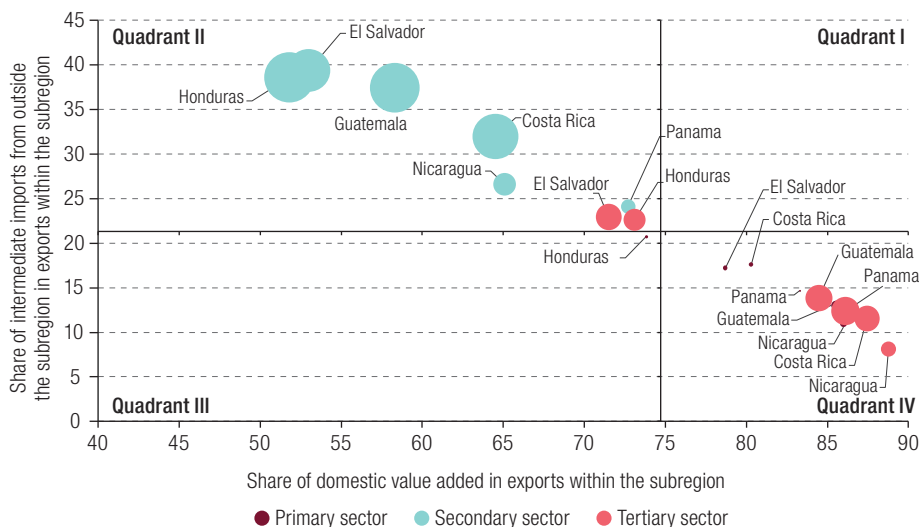
Meanwhile, the average share of foreign value added from the countries of the subregion is 2.8%. This figure corresponds to purchases of intermediate inputs within the subregion that are later incorporated into exports to the subregion. By sector, the average share of foreign value added of countries of the subregion is 3.3% in the secondary sector, 1.6% in the primary sector and 1.7% in the tertiary sector. Those relatively low numbers are an initial indicator of the scarcity of productive trade linkages between Central American countries. A breakdown of Central American trade indicates a high level of domestic value added content and imports of intermediate inputs from outside the subregion, but a low level of intermediate inputs purchased from other Central American countries.

Honduras is the country with the highest share of subregional foreign value added in exports within Central America (5.2%, equivalent to US\$ 149 million), followed by Nicaragua (4.9%, equivalent to US\$ 39 million) and El Salvador (3.8%, equivalent to US\$ 92 million). In Guatemala and Panama, the shares are lower: 1.1% (equivalent to US\$ 34 million) and 0.6% (equivalent to US\$ 6 million), respectively.

The sectoral composition of exports within Central America, in terms of domestic value added and the imports required to produce them, is influenced by the development strategy applied by the countries of the subregion over the past 30 years. As noted by Martínez Piva (2019b), trade within the subregion largely consists of natural resource-based and low-technology manufactures (56% in 2016). For these reasons, despite the fact that the secondary sector is the source of most subregional exports, it is also the sector that contributes the least to the value added per unit of product exported.

This phenomenon is analysed in greater detail in figure 3. The horizontal scale shows the share of domestic value added in subregional exports. The vertical scale shows imports from outside the subregion as a percentage of exports to the subregion.

**Figure 3**  
Central America: domestic value added and intermediate imports from outside the subregion embodied in exports within the subregion, 2011  
(Percentages)



**Source:** Prepared by the authors on the basis of the Central American input-output table developed by the Economic Commission for Latin America and the Caribbean (ECLAC).

**Note:** The size of each sphere is proportionate to the value of exports within the subregion for each sector.

The coordinate axes intersect at the point representing the average for the indicators selected (74.7% and 21.3%), defining four areas in the plane. Given the accounting complementarity between the variables, the sectors are distributed along a straight line with a negative slope. Sectors that are intensive in the use of intermediate inputs imported from outside the subregion, meaning sectors in

which the share of those inputs is greater than the share of domestic value added embodied in exports to the subregion, are located in the upper left-hand section (quadrant II). In contrast, sectors in which the share of domestic value added is greater than the share of the imports required for exporting which originate from outside the subregion are located at the bottom right (quadrant IV).

The colour of the sphere represents the three main groups of productive activity: primary sector (dark color), secondary sector (light blue) and tertiary sector (red). The size of each sphere is proportionate to the value of exports to the subregion for each sector.

As mentioned, the secondary sector is the main generator of domestic value added from subregional exports in absolute terms. However, one fact worth noting from figure 3 is that, in relative terms, the secondary sector contributes the least to the generation of domestic value added: it ranges from 51.8% in Honduras to 65.1% in Nicaragua (the secondary sector of Panama is an exception, with a share of 72.7%). As a consequence, the secondary sector accounts for the largest share of inputs imported from outside the subregion per unit of product exported. In the secondary sectors of El Salvador, Guatemala and Honduras, these inputs represent just over 37% of total exports to the subregion; in Costa Rica, they account for 32%; and in Nicaragua and Panama, the corresponding amounts are 26.6% and 24.1%, respectively.

In contrast, in the tertiary sector, the share of domestic value added embodied in exports within Central America is significantly higher: in El Salvador, it is 71.5%; in Honduras, 73.1%; and in the rest of the countries, it varies between 84% (in Guatemala) and 88.7% (in Nicaragua). The share of inputs imported from outside the subregion is therefore lower in the tertiary sector: 22% in El Salvador and Honduras and less than 14% in the rest of the countries in the subregion.

Along the same lines, primary sector exports within the subregion are characterized by a higher share of domestic value added, ranging from 73% (in Honduras) to 86% (in Nicaragua). However, because primary exports within the subregion make up a smaller share of total exports, the impact of this on the total share is limited.

To sum up, domestic value added and intermediate imports from outside the subregion embodied in exports to Central America vary by sector. With regard to the subregional average, secondary sector exports to the subregion account for the highest share of intermediate imports from outside the subregion, while those from the tertiary and primary sectors chiefly include domestic value added.

The indicators analysed above for domestic value added, foreign value added and the intermediate imports required for exporting are the traditional indicators for vertical specialization, which focus only on the role of total gross exports as a generator of value added. This article analyses, in addition to those indicators, the value added created by total imports within Central America. Below is the analysis of trade-induced value added in the subregion, meaning the value added created in Central America from exports and imports within the subregion.

Table 4 shows the value added created by trade within the subregion, broken down according to five variables: (i) domestic value added embodied in subregional exports; (ii) foreign value added originating in countries of the subregion and embodied in subregional exports; (iii) bilateral value added created by subregional imports; (iv) multilateral value added created by subregional imports; and (v) reimported value added created by subregional imports. Each variable is presented for the country and economic sector (primary, secondary and tertiary), both in absolute and relative terms with regard to the total value added contributed by the trade of each country within the Central American subregion.

**Table 4**  
Central America: breakdown of the value added created by trade within the subregion, by anchor country, 2011  
(Millions of dollars and percentages of value added created by subregional trade)

Country	Sector	Value added contributed by subregional trade (Millions of dollars)	(1) Domestic value added embodied in gross subregional exports		(2) Foreign value added embodied in gross subregional exports		(3) Bilateral value added		(4) Multilateral value added		(5) Reimported value added	
			(Millions of dollars)	(Percentages of value added created by subregional trade)	(Millions of dollars)	(Percentages of value added created by subregional trade)	(Millions of dollars)	(Percentages of value added created by subregional trade)	(Millions of dollars)	(Percentages of value added created by subregional trade)	(Millions of dollars)	(Percentages of value added created by subregional trade)
Costa Rica	Primary	77	24	31.2	0	0.4	52	67.4	1	0.7	0	0.3
	Secondary	1 865	1 246	66.8	33	1.8	534	28.6	41	2.2	11	0.6
	Tertiary	1 043	560	53.7	4	0.4	471	45.2	5	0.5	2	0.2
	Total	2 985	1 830	61.3	37	1.2	1 057	35.4	47	1.6	14	0.5
El Salvador	Primary	102	26	25.9	1	0.7	74	72.6	1	0.6	0	0.2
	Secondary	2 184	921	42.2	70	3.2	1 138	52.1	40	1.8	16	0.7
	Tertiary	1 199	476	39.7	21	1.8	692	57.7	8	0.7	2	0.2
	Total	3 486	1 423	40.8	92	2.6	1 904	54.6	48	1.4	18	0.5
Guatemala	Primary	124	94	75.4	0	0.3	29	23.7	0	0.3	0	0.3
	Secondary	2 302	1 329	57.7	29	1.3	870	37.8	37	1.6	36	1.6
	Tertiary	1 172	577	49.2	5	0.4	577	49.3	8	0.7	5	0.5
	Total	3 597	1 999	55.6	34	0.9	1 477	41.1	45	1.3	42	1.2
Honduras	Primary	44	14	31.3	1	1.4	29	66.3	0	0.8	0	0.2
	Secondary	2 625	1 224	46.6	136	5.2	1 212	46.2	43	1.6	9	0.4
	Tertiary	887	356	40.1	12	1.3	509	57.4	9	1.0	2	0.2
	Total	3 555	1 594	44.8	149	4.2	1 750	49.2	52	1.5	11	0.3
Nicaragua	Primary	69	48	69.6	1	1.6	20	28.3	0	0.5	0	0.0
	Secondary	1 335	323	24.2	31	2.3	931	69.8	47	3.5	3	0.2
	Tertiary	611	210	34.4	6	1.1	388	63.5	6	0.9	1	0.1
	Total	2 015	581	28.8	39	1.9	1 339	66.5	53	2.6	3	0.2
Panama	Primary	17	8	44.0	0	0.3	9	55.0	0	0.6	0	0.1
	Secondary	686	154	22.4	2	0.3	511	74.6	17	2.5	1	0.2
	Tertiary	894	673	75.3	4	0.4	213	23.9	3	0.4	0	0.0
	Total	1 597	835	52.3	6	0.4	734	46.0	21	1.3	2	0.1
Overall total		17 234	8 261	47.9	356	2.1	8 261	47.9	266	1.5	90	0.5

Source: Prepared by the authors on the basis of the Central American input-output table developed by the Economic Commission for Latin America and the Caribbean (ECLAC).

An analysis of table 4 shows at least three important findings. First, in all the countries considered, domestic value added embodied in subregional exports (column 1) and bilateral value added created by imports into each country of the subregion (column 3) account for more than 90% of the value added created by subregional trade. Second, in all the countries of Central America save Panama, there is a strong secondary sector component in the value added contributed by trade within the subregion. Third, the share of foreign subregional value added embodied in exports between Central American countries and that of multilateral and reimported value added created from imports is low. These findings are examined in greater detail below.

As an example, an analysis is conducted of the components that correspond to Guatemala, the country with the greatest value added created by trade within the subregion (US\$ 3.597 billion). Of that figure, 55.6% (US\$ 1.999 billion) corresponds to domestic value added embodied in subregional exports, meaning that most of the value added created by Guatemalan trade is created in-country. However, bilateral value added (the value added created in other Central American countries as a result of Guatemalan imports from those countries) represents 41.1% (US\$ 1.477 billion) of the value added created by Guatemalan trade. That value added corresponds to intermediate inputs that Guatemala purchases from other Central American countries, whose respective intermediate inputs do not originate from the subregion but from third countries. At the sectoral level, domestic value added embodied in exports is primarily created by secondary sector activity (66.5%); the same sectoral concentration can be seen in bilateral value added (58.9%).

Lastly, foreign value added embodied in subregional exports and multilateral and reimported value added embodied in imports represent just 3.4% of the value added created by Guatemalan trade within the subregion. This result reflects the fact that few subregional productive networks are created through Guatemalan trade with the other countries of Central America. If there were more networks, the share of these three indicators would be greater. If Guatemala's exports to Central America contained a higher share of subregional inputs, foreign value added originating in the subregion would be higher. Similarly, if Guatemala used intermediate inputs imported from El Salvador, for example, which in turn used inputs imported from Costa Rica, then multilateral value added would be higher. Likewise, if Guatemala were to use imported inputs which contained Guatemalan inputs previously exported to other countries in the subregion, reimported value added would increase.

Two groups of countries can be distinguished from the analysis of the Central American countries. In the first group, made up of Costa Rica and Panama, the share of domestic value added embodied in subregional exports is greater than the share of the bilateral value added created by imports, meaning that the share of domestic value added in the exports of these two countries is greater than the share of the value added imported from the other countries of the subregion. In Costa Rica, those proportions are 61.3% (US\$ 1.830 billion) for domestic value added, and 35.4% (US\$ 1.057 billion) for bilateral value added; for Panama, the proportions are 52.3% (US\$ 835 million) and 46% (US\$ 734 million), respectively.

In Costa Rica, both domestic value added embodied in subregional exports and bilateral value added are mainly created through secondary sector trade. In Panama, the tertiary sector accounts for most of the value added embodied in the country's exports to the subregion, while secondary sector imports account for more than half of the bilateral value added. As shown in table 4, the sum of foreign value added embodied in subregional exports, multilateral value added and reimported value added accounts for just 3.3% of the total value added created by trade within Central America for Costa Rica, and for just 1.8% for Panama.

In the second group of countries, made up of Guatemala, Honduras, El Salvador and Nicaragua, the share of domestic value added embodied in subregional exports is lower than the share of bilateral value added created by imports. This means that countries in this group import more value added from the subregion than they export to the subregion. In Honduras, domestic value added embodied in subregional exports accounts for 44.8% (US\$ 1.594 billion), and bilateral value added accounts

for 49.2% (US\$ 1.750 billion) of trade-induced value added. In El Salvador, these figures are 40.8% (US\$ 1.423 billion) and 54.6% (US\$ 1.904 billion), respectively. The figures for Guatemala have already been analysed in this section.

Nicaragua is the Central American country with the least value added created by subregional trade (US\$ 2.015 billion): of that figure, 28.8% (US\$ 581 million) corresponds to domestic value added and 66.5% (US\$ 1.339 billion) to bilateral value added. In other words, Nicaraguan imports from the subregion have the highest share of bilateral value added of all the Central American countries. In sectoral terms, secondary sector trade is the main source of both domestic and bilateral value added in all the countries of this group.

In the four countries of the second group, foreign value added from the subregion embodied in exports to Central America and multilateral and reimported value added created by imports are also low: the sum of their shares is 4.5% in El Salvador, 3.4% in Guatemala, 6% in Honduras and 4.7% in Nicaragua. Honduran exports to the subregion therefore incorporate the greatest share of imported inputs from the Central American subregion.

The figures presented above reflect the volume and composition of the value added created by trade within the Central American subregion from a new perspective, using various measurements of domestic, foreign and subregional value added from the first Central American input-output table. Costa Rica and Panama are net exporters of subregional value added; El Salvador, Guatemala, Honduras and Nicaragua, in contrast, are net importers.

The results presented bolster the conclusions reached in previous studies on the basis of traditional trade statistics. Durán-Lima and Zaclicever (2013), for example, in their analysis of trade in intermediate goods (exports and imports), have found that Latin America is not a significant destination and origin of intraregional trade. In this context, compared with other subregions of Latin America and the Caribbean, and considering gross trade in intermediate goods to be an indicator of value chain participation, exports within the Central American subregion are more intensive in intermediate goods (an average of 42% in the 2010–2011 biennium). However, analysis of cross-industry bilateral trade (using the Grubel-Lloyd index) shows that some regional value chains exist, and that El Salvador is the Central American country that trades most with the subregion.<sup>12</sup>

As argued by Durán-Lima and Zaclicever (2013), input-output tables present the most accurate methodology for evaluating the participation of Latin American countries in international value chains, as they make it possible to capture not only the value added contributed by each economy but also the existing productive interrelationships between countries. This study, which focuses on intersectoral trade relations in Central America as a whole, measured in terms of value added, aligns with that assertion.

## V. Conclusions

The data from the first Central American input-output table confirm the importance, in gross terms, of subregional trade. However, the data also indicate that exports within Central America create less domestic value added than total exports and include significant intermediate inputs from outside the subregion, thus creating little value added in the subregion itself. These results suggest that there is a limited presence of long and deep production chains within Central America that can significantly increase value added through subregional trade.

<sup>12</sup> Orozco and Torres (2021) present an analysis of intraregional trade networks. The authors indicate that despite the prevalence of patterns of low integration between Central American countries and sectors, three clusters can be identified when examining import and export networks: (i) Costa Rica and Nicaragua; (ii) Honduras and Guatemala; and (iii) Honduras and El Salvador. The last cluster is determined by the relationships between the textile and garment sectors of both countries.



Calculations of the trade-induced value added (exports and imports) show that the share of subregional foreign value added embodied in subregional exports is low, as is the share of multilateral and reimported value added created by imports. The highest share is recorded in Honduras, where the sum of these values is 6%, while the lowest share is recorded in Panama, at just 1.8% of all subregional trade. In contrast, intermediate imports from countries outside the subregion account for an average of 30% of gross exports within the subregion.

In other words, imports from countries of the subregion create very little indirect value added, given the low share of intermediate inputs originating in the subregion, as represented by the low values for the indicators for multilateral and reimported value added. The statistics show that although the gross value of subregional trade is high, Central America is largely dependent on inputs from outside the subregion.

This analysis also shows that there are various profiles as regards trade within the subregion and value creation through exports and imports. In El Salvador, Guatemala, Honduras and Nicaragua, the share of domestic value added embodied in exports to Central America is lower than the share of bilateral value added created by imports; in Costa Rica and Panama, these proportions are reversed.

The open regionalism strategy has resulted in significant trade integration in Central America with regard to gross exports; however, exports include a significant share of intermediate inputs from outside the subregion. Participation in international trade outside Central America has been dominated by exports of semi-finished and final manufactured goods, which are produced in the context of preferential tax regimes, such as those governing free trade zones, maquilas and inward processing. The widely studied maquila model is characterized by the substantial incorporation of intermediate inputs into exported goods (Buitelaar, Padilla and Urrutia, 1999; Granados, 2003; Padilla and others, 2008; Vargas Hernández, 2010; Granados and Ramos Martínez, 2012; ILO, 2016; Bamber and Frederick, 2018).

Accordingly, these results indicate a need to strengthen existing regional linkages and foster the establishment of new ones that increase intraregional trade flows and value creation. To achieve this, progress is recommended in the areas mentioned below. First, there is a need to continue breaking down the administrative barriers that hinder full participation in the common market. This includes the filling out of customs forms, the processing of sanitary and phytosanitary certificates, and packaging requirements and inspections at various points of the export process, among others, which also raise the cost of imported products (Martínez Piva, 2019a). Second, the strengthening of subregional logistics and mobility policies would offer a huge opportunity to improve the efficiency and connectivity provided by mobility services at a much lower cost than providing services of the same quality on an individual basis (Pérez, 2017). Third, initiatives to enhance and promote production linkages and strengthen regional value chains must continue to be encouraged, to provide meaningful support so that small and medium-sized enterprises in Central America can access financing, technical assistance and innovation incentives, among others. Fourth, as this article shows, not all sectors offer the same opportunities for integrating domestic and intraregional value added. In line with Chilliato-Leite (2021), therefore, regional integration strategies, could place special emphasis on the activities and sectors with the greatest potential for creating intraregional linkages; in other words, it is important for regional integration strategies to be combined with measures to promote structural change.

This article shows one of the applications of input-output tables with respect to the analysis of regional integration. A more in-depth analysis could look into specific sectors and value chains, such as those of textiles, garments and the agrifood sector, which are extremely important in Central America. Another avenue for future research would be to conduct a dynamic analysis by updating the subregional input-output table, making it possible to study changes in the indicators over time. Through dynamic analysis, a more in-depth study could be conducted of the international trade participation patterns of Central American countries, such as variations in domestic and subregional value added over time. In that regard, ECLAC will continue to work with the governments of the region to build new regional input-output tables that can facilitate the dynamic analysis proposed, using the most recent information available.

## Bibliography

- Bamber, P. and S. Frederick (2018), “Central America in manufacturing value chains”, paper prepared by the Duke Global Value Chain Center for Inter-American Development Bank (IDB) [online] <https://gvcc.duke.edu/wp-content/uploads/CentralAmericaManufacturingGVCsReport2018.pdf>.
- Buitelaar, R., R. Padilla and R. Urrutia (1999), “The in-bond assembly industry and technical change”, *ECLAC Review*, No. 67 (LC/G.2055-P), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).
- Chiliatto-Leite, M. V. (2021), “Constrained integration in Latin America: analysis based on a twenty-first-century centre-periphery vision”, *ECLAC Review*, No. 133 (LC/PUB.2021/6-P/Rev.1), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).
- Durán-Lima, J. and D. Zaclicever (2013), “América Latina y el Caribe en las cadenas internacionales de valor”, *International Trade series*, No. 124 (LC/L.3767), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).
- ECLAC (Economic Commission for Latin America and the Caribbean) (2021), *International Trade Outlook for Latin America and the Caribbean, 2020* (LC/PUB.2020/21-P), Santiago.
- (1994), *Open regionalism in Latin America and the Caribbean: economic integration as a contribution to changing production patterns with social equity*, ECLAC Books, No. 39 (LC/G.1801(SES.25/4)), Santiago.
- Granados, J. (2003), “Zonas francas y otros regímenes especiales en un contexto de negociaciones comerciales multilaterales y regionales”, *Documento de Divulgación*, No. 20, Buenos Aires, Institute for Latin American Integration (INTAL)/Integration, Trade and Hemispheric Issues Division (ITD)/Statistics and Quantitative Analysis Unit (STA).
- Granados, J. and A. Ramos Martínez (eds.) (2012), *Zonas francas, comercio y desarrollo en América Latina y el Caribe. Análisis crítico de sus oportunidades y desafíos*, Washington, D.C., Inter-American Development Bank (IDB).
- Hummels, D., J. Ishii and K.-M. Yi (2001), “The nature and growth of vertical specialization in world trade”, *Journal of International Economics*, vol. 54.
- ILO (International Labour Organization) (2016), *La industria de la maquila en Centroamérica*, ACT/EMP Publicaciones.
- Koopman, R. and others (2011), “Give credit where credit is due: tracing value added in global production chains”, *NBER Working Paper*, No. 16426.
- Martínez Piva, J. M. (2019a), “Introducción”, *Logros y desafíos de la integración centroamericana*, ECLAC Books, No. 156 (LC/PUB.2019/7-P), J. M. Martínez Piva (ed.), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).
- (2019b), “El modelo de desarrollo subyacente de la integración centroamericana”, *Logros y desafíos de la integración centroamericana*, ECLAC Books, No. 156 (LC/PUB.2019/7-P), J. M. Martínez Piva (ed.), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).
- Orozco, R. (2020), “Valor agregado inducido por el comercio entre Centroamérica, México y la República Dominicana”, *Project Documents* (LC/TS.2020/144), Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).
- Orozco, R. and L. D. Torres (2021), “Redes intersectoriales de comercio entre Centroamérica, México y la República Dominicana: un análisis desde la perspectiva de la teoría de redes sociales”, *Project Documents* (LC/TS.2021/5), Mexico City, Economic Commission for Latin America and the Caribbean (ECLAC).
- Padilla, R. and others (2008), “Evolución reciente y retos de la industria manufacturera de exportación en Centroamérica, México y República Dominicana: una perspectiva regional y sectorial”, *Studies and Perspectives series—ECLAC Subregional Headquarters in Mexico*, No. 95 (LC/L.2868-P), Mexico City, Economic Commission for Latin America and the Caribbean (ECLAC).
- Pérez, G. (2018), “Logistics in Mesoamerica: outcomes of the policy workshops and logistics integration indicators 2017”, *FAL Bulletin*, No. 364, Santiago, Economic Commission for Latin America and the Caribbean (ECLAC).
- Stehrer, R. (2013), “Accounting relations in bilateral value added trade”, *WIIW Working Paper*, No. 101, The Vienna Institute for International Economics (VIEC).
- Stehrer, R., N. Forter and G. d. Vries (2012) “Value added and factors in trade: a comprehensive approach”, *WIIW Working Paper*, No. 80, Vienna Institute of International Economic Comparison (VIEC).
- Torres, L. D. and K. Z. García (2020), “Distribución funcional del ingreso inducido por el comercio entre los países de Centroamérica, México y la República Dominicana”, *Project Documents* (LC/MEX/TS.2020/28), Mexico City, Economic Commission for Latin America and the Caribbean (ECLAC).
- Vargas Hernández, J. (2010), *Las maquiladoras en Centroamérica*, Axe II, Symposium 6, Toulouse.