Advances in the Latin American Input-Output Table 2005, 2011 and beyond[1]

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Background

At ECLAC we have been studying the linkages between trade and value-added through various approaches. We began with very modest analyses until embarking on the ambitious project of developing an Input-Output Table (IOT) for Latin America.

In the first instance we used a simple method that identified the amount of trade in parts and components in the manufacturing industry. In this way, we could identify the incidence of trade in parts and components in the total trade (either by imports or exports), for example (following Campa and Golberg, Hummels, and others). Obviously, this was done at the country-, sector-, and multi-country-levels. The main objective was to identify the share of trade with the highest content of intermediate goods. Although it yielded interesting results, such an approach only presents a general picture, and has the problem of being a measure of trade in gross terms only.

We later refined the approach and moved towards measuring two-way trade as measured by the intra-industry trade index. We adopted the Grubel-Lloyd Index as a measure of the intensity of trade linkages that are often part of value chains. For this we defined the indicator considering only intermediate products and/or capital goods. In this way, the indicator allowed for the identification of aggregate sectors in which there was greater intensity of two-way trade, mainly in manufacturing: machinery and equipment, paper and cardboard, and chemical products, among others. In this way we moved closer to identifying intra-industry trade with a view to greater productive linkages. However, using this approach we could not discriminate between the gross and the net (i.e. productive linkages by value added incorporated in binational or intra-regional value chains).

We then began to explore the possibilities offered by the input-output approach. It is then that we worked with available national IOTs to identify the sectors with greater internal productive linkages. Using the Hirschman-Rasmussen approach, we identified the sectors of greatest analytical interest as forward-oriented or backward-oriented sectors and we focused on those of the group with the highest incidence of exportation, that is, with

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greater exposure to international trade. This is because our main interest was to identify export chains at a regional level. In our analysis we included the bilateral relationship with the United States, in addition to the rest of the intraregional relations within Latin America and the Caribbean.

We calculated the direct and indirect employment associated with exports using the Input-Output methodology and industry-occupation matrices. Again, a set of sectors such as those previously described appeared with greater productive links. Among others, agribusiness and the textile, garment and footwear sectors were added, both of which are important sectors triggering indirect employment in other sectors of the economy (both upstream and downstream goods and services). We tried to advance by including indicators of vertical integration, that is, imported intermediate inputs incorporated in the exported value added, but the non-incorporation of the countries of the region in global matrices such as the World Input-Output Database (WIOD) or OECD's Trade in Value Added indicators (TiVA) made a comprehensive analysis of subregional value chains impossible. Only one-off analyses were possible for the larger countries: Brazil and Mexico in WIOD, and Argentina, Brazil, Chile, Colombia and Mexico in the case of TiVA. We also explored the possibility of using the EORA database, but we did not follow this route upon learning to our surprise that there was information for all the countries in the region, including many from the Caribbean for which we did not know that there was statistical information (often lacking IOTs and with very partial and incomplete Supply and Use Tables (SUTs)).

We decided to carry out the work of setting up a Regional IOT driven by a request from the Pro Tempore Secretariat of the Community of Latin American and Caribbean States (CELAC), led at that time by Costa Rica. In a short document we explained the steps necessary to complete a Regional IOT. We reviewed the availability of regional information and defined a suggested method to disaggregate the intermediate use imported by origin and economic use (i.e. intermediate inputs, capital, and consumption). We were inspired by the work of IDE-JETRO, TiVA, GTAP, and above all the WIOD teams. Basically, we used proportionality assumptions for such exercises, as well as the separation of the price and the freight cost in the trade flows.

Subsequently, at the request of the Brazilian Institute of Applied Economic Research (IPEA) with whom we participated in the design of a project to identify South American value chains, we embarked on promoting work to standardize and homogenize the statistics of the countries in the region. This work received financial support from several sources, namely the Brazilian Industrial Development Agency (ABDI), the Inter-American Development Bank (IDB), the Development Bank of Latin America (CAF), and the resources of the International Trade and Integration Division of ECLAC.

The main data inputs with which the project started were: the SUTs of the participating countries, detailed trade information (CIF and FOB) provided by the Latin American Integration Association (ALADI), and the establishment of official contacts with statistical institutes, central banks, and ministries of finance, depending on the case, for responses to technical questions related to specific inputs by the teams. For example, in some cases sectoral information from SUTs more disaggregated than the ones normally published by countries was necessary, requiring the opening of the SUT by the product-to-product methodology.

Work realized to achieve the South American IOT 2005

There were several problems that had to be solved. The first obstacle was to identify the state of the art of the National IOTs and SUTs available for each of the countries of the region. These were identified as the main raw material for the project. A second challenge was to define a common base year of reference to obtain homogeneous matrices in all the countries of the region. The year chosen was 2005 because at least three countries in the region had information available for that year, and another five for adjacent years (Argentina 2004, Chile, 2003, and Peru, Venezuela and Ecuador 2007) (See Table 1).

Table 1
Latin American and the Caribbean: First evaluation of industry openings, circa 2005

	ARGENTINA	BRAZIL	BOLIVIA	CHILE	COLOMBIA	ECUADOR	PARAGUAY	PERU	URUGUAY	VENEZUELA
ISIC	3.1	3 & 3.1	3.1	3 & 3.1	3 & 3.1	4	3	3	3	4
Year	2004	2005	1990	2003 y 2008	2005	2007	1997	1994 - 2007	2005	2007
National IOT	124 x 195	55 X 55	35 X 35	73 X 73	61 X 61	69x69	46X46	54 x 54	56 x 56	99 x 99

Source: ECLAC, based on the national IOTs and/or SUTs

In the same way, it was necessary to homogenize the sectors between countries. In the end, 40 sectors were identified: 33 for goods and seven for services. The main goal was to have information sufficiently disaggregated to allow for the analysis of productive linkages in sectors of importance to the region. For example, the agri-food sector was opened into five subsectors (meat and meat products, flour and pasta, sugar, other food products, beverages, and tobacco). Also, the chemical sector was separated into basic chemicals, other chemicals, and pharmaceuticals, leaving rubber and plastic as a separate sector, as well as coal, refined petroleum and nuclear energy.

After the identification of the year and the 40 sectors, each national team (10 in total) was in charge of identifying the necessary correspondences to reach these sectors in the intermediate consumption (national and imported), final demand, and in value added (see diagram 1). Depending on the country, it was sometimes necessary to merge sectors, and in other cases further disaggregate ones when some of the 40 sectors were combined.

Diagram 1
Converters applied for determining the sectors of the Latin American IOT and link national data with international trade data

Supply Use (GDP)   **Trade (By use and by partner)**

SNA → 40 sectors ← HS
ISIC   BEC[a]
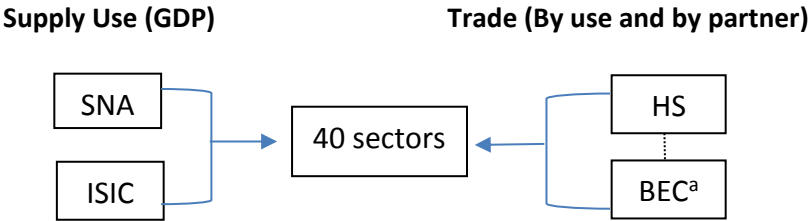
Source: ECLAC, based on the analysis of the national IOTs and various classifications
[a] The original revision 3 of Broad Economic Categories (BEC) was modified to improve use imputation in HS (intermediate consumption, final consumption and capital consumption) according WIOD methodology See Timer (2012)

After several technical meetings in São Paulo, Brasilia and Santiago, various work teams throughout the region managed to have the 10 National IOTs necessary for the assembly of the South American IOT. After the disaggregation of imported intermediate consumption by type of use, imports and exports were disaggregated according to geographical distribution (by partner). After a rigorous process of checking the consistency and compatibility of bilateral flows for the countries of the South American IOT, the process was completed. All the steps taken within the construction of this IO for South American are detailed in the document *"The South American input-output table. Key assumptions and methodological considerations"* (ECLAC, 2016).

An important point to highlight in the assembling process is that each National IO Table was harmonized not only in terms of reference year, but also of the valuation in current dollars at basic prices and the sectoral structure). Only after this process all the national matrices were assembled.

After the assembly, a balancing process was carried out in which an adjustment vector was included, verifying that the equilibrium conditions were met, that is, that Total Supply equals the Total Demand at the level of each country, and throughout the grouping of countries in the expanded IOT.

Likewise, we have obtained matrices of employment from which we have made some estimates of export employment (direct and indirect), for example, and made some sectoral analyses of the imported content of exports at the sector-level, of intra- and extra-regional exports, among others. Moreover, it is impossible to analyze global value chains due to the absence of many of the countries of the region in global matrices such as TiVA or WIOD.

South American IOT Update and Regional IOT Preparation (18 countries)

As the global bases (TiVA and WIOD) have information for more years, and our objective is to be able to include the regional matrices in a global project, we have made the effort to advance in coverage in terms of both geography and time for at least two additional years with complete information. Therefore, after the completion of the IOT 2005 we began to prepare work teams to have a new IOT for all the countries of the region, and for a couple of more recent years (2011 and 2014 inclusive). We expect at the end of 2018 to have an IOT for 18 countries of the region for 2011, while we advance in promoting the compilation of the data for a 2014 IOT. In all cases, these tables are in current dollars.

How has this process been and where are we currently?

Given that it is an arduous task, we have worked in modules, taking advantage of the support of a project of the United Nations Development Account. Thus, the ECLAC Office in Buenos Aires supported us in promoting the work of the teams that completed the national matrices of the MERCOSUR countries (Argentina, Brazil, Paraguay and Uruguay). From Santiago, we coordinate the national teams in the Andean countries (Bolivia, Colombia, Ecuador and Peru), Chile and Venezuela. In the case of Venezuela, it was required to contract a former official of the Central Bank of Venezuela who had the official information that the Central Bank of Venezuela had made public before the current political situation, resulting in the timely closure of the exercise. On the other hand, a team of economists from the ECLAC Office in Mexico, with the support of INEGI, has encouraged the inclusion of Mexico and several countries in Central America and the Dominican Republic in the project. Their work has advanced the development of national matrices with the same 40 sectors, fully compatible with the new South American IOT 2011. Recently I was at a workshop in Mexico City and had the satisfaction of seeing that there have been important advances and the project is moving in the right direction. The representatives of national statistical offices and central banks that participated in the conference shared all the advances that have been realized so far. Some countries that had previously had doubts about joining this titanic effort have confirmed their involvement in the process.

At the end of June, we will launch an IOT for the MERCOSUR countries in Paraguay. We already have an IOT for the Andean countries that we have shared with the Secretariat of the Andean Community, and we will make it public during the month of August.

We are completing the national IOT of Chile in ECLAC. Once this process is concluded, together with the reconciliation and opening of the intermediate utilization by partner and type of imported inputs, currently in preparation, we can make public a new input-output table for South America for 2011.

We hope that once we have completed the work with the team that prepares the IOTs for Mexico and Central America, we can finally have a Regional IOT with broad coverage for the 18 countries mentioned (See figure 1).

Figure 1
ECLAC LAC TIVA 2011 countries

Source: ECLAC. The map is only referential and illustrative of the number of countries involved in ECLAC LAC TIVA initiative.

Before the process is concluded, we have already taken steps to expand the coverage of the Regional IOT for a more recent year (2014 or 2015). In this exercise, frequent contact with national statistical offices, central banks, as well as with the official bodies of each country linked to the compilation of national accounts plays an important role. For this we will also have the support of our colleagues from the Statistics Division of ECLAC.

Challenges and Future Steps

One of the main challenges in the construction of the South American IOT 2005 and later 2011 has been the disaggregation of the imported intermediate use of services by origin, since there are few countries in the region that maintain a complete sectoral breakdown, and secondly the lack of detailed information about the country and sector from which the import is made. These same challenges exist for the export of services as well.

I think all of you would agree that complete, consistent and more accurate data for services statistics are vital for a better understanding of the role services play in international trade. In particular, the improvement of data on trade in services will make the analysis of value chains and their impact on trade in goods and production clearer. Unfortunately, the available data are weak and in the case of Latin American and the Caribbean countries, are not disaggregated by partner.

Currently only four countries in the region have detailed information on services for a set of sectors: Brazil, Chile, Colombia, and Costa Rica. The information for Costa Rica has not been incorporated into the Regional IOT up to this point, nor has it been officially published. It is only through contact with officials at the Ministry of Commerce and information and from Costa Rica Investment Promotion Agency (CINVE) that I have knowledge of its existence.

In the meeting that we had between ECLAC and the National Institute of Statistics and Geography (INEGI) of Mexico to review the progress of the construction process of national IOTs in Central America, there was a strong show of support by delegates from the countries. Some of them have agreed to assist with the provision of primary and secondary official information they have available.

In TiVA there is information for Argentina, Brazil, Colombia, Costa Rica, Chile, Mexico, and Peru. We would like to receive technical feedback on how this project has solved the problem of a lack of data for some of these countries, since we know that information from official sources is some cases is nonexistent or very poor. Perhaps mirror data from developed countries or some assumptions can help alleviate the gap in the data. Maybe you have already been following this approach. This is what I have been able to draw from the review of the joint document "The OECD-WTO Balanced Trade in Services Database".

Some academics make more heroic attempts at disaggregating trade flows by using the structure of the distribution of the goods trade to distribute the totals of imports of goods by partners. In our case we use an ad-hoc methodology that follows a few steps: The first step uses the official information of the countries for which data exists by partner; The second step is to build a matrix that includes all available mirror flows. Once these two sources have been exhausted we proceed to make some particular assumptions dependent on the subsector concerned. Basically, we obtain a proxy variable that is disaggregated by partner. From this structure of the bilateral flows of the proxy variable by partner, the disaggregation of services by sector by partner is reconstructed.

Next, I will describe in detail some assumptions we have been using in ECLAC to disaggregate services data. I would like to receive your feedback about these.

We have conducted a detailed analysis of the possible proxy variables and the possible sources of available data. If there is no official information available, nor mirror information, the resulting bilateral flows are extracted from the residual (after having imputed the mirror flows) and bilateral matrices are completed using the structure of the proxy variables. For example, in the case of transport, the structure of trade in goods is used, with the understanding that trade in goods corresponds in each case to the use of transportation services of various types (by road or by plane).

Table 1
Main proxies used to open import and export services by partners, 2011 LAC IOT

SA-IO	Services sectors	Proxy for exports	Proxy for imports
34	Electricity and gas	Share of volume of intrarregional imports by partner	Share of volume of intrarregional imports by partner
35	Construction	zero or less significant	zero or less significant
36	Transport	Structure of trade of goods by partner	Structure of trade of goods by partner
37	Communications	Remittances by destination, and SITC 675 (telecommunication equipment)	Remittances by destination, and SITC 675 (telecommunication equipment)
38	Finance and insurance	Structure of FDI inflows by partner	Structure of FDI outflows by partner
39	Other business services	Structure of good exports by partner	Structure of good imports by partner
40	Other services	Structure of good exports by partner	Structure of good imports by partner

Source: ECLAC, based on Workshop with national experts in LAC countries.

Regarding the opening of the communications sector, the possibility of using remittances by origin was explored, as there was a high correlation between remittances from abroad and calls made from abroad by nationals.

There are more assumptions that are listed in the table presented below. Illustratively, I have inserted Table 4 in Annex 1 with the structure of the disaggregation of the insurance and financial sectors, where the variables with known flows by partner were direct foreign investment (inward for imports and outward for exports).

The second example is that of the telecommunications sector. Here the variable with information on the structure of trade by partner was remittances by origin and/or destination.

Finally, I would like to reiterate that at ECLAC we have the medium- and long-term objective of including the countries of the region in one of the global Input-Output Table projects, specifically the TiVA or the WIOD databases. We consider it important to do this exercise for several reasons:

The first is so that the region becomes well-represented in these projects. So far in WIOD the region is under-represented with only the largest countries included, Brazil and Mexico; and in the TIVA database, although a set of additional countries is included (Argentina, Colombia, Costa Rica, Chile, and Peru), there is still a great underrepresentation, which makes it impossible to analyze trade in value added for a large number of countries in Central and South America.

The second reason is linked to the strengthening of human capital, that is, of the technicians and analysts who compile and process basic statistics. In our experience, a process like this allows officials from the statistical agencies and central banks to strengthen their knowledge of the links between production and trade.

A third very clear and urgent reason is the link to the design of public policies with greater coherence, since it will allow countries to make decisions based on official information. This is valid at the national, subregional and regional levels. I cite as an example the current work developed to evaluate the effects of the Deepening of the Customs Union between El Salvador, Guatemala, and Honduras; or, in another example, the calibration of a country model for Ecuador to estimate the possible effects of negotiating a Trade Agreement with the United States.

To illustrate the possibilities of inclusion of Latin American countries in the global initiatives in trade in value added, at ECLAC we have made an exhaustive and detailed review of the correlations between the different sectors of the South American IOT to OECD-TiVA and

WIOD, finding that in the case of trade in goods there is full compatibility, which is evident in the fact that it is not necessary to separate sectors of goods from the South American IOT, but rather to aggregate those already existing among the 40 sectors.

In terms of services, it would require some particular efforts to harmonize sectors. However, there are a few sectors in which such an opening should be made: business services, and other sectors as can be seen in the table presented above.

If we wanted to have an IOT to analyze value chains for all of Latin America for 2011, for example, we could add the WIOD base to 23 sectors (16 of goods, and 7 of services), and the TIVA base to 25 sectors (18 of goods, and 7 of services) (See Annex 2 and 3).

Finally, I would like to conclude by noting that ECLAC has a great interest in being able to promote a process of this nature in which the statistical institutions, central banks, and other institutions linked to the construction of each national IOT will benefit from the improvement of its basic statistics on the one hand, and for a greater training of the human capital that produces the data, as well as that of those who analyze it and use it for the design of public policies, as well as for its evaluation.

However, in ECLAC we are aware that this could only be developed in a joint effort of compatibility and homogenization of the basic information present in all the global initiatives and the Latin American IOT that ECLAC is completing.

In the same vein, we have to embarked on a new project with support from the Forum for East Asia-Latin American Cooperation (FEALAC), in collaboration with the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) to harmonize national IOTs in the two regions for the analysis of potential interregional value chains. We look forward to productive discussion and collaboration with the Asian Development Bank (ADB) and Asia-Pacific Economic Cooperation (APEC), whose work has already expanded the scope of national IOTs throughout the Asia-Pacific region.

Colleagues, we have a fertile field for cooperation between our institutions, and much more importantly with our member countries, the main recipients of efforts to strengthen international initiatives in trade in value added.

The proposal I make goes beyond an effort to fill statistical gaps and facilitate the development of academic work. It is an effort to improve the knowledge that the governments themselves have of the link between trade and production within the productive sectors of each country, and between the productive sectors of a country and those of partner countries. It is an approach that is clearly at the heart of efforts to deepen regional integration.

Annex 1
Methodological Note:
Estimation of bilateral trade in services in the South American IOT, 2011 y 2014

The purpose of this document is to describe the steps taken to estimate trade in services in the Latin American countries included in the assembly of the Latin American Input-Output Matrix for the year 2011. This is an update and expansion exercise of the information collected in the document "Estimation of Trade in Services by partner country in selected countries: Methodological Notes", used to complete trade in services of the Input-Output Table of South America for the year 2005 (ECLAC, 2016).

The measurement of bilateral flows of trade in services is a complex task. Apart from the difficulties inherent in measurements of trade in services, the absence of data remains the norm in most countries in Latin America in terms of: i) time series (some countries have only recent data); ii) bilateral flows by trade partner; and iii) sector-level information based on the classification of the International Monetary Fund's Balance of Payments and International Investment Position Manual in its fifth (BPM5) or sixth edition (BPM6) (IMF, 1993 and IMF, 2009). Therefore, in general, the same procedure and the assumptions that were made for the original South American IOT are maintained.

The following notes refer to the methodology used to disaggregate the service account in 18 countries in Latin America and the Caribbean, two groupings in the region, and five extra-regional partner regions, in order to estimate the flows of bilateral trade in services. The **18 selected countries of Latin America and the Caribbean** are: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Panama, Paraguay, Peru, Uruguay, Venezuela, Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and the Dominican Republic. The **two groups in the region** are: the member states of the Caribbean Community (CARICOM), and the rest of Latin America and the Caribbean (RALC, mainly composed of Cuba and other Caribbean countries). The **five extra-regional partner regions** are: The United States, Canada, the European Union (EU-27), China and Rest of Asia (RASIA: includes Japan, South Korea, India, Taiwan, Hong Kong and ASEAN). We have recently begun the process of opening the vector of the rest of Asia by partners, for the widest possible disaggregation of countries. For this, the effort made within the framework of APEC, as well as that of the ADB for the Asia-Pacific region, will be very useful.

Specifically, there are seven service sectors included in the matrix:

1. Electricity and gas (sector 34)
2. Construction (sector 35)
3. Transportation (sector 36)
4. Communications (sector 37)
5. Finance and insurance (sector 38)
6. Other business services (sector 39)
7. Other services (sector 40)

General procedure:

- The totals reported in the Balance of Payments, exports and imports account are used for each of the selected sectors. The implicit idea of this decision is that the consultation of any other source of information or the estimate used is adjusted to the total reported in the Balance of Payments by the countries.

- Preference is given to the official information reported by the countries. This means that estimation methods are applied only to countries that do not report data.

- Information from the OECD *Statistics on International Trade in Services* (ITSS) database is appended where necessary.

- Mirror data from official sources is prioritized for the estimates.

- When the existing official information from trading partners or that obtained by some estimation method does not agree, that is, when the exports from country A to B are different from the imports reported by country B from A, an average of both is calculated.

- In general, when no information is available, what is sought is to find a structure of bilateral trade flows between the different countries through indirect data sources. In this way, the key is to find appropriate weights that reflect this structure as best as possible. Regularly accepted standard criteria are used such as the trade in goods, particularly the flow of a particular good that is of intensive use in the sector.

- The differential of total trade to the world and the sum of these measured flows corresponds to trade to the rest of the world (RoW).

- For groupings of countries (CARICOM, RALC, EU-27 and RASIA), given the limitations of bilateral flows, as many countries as possible are taken into account, sometimes resulting in an underestimation of the groupings, which ends up in the category RoW. An example is the information provided by Colombia, which shows the most representative bilateral flows, generating a grouping called "Other countries" where, for example, the countries of RASIA and UE-27 are included.

Previous considerations:

As a preliminary step to explain the specificities of each sector, below, a series of considerations to be taken into account are described:

- *Main sources of data:* in the review of regional statistics, Brazil, Chile and Colombia are still the only countries that have made estimates of trade flows by partner country. Therefore, the estimates of trade in services in the region are still somewhat rough. The official data for Brazil are provided by the Ministry of Industry, Foreign Trade and Services and its SISCOSERV database for the year 2014. For estimates, the bilateral trade structure between 2011 and 2014 is treated as the same. The official data for Colombia comes from the National Administrative Department of Statistics (DANE) and its Quarterly Sample of Foreign Trade in Services (MTCES). The official data for Chile is provided by the Central Bank of Chile. Finally, the OECD offers data for the United States, Canada and the European Union (28

countries). To simplify, the estimates include Croatia in the EU-27 grouping, assuming that the weight of that country in trade in services in the world is marginal.

- *Bilateral flows by partner:* Brazil, Colombia and Chile have insufficient data by partner country, providing information only related to their main trading partners.
- *Sectors:* Chile only provides bilateral flows in transportation, professional services, IT services and travel. Colombia does not have information on construction, finances and insurance (sectors 35 and 38). For these cases, the corresponding estimates are carried out.
- *Correspondence to the balance of payments:* the official data from Brazil and Colombia differ with respect to the balance of payments data. The estimates are adjusted to the totals of the balance of payments.
- *Colombia:* the total flows of trade in services do not coincide with the sum of the bilateral flows for the sectors offered by the DANE. The estimates are adjusted to the sum of bilateral flows.

- *Balance of payments:* some countries do not offer detailed data on trade in services. Therefore, they report that there is no trade in services such as construction (Ecuador, Peru, Brazil, Chile, Paraguay, Uruguay, Venezuela, Mexico, Nicaragua, Costa Rica, the Dominican Republic and the United States); financial services (Peru and Venezuela); royalties and licenses (Peru, Venezuela and Mexico); other business services (Mexico); personal, cultural and recreational services (Peru, Paraguay, Mexico and the United States); or government services (Peru and Mexico). It does not necessarily mean that there is no trade, but that it has not been registered. This is demonstrated by observing mirror data.

Most countries are governed by the BPM6, although others report data according to the BPM5. This is not a problem in the telecommunication, computer and information services. In some cases, where it has been impossible to disaggregate this sector, all the weight has fallen to sector 37 (Communications). In the rest of the cases, computer and information services could be assigned to sector 40 (Other services).

Finally, for the CARICOM groupings (balance of payments include Antigua and Barbuda, Belize, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago and Suriname), RALC (Anguilla and Panama) and RASIA (Korea, Japan, Indonesia, India, Singapore, the Philippines, India and Thailand), in cases for which no official data are available, estimates to "subtract" intra-regional participation (sectors 37 and 40) from the total of the Balance of Payments were made, where possible. The idea is that the sum of Balance of Payments for groupings includes intra-regional trade that must be eliminated in order not to overestimate bilateral trade.

1. Electricity and gas (sector 34)

The opening of the electricity and gas sector is carried out using the assumption that imports from the electricity and gas sector follow the same structure as energy imports. The first source of data

for the sector is obtained from the imports presented by the COMTRADE database of the United Nations. In the case of the Central American countries, there is sufficiently detailed information available in terms of megawatts per hour. From this information, the total imports per member will be prorated. It is assumed that the supply of electricity and gas are offered by national companies in the country of origin.

2. Construction (sector 35)

The construction sector in the Balance of Payments of most countries in the region indicates that this trade is zero or has an insignificant value. The only data on bilateral flows available are provided by the ITSS for the United States, Canada and the EU-27. No estimation process has been carried out, so bilateral trade falls solely into the RoW flows. In the construction sector, for example, intra-regional trade cannot be eliminated from balance of payments totals for CARICOM, RALC and RASIA, so the total is overvalued.

3. Transportation (sector 36)

To estimate the transportation sector, two main sources have been used. On the one hand, official data for Brazil, Chile and Colombia, provided by the Ministry of Industry, Foreign Trade and Services of Brazil, the National Administrative Department of Statistics (DANE), and the Central Bank of Chile are used, respectively. In the other countries, the data were estimated using the freight value records obtained from the ALADI Database (of imports). As there is no record of the company with whom the export services were contracted or their nationality, it was assumed that the exporter of the good also exports the transport service. The weights are multiplied by the total of exports reported in the balance of payments.

- *Official data:* The data obtained from the Quarterly Services Sample prepared by the DANE (Colombia) and by SISCOSERV (Brazil) have the disadvantage that the sectoral totals are not the same as those reported by the Central Banks in their balance of payments. However, despite this drawback, the weighting of the share with the partners is maintained and the total is adjusted to reflect the total reported to the balance of payments data.
- *ALADI database:* With the exception of Venezuela, Mexico and Panama, this database shows the freight rates associated with imports by partner of origin, for the organization's member countries. With these data, a first matrix is generated for the selected countries, which takes into account the weight of imports by trade partner in transportation (by columns).

From the two data sources cited above, three matrices are generated: exports, imports and a final one. The first one includes the exports of the countries that offer official data (Brazil, Chile, Colombia, the United States, Canada and the EU-27). The import matrix contains official data and freight estimates. The final matrix includes the official data, mirror data of imports (which are prioritized), and an average of the matrices of exports and imports in the case of having only the proxy created with the data from ALADI. In the transportation sector, intraregional trade cannot be

eliminated from balance of payments totals for CARICOM, RALC and RASIA, so the total is overvalued.

4. Communications (sector 37)

The communications sector was completed with official data for Brazil and Colombia (SISCOSERV and the DANE Quarterly Services Sample, respectively). Information was also obtained for the United States, Canada and EU-27 (ITSS, OECD). In the other countries, bilateral trade in communications was estimated using trade in goods complementary to the activity. In this case, group 764 of SITC Rev.3 was considered: "telecommunications equipment and its parts and pieces". In this way, the bilateral structure of these trade flows of group 764 goods was applied to calculate the bilateral communications flows using the totals reported by the balance of payments. Once again, the final matrix prioritizes official data in determining the estimates. In the rest of the cases, an average is established between the export matrix and the import matrix. The balance of payments of Mexico does not report trade in this sector, although the data offered by ITSS show the existence of bilateral flows in the sector involving Mexico. Therefore, OECD data are prioritized over national data in this case.

5. Finance and insurance (sector 38)

Excluding Brazil, the United States, Canada and the EU-27, no other country reports official data on this sector, so bilateral foreign direct investment (FDI) flows are used as the best estimate. Investment inflows are consequently a proxy for exports and investment outflows similarly for imports. When foreign investment enters a country, it will require insurance and financial services related to the investment process. This proxy assumes that all these services are contracted in the country where the investment is made.

FDI data are available by origin and destination for Colombia. For the rest of the countries, the Production, Productivity and Management Division of ECLAC provided inflows of FDI by origin for Bolivia, Argentina, Chile, Ecuador, Uruguay, Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, CARICOM (Trinidad and Tobago) and RALC (Panama). In the case of Ecuador, the shares were not estimated, since the balance of payments does not report exports in the finance and insurance sector. For all cases where the inflows were negative, the final matrix of the finance and insurance sector eliminates the flows. In the finance and insurance sector, intraregional trade cannot be eliminated from balance of payments totals for CARICOM, RALC and RASIA, so the total is overvalued.

6. Other Business Services (sector 39)

Only Brazil, Colombia and Chile, as well as the United States, Canada and EU-27 publish official data disaggregated by partner. For this sector, no estimates have been made, so for the rest of the countries, all the trade in other business services is transferred to the rest of the world. In the other business services sector, intraregional trade cannot be eliminated from balance of payments totals for CARICOM, RALC and RASIA, so the total is overvalued.

7. Other Services (sector 40)

The Other Services account in the matrix includes the computer and information sectors; royalties and licenses; personal, cultural and recreational services; government services; and travel. Only Brazil, Canada, Chile, Colombia, the United States and EU-27 report bilateral flows. As it is very difficult to estimate this aggregate due to the scarcity of information, it was decided to build a trade in travel services matrix using the tourism statistics of receiving and sending countries offered by the World Tourism Organization (UNWTO) for the rest of the countries and groups. The reason for this is that the share of the travel account in the total value of the Other Services trade in the countries of the sample was greater than 92% on average in 2011. Therefore, it seems reasonable to estimate the bilateral flows of the Other Services account using the weighted bilateral trade flows estimated from the travel account.

Travel Account

The travel account was constructed using mainly the surveys of sender and receiver countries that process data related to arrivals of non-residents by country of origin, and departures of residents by country of destination. This approach was used in all cases except those of Brazil, Colombia, Chile, the United States, Canada and the EU-27, which offer official data. In the cases of Chile and Colombia, the data offered are partial, so that bilateral relations have been completed with travel estimates. In addition, for Colombia, data on recipient tourism by country of origin start from September 2012 to August 2013 (International Travelers Survey), so the average weights of this period were used to analyze tourism in 2011. In the cases of Brazil, Chile and Colombia, which have data referring to IT, royalties, personal services and others, these data are prioritized, weighting their share by partner with respect to the corresponding item of the balance of payments. The bilateral estimates of weighted travel complement these data, and are scaled to match the totals of the travel account in the balance of payments. For the rest of the countries, the estimates resulting from the UNWTO data are weighted considering the total of other IOT service sectors of the balance of payments.

In the absence of information from tourism satellite accounts, data on departures (*outbound tourism*) and arrivals (*inbound tourism*) is taken from the UNWTO. In this sense, data is prioritized by residence rather than nationality of the tourist (TFR to TFN); furthermore, tourists are prioritized with respect to visitors (TFR to VFR); finally, tourists who settle in any type of establishment are prioritized with respect to those who stay in hotels (TCER to THSR). The two main challenges in addressing this problem are: i) many countries do not have outbound tourism for 2011, so the weights for 2012 are used; and ii) for outbound tourism, the UNWTO does not report to a large part of the countries in the European Union, Argentina, Bolivia, Uruguay, Guatemala, Japan, the Philippines, Viet Nam, Burma, Laos, Taiwan, or Indonesia.

For group travel: Arrivals and Outbound. RALC: Cuba and Panama; RASIA: India, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Thailand, Taiwan and Vietnam. CARICOM: Bahamas, Trinidad and Tobago, Jamaica and Belize.

Limitations of trade in services estimates for the IOT

When analyzing the importance of services in the intermediate consumption imported from the countries of the Andean Community, it is concluded that the sector "Other business services" (sector 39) occupies a relevant position within trade in services.

Table 1. Importance of sector 39 in the Andean Community

Imported Intermediate Use	Bolivia	Colombia	Ecuador	Peru
Electricity and gas	0%	0%	1%	0%
Construction	0%	0%	0%	1%
Transport	8%	2%	2%	2%
Communications	0%	0%	0%	1%
Finance and insurance	2%	6%	2%	4%
Other business services	7%	8%	4%	3%
Other services	2%	0%	2%	3%
Total Imported Intermediate Use	**19%**	**16%**	**10%**	**14%**

However, this document reflects the shortcomings of measuring this sector. It is one of the sectors with the least data available, and without alternative estimates that allow for the straightforward allocation of the share of bilateral flows.

On the other hand, in some cases when combining official data with estimates, trade with the RoW displays negative values. There are also cases in which the balance of payments of countries such as Mexico, Ecuador or Peru do not report trade flows in certain services, but other sources do show that there is trade.

Finally, in the Travel Account, the UNWTO in its *outbound tourism* reports insufficient data that mainly lead to the undervaluation of the European Union as an exporter in this sector.

Table 2. Official sources of information

	34	35	36	37	38	39	40
Brazil	-	-	SISCOSERV (1.04, 1.05)	SISCOSERV (1.17)	SISCOSERV (1.09)	SISCOSERV 1.02, 1.10, 1.11 (01 and 02), 1.12, 1.13, 1.14, 1.15, 1.18 (01, 02, 03 and 05), 1.19	SISCOSERV 1.03, 1.11 (3,4,5,9), 1.18 (4), 1.22, 1.23, 1.25, 1.26, 1.27
Chile	-	-	Transport	-	-	Business services	Travel + IT and information. Bilateral flows completed with UNWTO estimations
Colombia	-	-	MTCES	MTCES	-	MTCES	MTCES
United States, Canada and EU-27	-	ITSS (OECD)	ITSS (OECD)	ITSS (OECD)	ITSS (OECD)	ITSS (OECD) Business; Other business services; Professional services; Research and development; and Trade related.	ITSS (OECD) Charges for the use of intellectual property; Computer services; Government goods; Health-related, information; Personal, cultural; Travel

Source: ECLAC, based on official statistics date

Table 3

South America: *Proxy for open Communications services by partners*

Bilateral Remittance Estimates for 2011 using Migrant Stocks, Host Country Incomes, and origin country incomes

(Percentages on total of remittances)

Remesas (receptor/ emisor)	Argentina	Brazil	Paraguay	Uruguay	Venezuela	Bolivia	Colombia	Ecuador	Peru	Chile
Argentina	0.0	1.0	11.9	5.6	0.2	11.2	0.8	0.7	1.9	7.6
Brazil	3.7	0.0	68.6	13.4	0.6	26.6	2.6	1.5	5.1	5.1
Paraguay	18.4	2.5	0.0	0.8	0.0	2.7	0.1	0.1	0.2	0.5
Uruguay	1.1	0.4	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.1
Venezuela	0.0	0.0	0.0	0.1	0.0	0.1	4.1	0.4	0.2	0.2
Bolivia	10.9	1.5	0.3	0.2	0.1	0.0	0.4	0.4	2.7	3.5
Colombia	0.0	0.4	0.2	0.2	45.8	1.3	0.0	39.9	2.7	1.8
Ecuador	0.0	0.1	0.0	0.1	2.4	0.7	10.1	0.0	2.3	4.5
Peru	6.6	1.3	0.9	0.4	3.2	11.1	3.9	5.3	0.0	19.6
Chile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
México	0.0	0.1	0.8	0.2	0.2	9.8	1.8	0.7	0.8	0.7
Costa Rica	0.0	0.0	0.0	0.0	0.2	0.3	1.5	0.6	0.5	0.4
El Salvador	0.0	0.1	0.0	0.0	0.1	0.1	0.3	0.2	0.1	0.1
Guatemala	0.0	0.0	0.0	0.0	0.1	0.3	0.6	0.3	0.3	0.2
Honduras	0.0	0.0	0.0	0.0	0.0	0.4	0.5	0.3	0.3	0.2
Nicaragua	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.1	0.1	0.1
Panama	0.0	0.1	0.0	0.1	0.1	0.1	1.9	0.4	0.5	0.3
United States	0.0	1.7	1.1	1.0	0.9	4.4	15.8	11.2	8.4	4.0
Canada	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
China	0.9	3.4	1.4	0.0	2.4	1.9	4.5	3.1	14.6	2.4
Dominican Republic	0.0	0.0	0.0	0.0	1.7	0.0	0.4	0.2	0.2	0.2
Rest of Asia	0.5	11.5	1.8	0.2	0.1	2.6	0.8	0.6	5.0	0.7
CARICOM	0.0	0.1	0.0	0.0	0.3	0.6	0.0	0.0	0.0	0.0
European Union	55.9	61.7	7.3	74.1	37.3	20.6	40.9	27.9	45.9	41.0
R-World	2.2	13.9	5.2	3.5	4.2	5.1	8.8	6.1	8.0	6.7
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: ECLAC, based on Remittances data from World Bank database

Table 4
Mexico and Central America: *Proxy for open Communications services by partners*
Bilateral Remittance Estimates for 2011 using Migrant Stocks, Host Country Incomes, and origin country incomes
(Percentages on total of remittances)

Remesas (receptor/emisor)	Mexico	Costa Rica	El Salvador	Guatemala	Honduras	Nicaragua	Panamá	Dominican Rep.
Argentina	0.3	0.0	0.1	0.2	0.2	0.1	0.2	0.4
Brazil	0.6	0.0	0.7	0.4	0.9	0.5	1.1	0.7
Paraguay	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
Uruguay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Venezuela	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.8
Bolivia	0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.1
Colombia	0.9	0.0	0.9	1.2	1.8	0.6	17.0	1.9
Ecuador	0.2	0.0	0.2	0.2	1.1	0.2	1.6	0.4
Peru	0.6	0.0	0.4	0.6	1.0	0.5	2.6	1.0
Chile	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
México	0.0	0.0	2.7	18.2	3.3	1.7	1.7	0.7
Costa Rica	0.6	0.0	3.0	2.6	3.9	23.7	7.6	1.4
El Salvador	0.9	6.3	0.0	23.5	22.2	5.9	2.0	0.2
Guatemala	7.2	2.5	28.2	0.0	18.5	4.0	1.0	0.4
Honduras	1.0	3.5	34.7	15.6	0.0	37.8	1.4	0.4
Nicaragua	0.2	79.6	7.0	4.7	8.4	0.0	2.4	0.1
Panamá	0.3	8.1	1.0	0.4	1.2	1.1	0.0	0.4
Estados Unidos	58.9	0.0	11.1	11.2	18.8	9.0	5.1	4.9
Canadá	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
China	0.9	0.0	1.4	2.1	4.2	0.3	24.8	2.6
Dominican Republic	0.2	0.0	0.0	0.2	0.5	0.2	7.6	0.0
Rest of Asia	0.8	0.0	0.0	0.5	0.5	0.3	1.5	1.1
CARICOM	0.2	0.0	0.3	0.6	0.6	0.2	0.6	39.8
European Union	22.9	0.0	7.6	10.9	11.0	11.5	13.4	35.0
Rest of the World	3.2	0.0	0.6	6.7	1.8	2.3	8.2	7.7
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: ECLAC, based on Remittances data from World Bank database

Annex 2A

Latin American IO Table 2011. ECLAC LAC TIVA and OECD TIVA convergence, 2011

Combined sector	OECD TIVA and ECLAC LAC TIVA combined sectors	TIVA Code	ECLAC IO Table 40
1	Agriculture, hunting, forestry and fishing	C01T05AGR	1+2
2	Mining and quarrying	C10T14MIN	3+4
3	Food products, beverages and tobacco	C15T16FOD	5+6+7+8+9+10
4	Textiles, textile products, leather and footwear	C17T19TEX	11+12+13
5	Wood and products of wood and cork	C20WOD	14
6	Pulp, paper, paper products, printing and publishing	C21T22PAP	15
7	Coke, refined petroleum products and nuclear fuel	C23PET	16
8	Chemicals and chemical products	C24CHM	17+18+19
9	Rubber and plastics products	C25RBP	20
10	Other non-metallic mineral products	C26NMM	21
11	Basic metals	C27MET	22+23
12	Fabricated metal products	C28FBM	24
13	Machinery and equipment, nec	C29MEQ	25
14	Computer, Electronic and optical equipment	C30T33XCEQ	26-28-29
15	Electrical machinery and apparatus, nec	C31ELQ	27
16	Motor vehicles, trailers and semi-trailers	C34MTR	30+31
17	Other transport equipment	C35TRQ	32
18	Manufacturing nec; recycling	C36T37OTM	33
19	Electricity, gas and water supply	C40T41EGW	34
20	Construction	C45CON	35
21	Transport and storage	C60T63TRN	36
22	Post and telecommunications	C64PTL	37
23	Financial intermediation	C65T67FIN	38
24	Bussiness srevices of all type	C50T52WRT; C70REA; C71RMQ	39
25	Other services	C72ITS; C73t740BZ; C75GOV; C80EDU; C85HTH; C90T93OTS; C95PVH	40

Source: ECLAC, based on OECD TIVA sector analysis and 40 sectors of ECLAC TIVA

Annex 2B
Latin American IO Table 2011. ECLAC and WIOD convergence, 2011

Combined sector	WIOD and ECLAC TIVA combined sectors	ISIC Rev 3	ECLAC IO Table 40
1	Agriculture, Hunting, Forestry and Fishing	AtB	1+2
2	Mining and Quarrying	C	3+4
3	Food, Beverages and Tobacco	15t16	5+6+7+8+9+10
4	Textiles and Textile Products	17t18	11+12
5	Leather, Leather and Footwear	19	13
6	Wood and Products of Wood and Cork	20	14
7	Pulp, Paper, Paper, Printing and Publishing	21t22	15
8	Coke, Refined Petroleum and Nuclear Fuel	23	16
9	Chemicals and Chemical Products	24	17+18+19
10	Rubber and Plastics	25	20
11	Other Non-Metallic Mineral	26	21
12	Basic Metals and Fabricated Metal	27t28	22+23+24
13	Machinery, Nec	29	25+27
14	Electrical and Optical Equipment	30t33	26+28+29
15	Transport Equipment	34t35	30+31+32
16	Manufacturing, Nec; Recycling	36t37	33
17	Electricity, Gas and Water Supply	E	34
18	Construction	F	35
19	Transport and storage	60,61,62,63	36
20	Post and Telecommunications	64	37
21	Financial Intermediation	J	38
22	Bussiness services of all type	50,51,52,70,717,74	39
23	Other services	H,L,M,N,O,P	40

Source: ECLAC, based on WIOD sector analysis and 40 sectors of ECLAC TIVA

Annex 3
SUMMARY TABLE LATIN AMERICAN INPUT OUTPUT TABLES AND SUT

Country	Year Input-Output Table	Supply and Use Table (SUT)	Year SUT	ICIO TIVA	ICIO WIOD	ICIO ECLAC
Argentina	2004	Yes	2004	Yes	No	Yes
Bolivia (P.S.)	1990	Yes	1990-2006	No	No	Yes
Brazil	2000,2005, 2010	Yes	1990-2009,2010,2013	Yes	Yes	Yes
Chile	2003, 2008, 2013	Yes	1996/2003/2008; 2013-2014	Yes	No	Yes
Colombia	2005	Yes	2000-2009	Yes	No	Yes
Costa Rica	2011	-	2011; 2012-2015	Yes	No	Yes
Dominican Republic	-	Yes	2010	No	No	Yes
Ecuador	2013	Yes	2000-2007	No	No	Yes
El Salvador	2005	Yes	2005	No	No	Yes
Guatemala	2001	Yes	2001-2012	No	No	Yes
Honduras	2000	Yes	2000-2012	No	No	Yes
Nicaragua	2006	Yes	2006-2011	No	No	Yes
Mexico	2003, 2008, 2013	Yes	2003,2008,2013-	Yes	Yes	Yes
Panama	2007-2012	Yes	2007-2012	No	No	Yes
Paraguay	-	Yes	1994	No	No	Yes
Peru	1994-2007	Yes	1994-2007	Yes	No	Yes
Uruguay	2005/2008	Yes	1997-2008	No	No	
Venezuela (B.R.)	1997	Yes	1997	No	No	Yes

Source: ECLAC, based on official IO or SUT Tables

Data sources

- Brazil: Ministry of Industry, Foreign Trade and Services (SISCOSERV): http://www.mdic.gov.br/index.php/comercio-servicos/estatisticas-do-comercio-exterior-de-servicos/2555-estatisticas-do-comercio-exterior-de-servicos-2016
- Balance of Payments Statistics (BOPS) of the International Monetary Fund
- Trade in Commercial Service Data Base of the World Trade Organization (http://www.e-unwto.org/content/v486k6/?v=search)
- Statistics of International Trade in Services and Tourism of the United Nations
- OECD Statistics on International Trade in Services
- Central Bank of Chile: indicator Series (http://www.bcentral.cl/estadisticas-economicas/series-indicadores/index_se.htm)
- Central Bank of Argentina; FDI Flows
- Instituto Nacional de Estadísticas y Censos de Argentina. Historical Series of Tourism Arrivals and Departures availables on the official webpage of the INEC (http://www.indec.mecon.ar/nivel4_default.asp?id_tema_1=3&id_tema_2=13&id_tema_3=55)
- Central Bank of the Republic of Peru: FDI Flows
- Central Bank of Venezuela: FDI Flows
- National Institute of Statistics of Venezuela (INE). Tourism Indicators (http://www.bcu.gub.uy/Estadisticas-e-Indicadores/Paginas/Intercambio-Comercial-.aspx)
- Central Bank of Ecuador: FDI Flows
- Central Bank of Brazil: FDI Flows;
- Central Bank of Uruguay: FDI flows and also Tourism databases. Historical Series of Tourism Arrivals and Departures (http://www.bcu.gub.uy/Estadisticas-e-Indicadores/Paginas/Intercambio-Comercial-.aspx)
- Central Bank of Colombia: http://www.banrep.gov.co/es/inversion-directa
- National Administrative Department of Statistics (DANE); Quarterly Services Sample Survey (https://www.dane.gov.co/index.php/servicios/muestra-trimestral-de-comercio-exterior-de-servicios)
- ALADI Database (Special processing)

Bibliographic references

Banco Central de Chile (20018), Cuentas Nacionales Anuales. (2013-2017. En línea en el siguiente sitio: https://si3.bcentral.cl/estadisticas/Principal1/Excel/CCNN/anuales/excel.html

Banco Central de Costa Rica: https://www.bccr.fi.cr/seccion-cuentas-nacionales-periodo-2012/cuentas-nacionales-periodo-de-referencia-2012

Bullón, David, Tayutic Mena, Bo Meng, Natalia Sánchez, Henry Vargas, (2014)."Using the Input-Output Approach to Measure Participation in GVCs: The Case of Costa Rica", de David Bullón.

Departamento Administrativo Nacional de Estadística –DANE. 2015a. Ficha Metodológica Muestra Trimestral de Comercio Exterior de Servicios – MTCES. Bogotá.

Departamento Administrativo Nacional de Estadística –DANE. 2015b. EAM 2012. Productos y materias primas Colombia. Archivo digital

Dietzenbacher Erik, Bart Losa, Robert Stehrerb, Marcel Timmera And Gaaitzen de Vriesa, (2013). "The Construction of World Input–Output Tables In The Wiod Project", de

Dietzenbacher Erik, Bart Los, Marcel Timmer, (2012). "The World Input-Output Tables in the WIOD Database",

ECLAC (2016). The South American Input-Output Table: Key assumptions and methodological considerations. 2016.

Hummels, D., Ishii, J. y Yi, K. (2001): "The Nature and Growth of Vertical Specialization in World Trade", Journal of International Economics, Vol. 54, pp. 75-96.

INDEC Argentina, 2016. Cuadros de Oferta y Utilización: matriz de oferta a precios básicos y matriz de utilización a precios de comprador. Año 2004. https://www.indec.gov.ar/nivel4_default.asp?id_tema_1=3&id_tema_2=9&id_tema_3=114

Instituto Brasileiro de Geografía y Estadística (2018), 2015 Sistema de contas nacionais: Brasil. En líneas en: https://www.ibge.gov.br/estatisticas-novoportal/economicas/contas-nacionais/9052-sistema-de-contas-nacionais-brasil.html?=&t=resultados

Instituto Nacional de Estadística e Informática del Perú (INEI) (2014), Perú. Cuentas Nacionales 2007. Año base 2007. Documento disponible en línea en el siguiente sitio Web: https://www.inei.gob.pe/media/MenuRecursivo/publicaciones_digitales/Est/Lib1138/Pdfs_CAB2007/libro.pdf

Instituto Nacional de Estadística y Geografía (INEGI) (2008), Cuadros de Oferta y Utilización 2008. Disponible en línea en: http://www.inegi.org.mx/est/contenidos/proyectos/cn/cou08/default.aspx

Instituto Nacional de Estadística y Geografía (INEGI) (2018), Sistemas de Cuentas Nacionales de México. Fuentes y Metodología. Año base 2013. Cuadros de Oferta y Utilización. En línea en: http://www.inegi.org.mx/est/contenidos/proyectos/cn/cou/doc/SCNM_Metodo_COU_B2013.PD

Johnson, R. y Noguera, G. (2012): "Accounting for intermediates: Production sharing and trade in value-added", Journal of International Economics, Vol. 86 (2), pp. 224-236.

Koopman, R., Wang, Z. y Wei, S.-J. (2014): "Tracing value-added and double counting in gross exports", American Economic Review, Vol. 104 (2), pp. 459-494.

Lenzen Manfred ;Daniel Moran, Keiichiro Kanemoto and Arne Geschke, (2013). "Building Eora: A Global Multi-Region Input–Output Database at High Country and Sector Resolution",.

Meng Bo, Yong Fang, Norihiko Yamano, IDE, (2012) "Measuring Global Value Chain and Regional Economic Integration : An International Input-Output Approach".

OECD, (2012a). "Building the OECD Estimated Bilateral Trade in Services by Industry (EBTSI) dataset (Draft)".

OECD-WTO, (2012b). "Trade in Value-Added: Concepts, Methodologies and Challenges", Mimeo.

Tukker Arnold and Erik Dietzenbacher, 2013. "Global Multiregional Input–Output Frameworks: An Introduction and Outlook"

UNCTAD, (2013). "Global Value Chains and Development: Investment and Value Added Trade In The Global Economy".