# ONLINE COURSE ON THE USE AND INTERPRETATION OF TRADE INDICATORS, INCLUDING INPUT OUTPUT ANALYSIS


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DEVELOPMENT in transition

European Union regional facility for Latin America and the Caribbean

**Santiago de Chile, 17th December 2021**

# Agenda

**9.00 – 9.10 Opening Remark and presentation of team and participants**

**9.15 – 11.00 Block 1: Introduction, Setup, trade classification and Trade patterns indicators**

**11.00 – 12.00 Block 2: Technologic intensity, Interindustry trade and trade diversification**

**12.00 – 13.00 Break**

**13.00 – 14.00 Block 3: Comparative Advantage indicators**

**14.00 – 14.45 Block 4: Input Output approach to analyze trade and production. Expanding the coverage of IOT from Latin American to the Caribbean**

**14.45 – 15.00 Block 4: Closing remarks and final evaluation**

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# Survey Results – EXCEL Skills

| | COMFORTABLE | NEITHER COMFORTABLE NOR UNCOMFORTABLE (IN THE MIDDLE) | UNCOMFORTABLE | I DO NOT KNOW WHAT THAT IS |
|---|---|---|---|---|
| General functions (e.g. SUM, AVERAGE, COUNT) | 100,00 % 10 | 0,00 % 0 | 0,00 % 0 | 0,00 % 0 |
| Intermediate functions (e.g. VLOOKUP, IF, COUNTIF) | 55,56 % 5 | 33,33 % 3 | 11,11 % 1 | 0,00 % 0 |
| Advanced functions (e.g. SUMPRODUCT, Index/Match) | 11,11 % 1 | 55,56 % 5 | 33,33 % 3 | 0,00 % 0 |
| Data visualisation (e.g. charts, sparklines) | 66,67 % 6 | 33,33 % 3 | 0,00 % 0 | 0,00 % 0 |
| Pivot tables | 44,44 % 4 | 11,11 % 1 | 33,33 % 3 | 11,11 % 1 |

10 participants

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# Survey Results – Trade Classifications

| | I AM FAMILIAR WITH THIS CLASSIFICATION AND THERE IS NO NEED FOR ME TO REVIEW THIS TOPIC. | I AM FAMILIAR WITH THIS CLASSIFICATION, BUT I AM HAPPY TO REFRESH MY KNOWLEDGE. | I AM NOT FAMILIAR WITH THIS CLASSIFICATION AND IT IS NOT OF MY INTEREST. | I AM NOT FAMILIAR WITH THIS CLASSIFICATION, BUT I WOULD LIKE TO LEARN MORE ABOUT IT. |
|---|---|---|---|---|
| Harmonized System (HS) - Customs | 30,00 % 3 | 40,00 % 4 | 0,00 % 0 | 30,00 % 3 |
| Standard International Trade Classification (SITC) - Statistics | 10,00 % 1 | 70,00 % 7 | 0,00 % 0 | 20,00 % 2 |
| International Standard Industrial Classification (ISIC) - Economic Activity | 20,00 % 2 | 50,00 % 5 | 0,00 % 0 | 30,00 % 3 |
| Broad Economic Categories (BEC) - Broad Classification | 10,00 % 1 | 40,00 % 4 | 0,00 % 0 | 50,00 % 5 |
| Classification of Trade according to Economic Use or Destination (CUODE) | 10,00 % 1 | 0,00 % 0 | 0,00 % 0 | 90,00 % 9 |

10 participants

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# Survey Results – Trade Indicators

| | I AM FAMILIAR WITH THIS TRADE INDICATOR AND THERE IS NO NEED FOR ME TO REVIEW THIS INDICATOR. | I AM FAMILIAR WITH THIS TRADE INDICATOR, BUT I WOULD BE HAPPY TO DEEPEN/REFRESH MY KNOWLEDGE. | I AM NOT FAMILIAR WITH THIS TRADE INDICATOR AND IT IS NOT OF MY INTEREST. | I AM NOT FAMILIAR WITH THIS TRADE INDICATOR AND I WOULD LIKE TO LEARN MORE ABOUT IT. |
|---|---|---|---|---|
| Export, Import Intensity | 10,00 % 1 | 80,00 % 8 | 0,00 % 0 | 10,00 % 1 |
| Balance of Trade | 40,00 % 4 | 60,00 % 6 | 0,00 % 0 | 0,00 % 0 |
| Balance of Trade Index | 30,00 % 3 | 50,00 % 5 | 0,00 % 0 | 20,00 % 2 |
| Similarity Index | 10,00 % 1 | 30,00 % 3 | 10,00 % 1 | 50,00 % 5 |
| Grubel and Lloyd Index (for intra-industry trade analysis) | 10,00 % 1 | 30,00 % 3 | 0,00 % 0 | 60,00 % 6 |
| Analysis of technological intensity in trade (acc. to Lall) | 10,00 % 1 | 10,00 % 1 | 10,00 % 1 | 70,00 % 7 |
| Market share of exports, imports | 10,00 % 1 | 60,00 % 6 | 0,00 % 0 | 30,00 % 3 |
| Balassa index (comparative advantage indicator) | 20,00 % 2 | 50,00 % 5 | 0,00 % 0 | 30,00 % 3 |
| Revealed comparative advantage (comparative advantage indicator) | 20,00 % 2 | 60,00 % 6 | 0,00 % 0 | 20,00 % 2 |
| Herfindahl-Hirschman Index (degree of diversification/concentration of trade) | 10,00 % 1 | 70,00 % 7 | 0,00 % 0 | 20,00 % 2 |
| Trade Price Indices | 20,00 % 2 | 50,00 % 5 | 0,00 % 0 | 30,00 % 3 |

10 participants

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# Survey Results – Input-Output-Tables

| | YES | NO |
|---|---|---|
| I am familiar with the methodology of input-output table analysis. | 40,00 %<br>4 | 60,00 %<br>6 |
| I have worked with input-output tables. | 20,00 %<br>2 | 80,00 %<br>8 |
| I would like to learn more about the potential uses of input-output tables. | 90,00 %<br>9 | 10,00 %<br>1 |
| Input-output table analysis is not relevant to me. | 0,00 %<br>0 | 100,00 %<br>9 |

Comentarios (0)

10 participants

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# 1. Brief motivation on the use of Basic Trade Indicators

# ECLAC's Data Bases

**Economic Outlook,**
**GDP, Balance of Payments,**
**Population, Socioeconomic Indicators,**
**among others.**

**SIGCI**
**MAGIC**

**External Consultations General Public**
Trade Intensity (Maps)
Partners / Products
Indicators
Technology Intensity

External sector
Balance of Payments
Foreign trade of
goods
services

**CEPALSTAT**

**Internal inquiries**
Classifications
Partners
To the researcher's liking
Large queries
**Trade Structure**

**CEPALIT**
**BADEHOG**

**Prices**

**Conjuncture**

Partners,
products

**International trade information**
Monthly data X-M goods
Port information
Quarterly data X-M

**Input-Output Tables**

**Related projects**
National IOT Project
Subregions (2005, 2011, 2014)
Region (LA-18)
Global IOT (2011-2017)
**New IOT 2019**

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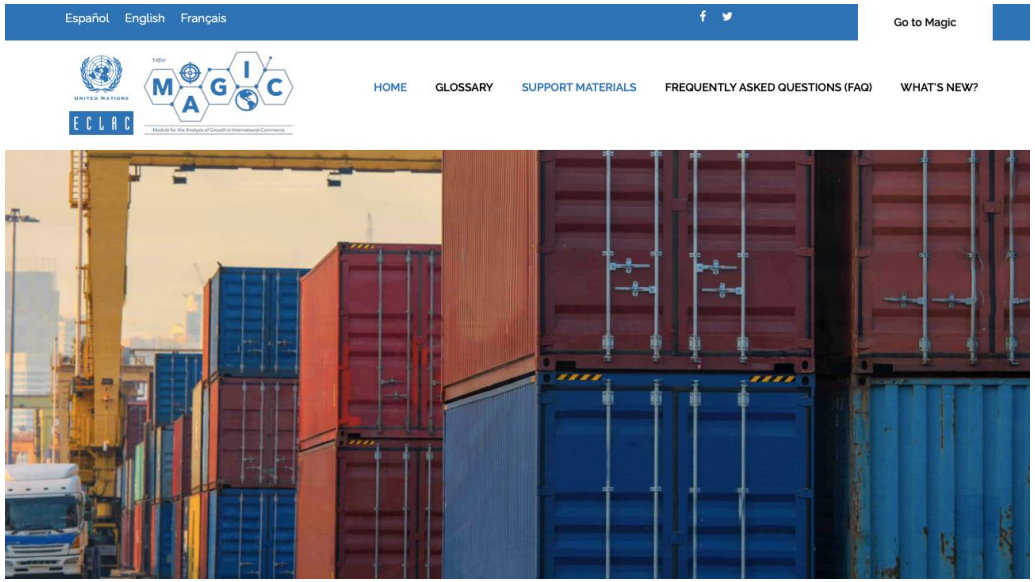
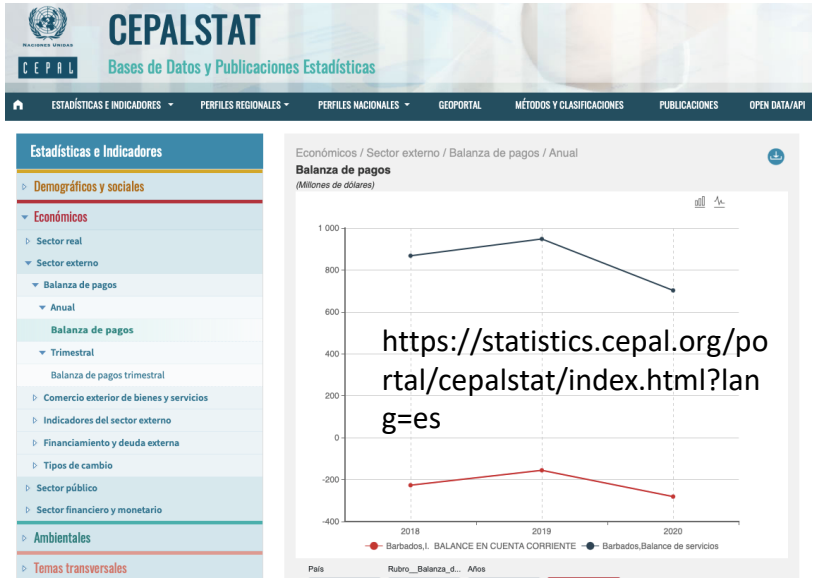
# There exist various websites suppling data, providing information on and visualizing trade indicators




https://magic.cepal.org/ES/Default.aspx



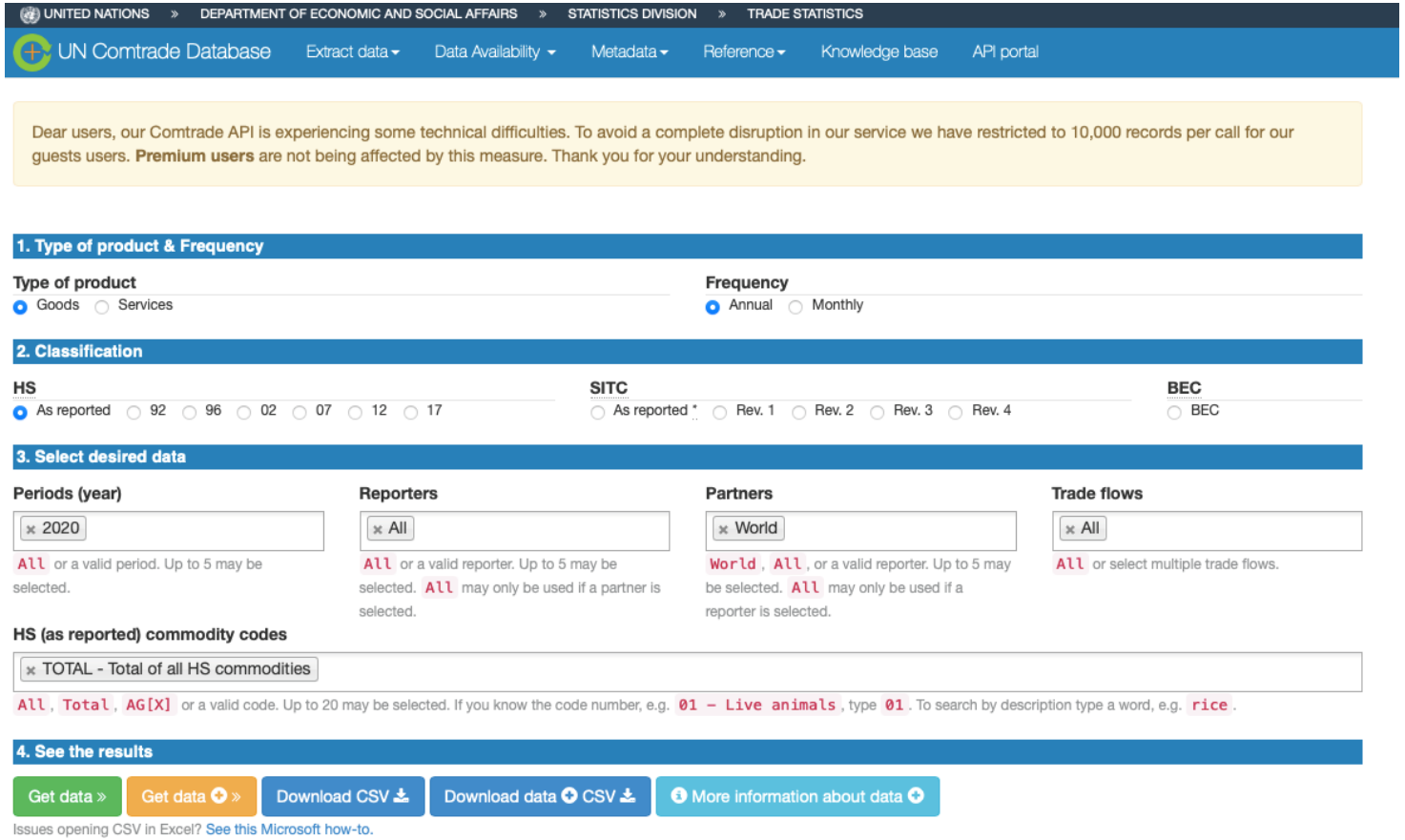
https://www.cepal.org/es/publicaciones/47537-analisis-economicos-partir-matrices-insumo-producto-definiciones-indicadores




https://www.cepal.org/en/publications/40864-manual-foreign-trade-and-trade-policy-basics-classifications-and-indicators-trade

# COMTRADE, the United Nations trade database

- International,
- Weekly update of annual periods,
- All Member States
  (+ Economies than National Customs bases),
- Current Dollars,
- Quantity units (Kg and 2nd unit),
- Classifications: HS, SITC and BEC.
- http://comtrade.un.org




**We shared with you a COMTRADE Database which includes the countries: Antigua & Barbuda, Barbados, Santa Lucía, Saint Vincent and the Grenadines, X and M, 2017-2020**
**Data availability for Caribbean countries is limited in COMTRADE**

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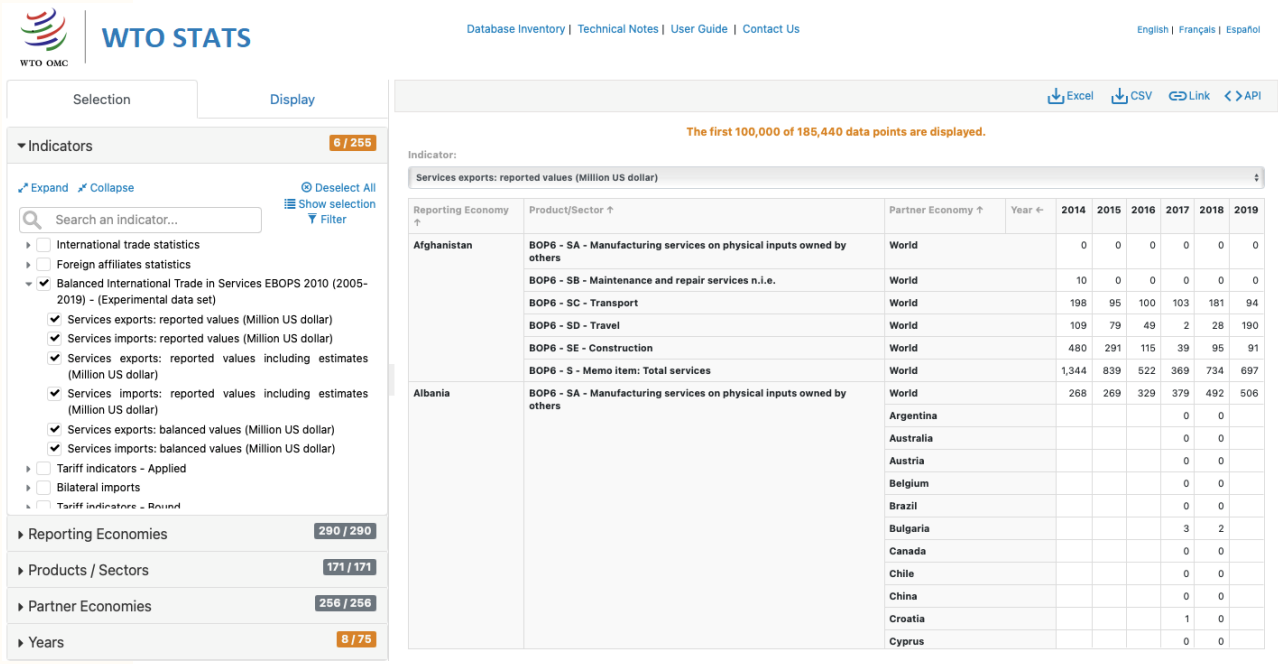
# WTO STATS offers a data base for trade in services

https://www.wto.org/english/res_e/statis_e/statis_e.htm

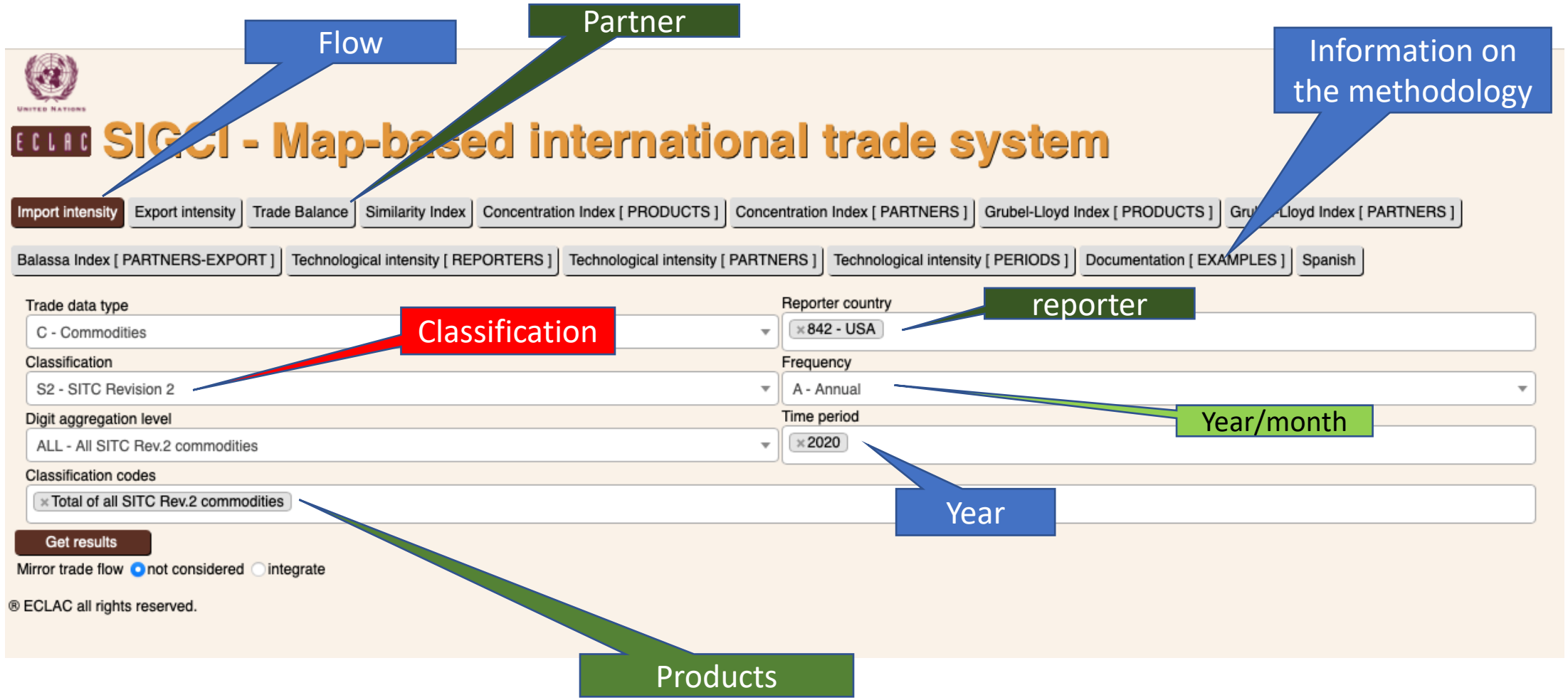
- **Balance of payments (BOP)**
  - **Goods and Services**
    - **Goods**
      - General merchandise
      - Goods a transformation
      - Repair of goods
      - Goods acquired in port by means of transport
      - Non-monetary gold
    - **Services**
      - Transportation
      - Travel
      - Others
        - Communications services
        - Construction services
        - Insurance services
        - Financial services
        - Computer and information services
        - Royalties and license fees
        - Other business services
        - Personal, cultural and recreational services
        - Government services




**We shared with you a data base on Services from the WTO that includes all countries, X and M, 2014-2019.**

STRUCTURE

# General elements of the SIGCI (main elements of a consultation)




**We will use the UN platform SIGCI to get to know the tool and to visualize some of our example analyses. The data in SIGCI is based on the Comtrade Database**

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# Motivation: The analysis of trade indicators

- The analysis of trade indicators is key to measure performance and to design sustainable and effective Trade Policy;
- There are multiple possibilities of analysis;
- This course has as main objective to provide tools to select the best indicators, and to suggest some included in SIGCI. E.g.:
  - Information on trends, trade intensity and the structure of trade,
  - Trade analysis according to partners and sectors,
  - Use of synthetic indicators.
- Rather than presenting data, a proper analysis should reveal causalities. For example, it should explain why flows are increasing or decreasing.
- The analysis is more than a mere description of the economic situation.

➡ **Before analyzing the data, we need to understand what our data looks like.**

➡ **Indicators presented today can be applied to both, goods and services.**

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# i. Use of international classifications (HS, SITC, BEC, ISIC, CPC)

# International Trade Classifications

These are the specific forms in which trade statistics are collected. There are several, and the use of one or another depends on the characteristics of each one and the purposes of the research. The most commonly used classifications are:

- **Harmonized System (HS) - Customs**
- **Standard International Trade Classification (SITC) - Statistics**
- **International Standard Industrial Classification (ISIC) - Economic Activity**
- **Broad Economic Categories (BEC) - Broad Classification**
- **Classification of Trade according to Economic Use or Destination (CUODE)**

CLASSIFICATION

# Harmonized System (HS) - Evolution of Classification

The Harmonized System, unlike its predecessors (NG, NAB and NCCA) expands the categories from four to six digits.

It maintains an almost complete correspondence with the new SITC. The classification is administered by the World Customs Organization.

It has General Rules of Interpretation of the system; Explanatory Notes for sections, chapters and subheadings, and an Alphabetical Index of headings and subheadings if appropriate.

Geneva Nomenclature (NG)
Brussels Tariff Nomenclature (BNB)
Customs Cooperation Council Nomenclature (CCCN)
Customs Cooperation Council Nomenclature (CCCN)

Harmonized System

| Evolution | Section | Chapter | Heading | Subheading |
|---|---|---|---|---|
| | 1 digit | 2 digits | 4 digits | 6 digits |
| NAB (1955) | XXI | 99 | - | - |
| NCCA (1978) | XXI | 99 | 1014 | - |
| SA88 (1988) | XXI | 96 | 1241 | 5019 |
| SA96 (1996) | XXI | 97 | 1241 | 5223 |
| SA02 (2002) | XXI | 97 | 1245 | 5223 |
| SA07 (2007) | XXI | 98 | 1221 | 5052 |
| SA12 (2012) | XXI | 98 | 1223 | 5194 |
| SA17 (2017 | XXI | 98 | 1224 | 5388 |

**This classification is the basis for the determination of import tariffs and trade rules of origin.**

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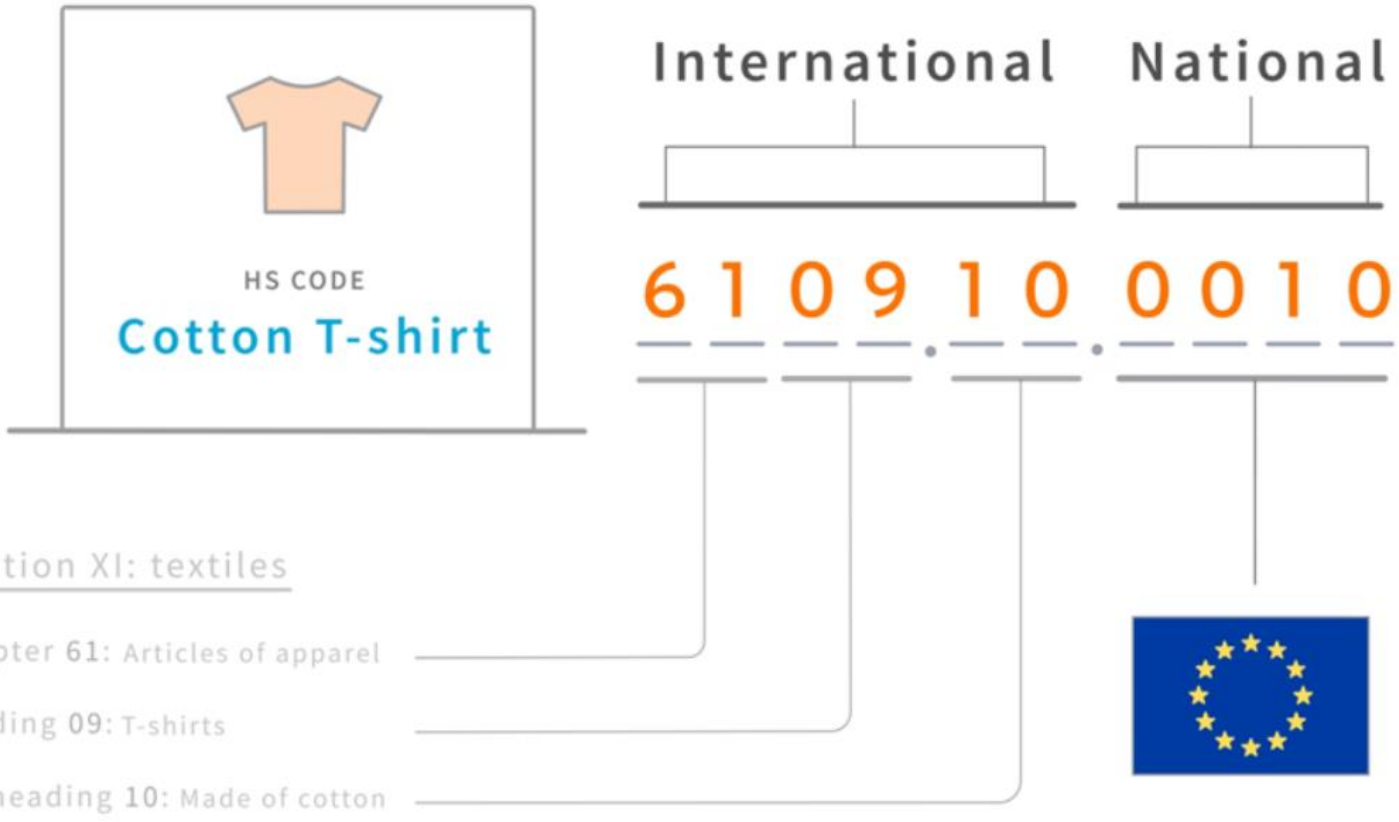
# Example of International and National Harmonized System - (EU)




**This classification is the basis for the determination of import tariffs and trade rules of origin.**

CLASSIFICATION

# Standard International Trade Classification (SITC) Evolution of classification

It is a classification of international trade for statistical purposes.

The classification criteria have been retained over time to ensure conceptual consistency between revisions:

- The nature of the merchandise and the materials used in its production;
- The degree of processing;
- The market practices and uses of the product;
- The importance of the product in world trade; and
- Technological changes.

| | No. of Digits | Rev.1 | Rev.2 | Rev.3 | Rev.4 |
|---|---|---|---|---|---|
| Sections | 1 | 10 | 10 | 10 | 10 |
| Divisions | 2 | 56 | 63 | 67 | 67 |
| Groups | 3 | 177 | 233 | 261 | 262 |
| Subgroups | 4 | 625 | 786 | 1 033 | 1 023 |
| Basic items | 5 | 944 | 1 466 | 2 824 | 2 970 |

**This classification is the basis for the analysis of trade by industry groups, as well as the breakdown of production chains, for example:**

- **onions, sauces, chemical compounds, or**
- **metals, metal products, and machinery**

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# Other classifications and aggregations

## FOR INDUSTRY ANALYSIS

- International Standard Industrial Classification of all economic activities (ISIC) **Various specialized agencies and United Nations programs have used it in their studies and publications (FAO, UNIDO, ILO and UNESCO, among others). Also, National Statistics Offices make use of it.**
- Classification by economic use or destinations (CUODE) **Used in sixty (60s) in the period of Industrialization for Industry substitution (IIS)**

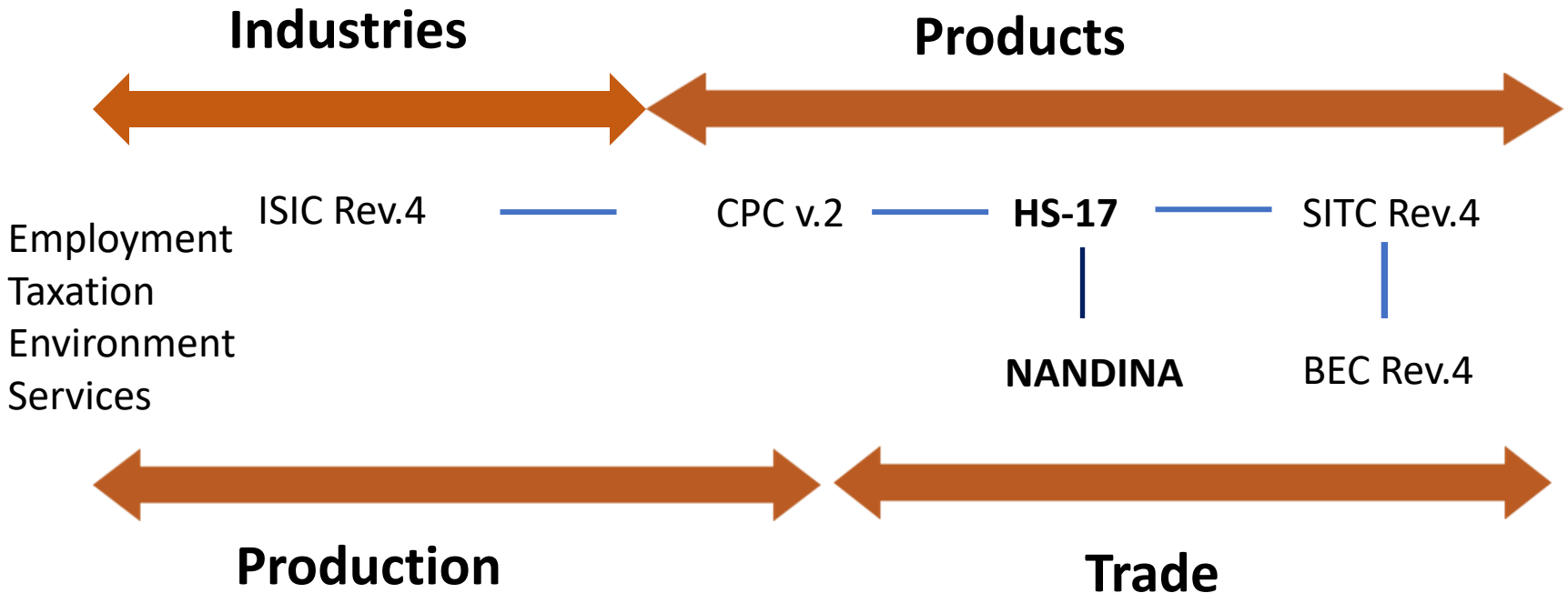
## FOR NATIONAL ACCOUNT ANALYSIS

- Broad Economic Categories (BEC) **Primary, processed (final), intermediate, and capital goods**
- Central Product Classification (CPC) **For production analysis based on their physical properties**

CLASSIFICATION

# CORRELATIONS BETWEEN CLASSIFICATIONS

## Explanatory diagram of correlations between different classifications




Source: Own elaboration

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CLASSIFICATION

https://unstats.un.org/unsd/trade/classifications/correspondence-tables.asp

## Conversion and Correlation Tables

Download Complete correlations among HS, SITC and BEC

Download Conversion Methodology General Note (2017)

| FROM / TO | HS 2012 | HS 2007 | HS 2002 | HS 1996 | HS 1992 | SITC 4 | SITC 3 | SITC 2 | SITC 1 | BEC 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| HS 2017 | | | | | | | | | | |
| HS 2012 | - | | | | | | | | | |
| HS 2007 | - | - | | | | | | | | |
| HS 2002 | - | - | - | | | - | | | | |
| HS 1996 | - | - | - | - | | - | | | | |
| HS 1992 | - | - | - | - | - | - | | | | - |
| SITC 4 | - | - | - | - | - | - | - | - | - | - |
| SITC 3 | - | - | - | - | - | - | - | | | |
| SITC 2 | - | - | - | - | - | - | - | - | | |
| SITC 1 | - | - | - | - | - | - | - | - | - | - |

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# There are some specific aggregations used in particular studies

- Classification by technological intensity

  This classification was developed by ECLAC with the purpose of determining the technological intensity in the manufacturing exports. To do that, ECLAC follows the approach developed by Sanjaya Lall, an Indian trade economist graduated from Oxford University.

- Classification for environmentally sensitive industries

  This classification was developed by Low and Yeats (1992) and cover some sensible industries: pulp and paper, petroleum product, chemical, iron, copper, tin, among others.

- Classification of Information and communication technologies
- Classification of pharmaceutical and medical manufactures (new)
  It links the harmonized system with the Anatomical Therapeutic Chemical (ATC) Classification.
- Classification of Environmental Goods (EG)

# Introduction to trade indicators revealing the trade structure of a country

*Trade intensity, Market share of exports/imports, Balance of Trade, Balance of Trade Index, Similarity Index*

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# Weights / Structure / Trade Intensity

They are used to consider the relative size of the parties included in the same aggregation, in order to avoid size bias when averaging.

$$\text{Simple average} = \frac{\sum_{i=1}^{n} X_i}{N}$$

$$\text{Weighted average} = \sum_{i=1}^{n} \alpha_i * X_i$$

$$\alpha_i = weight$$

When the structure is similar, then the simple average is close to the weighted average.

**Example 2:**
**Grenada: Top 10 exports, 2019**

| Products (SA) | Exports | Structure Top 10 ($a_i$) | Structure total ($a_i$) |
|---|---|---|---|
| Spices; mace, … | 4,5 | 19% | 13% |
| Wheat or meslin flour | 4,2 | 18% | 12% |
| Fruit, edible; fruits … | 2,6 | 11% | 8% |
| Cocoa beans; … | 2,4 | 10% | 7% |
| Dog or cat food … | 2,3 | 10% | 7% |
| Fish; fresh or chilled, … | 1,8 | 8% | 5% |
| Beverages, fermented … | 1,6 | 7% | 5% |
| Non-alcoholic beverages … | 1,4 | 6% | 4% |
| Paper articles; toilet paper | 1,4 | 6% | 4% |
| Fish; frozen, … | 1,2 | 5% | 4% |
| **Top 10** | **23,3** | **100%** | **67%** |
| **Total exports** | **34,5** | | **100%** |

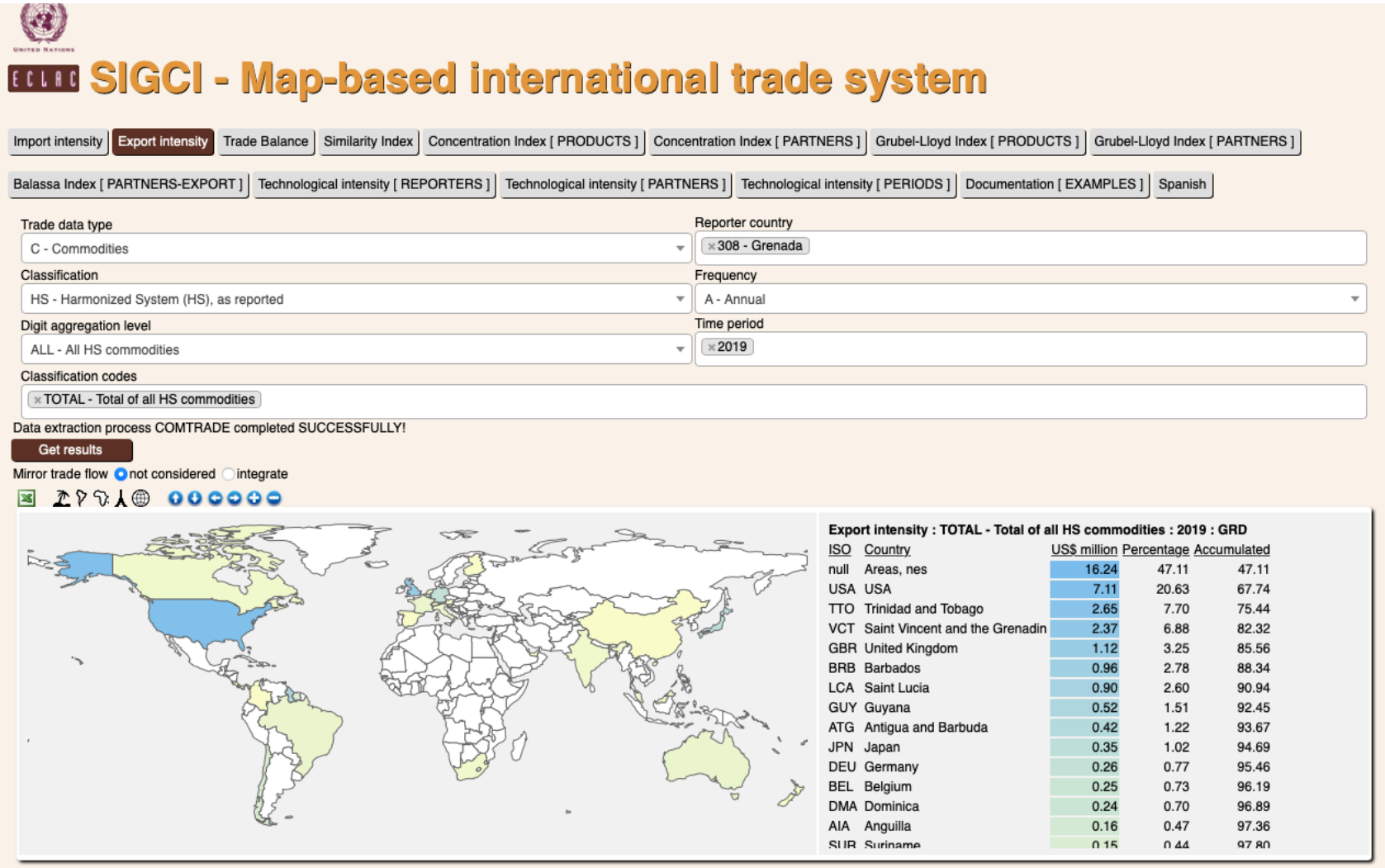
Source: Authors based on Comtrade.

EXAMPLE: GOODS

# Weights / Structure / Trade Intensity

**Example 3:**

**Grenada: Trade intensity by export destination, 2019**




Source: Authors based on SIGCI.

# Market share of exports

- This coefficient measures the degree of market share of exports of a sector k in the total world imports of that sector, in a given year.
- The intuition behind this indicator is that it captures the weight of the share of products in the total world demand for products in a given sector.
- In the case of calculating the market share coefficient for all exports of a country relative to the world demand, the above indicator must be aggregated. The result of this operation gives the weight of the market share of a country's goods or services as a whole in world demand.

**By products**

$$MS_i^k = \frac{X_i^k}{M_w^k}$$

Exports of a given service (k) by the reporting country (i)

Imports of a given service (k) by the world (w)

**Total demand**

$$MS_i = \sum_{k=1}^{n} \frac{X_i^k}{M_w^k}$$

# Relative Trade Balance Index

There exists a large family of indicators that analyze the advantages or disadvantages of trade exchanges of a country with its partners or various groups of countries, the Indices of Comparative Advantages.

Its simplest version is also known as Relative Trade Balance:

$$RTB_i^k = \frac{X_{ij}^k - M_{ij}^k}{X_{iw}^k + M_{iw}^k}$$

Difference between exports (X), imports (M) of a product (k) by the reporter country (i) to its partner (j)

Total exports (X), imports (M) of a product (k) by the reporter country (i) to the world

The indicator can take positive or negative values, which will be indicative of deficit or surplus in total trade and express disadvantages or advantages in exchanges.

An index greater than zero will indicate that the sector has advantages.

# Relative Trade Balance Index

## Products with the greatest advantage in Barbados' Balance of Trade Index with Antigua & Barbuda, Bahamas and Belize, 2019

| SITC Rev. 2 | SITC Rev. 2 Description | Antigua & Barbuda | Bahamas | Belize |
|---|---|---|---|---|
| **533** | **Pigments, paints, varnishes and related materials** | **0,12** | **0,00** | **0,00** |
| 541 | Medicinal and pharmaceutical products | **0,06** | **0,02** | **0,00** |
| 691 | Structures and parts, nes, of iron, steel or aluminium | **0,03** | **0,00** | **0,04** |
| 591 | Pesticides, disinfectants | **0,04** | **0,02** | **0,01** |
| 091 | Margarine and shortening | **0,05** | **0,00** | **0,00** |
| 062 | Sugar confectionery and preparations, non-chocolate | **0,04** | **0,00** | **0,00** |
| 001 | Live animals chiefly for food | **0,04** | **0,00** | **0,00** |
| 334 | Petroleum products, refined | **-0,01** | **0,00** | **0,00** |
| 061 | Sugar and honey | **0,00** | **0,00** | **-0,04** |
| 634 | Veneers, plywood, improved wood and other wood, worked, nes | **0,00** | **0,00** | **-0,05** |
| 036 | Crustaceans and molluscs, fresh, chilled, frozen, salted, etc | **0,00** | **0,00** | **-0,07** |
| 058 | Fruit, preserved, and fruits preparations | **0,07** | **0,00** | **-0,15** |
| 042 | Rice | **0,00** | **0,00** | **-0,11** |
| 273 | Stone, sand and gravel | **0,00** | **-0,14** | **0,00** |

Source: ECLAC, based on COMTRADE data.

# Similarity Analysis: Similar Export Baskets

One of the ways to appreciate the possible complementarity or competitiveness between two countries is to analyze how similar the structure of their export baskets is.

The traditional way of doing this is through percentages, either graphed or in a table, which the reader then compares. It is a snapshot of the moment.

There are also synthetic indicators that allow for a more accurate analysis and evolution over time.

# Similarity Analysis: Similar Export Baskets

The index measures the difference in the export structures of two countries, calculated as the aggregation of the minimum share of each product group in the total exports of each country or region, to a homogeneous destination market, which can be a sub-region or the world.

It fluctuates between 0 and 1; being 0 in two countries that have totally different trade structures, which will be indicative of the non-existence of competition.

$$IS = \sum_{k=1}^{n} Min\left[\frac{X_i^k}{XT_i}, \frac{X_j^k}{XT_j}\right]$$

Exports of a given service (k) by the countries that are to be compared (i, j)

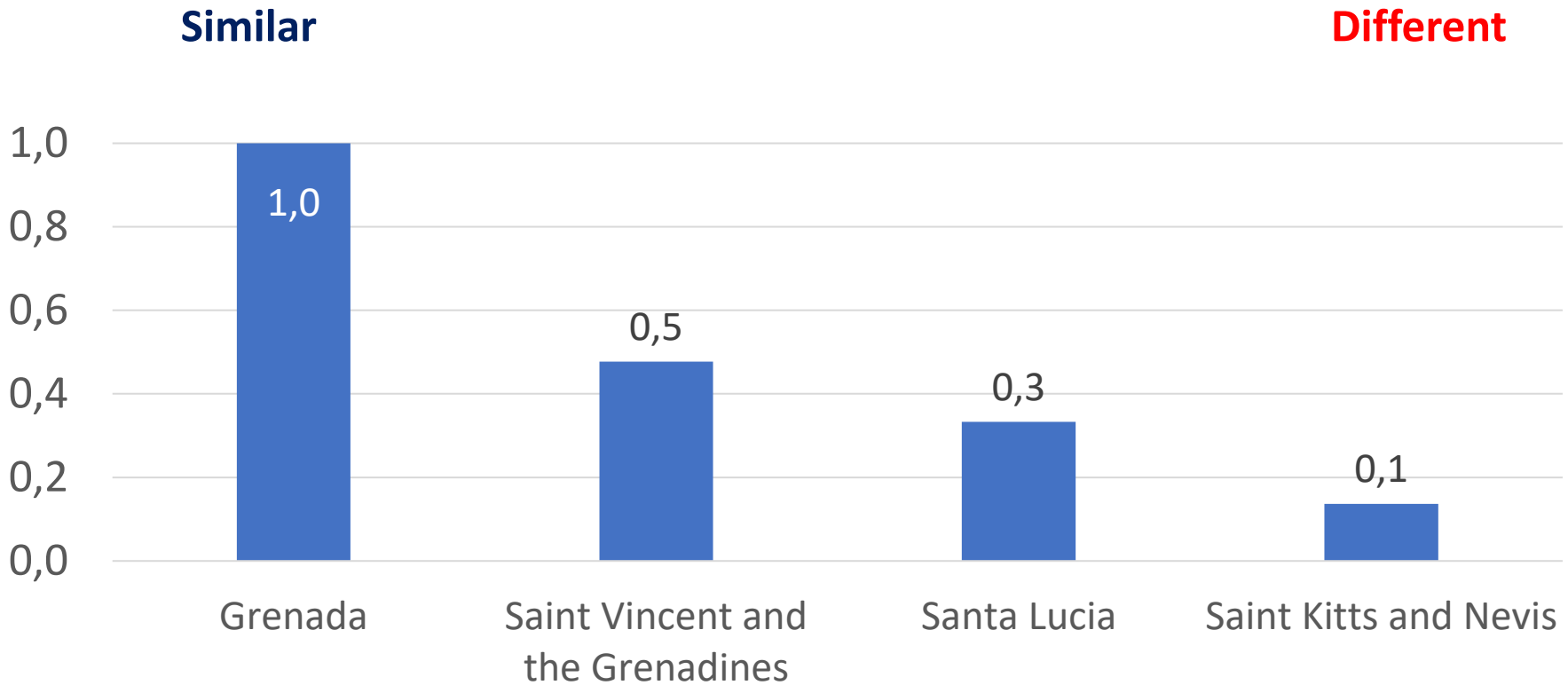
Total exports by the countries compared (i, j)

*Furthermore, the Index of similarity is useful for comparing or validating different data sources, comparing for example customs data with central bank information.*

Trade Indicators

# Similarity Analysis: Similar Export Baskets

**Saint Kitts & Nevis: Similarity Index for Exports of goods, selected partners, 2017**




Source: ECLAC, based on COMTRADE data.

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# TUTORIAL

## Introduction to trade indicators

### *Trade intensity, Market share of exports/imports, Balance of Trade, Balance of Trade Index, Similarity Index,*

*We created two breakout rooms for the exercises.*

- *The exercises will be solved by each participant in excel and SIGCI.*
- *We want to give you the opportunity to practice, answer your questions regarding the use of excel as well as regarding the indicators.*
- *From the survey we know that the skill levels vary across the participants, which is why we set up two breakout rooms: one for more advanced participants with José Durán and one for participants with less experience in excel and trade indicators with Ira Ronzheimer and Daniel Díaz.*
- *In order to increase the learning experience for each participant, we kindly ask you to assign yourself to one of the breakout rooms according to your own evaluation. The exercises will be the same in both rooms.*

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# Exercise Proposal

***Exercises in Excel***

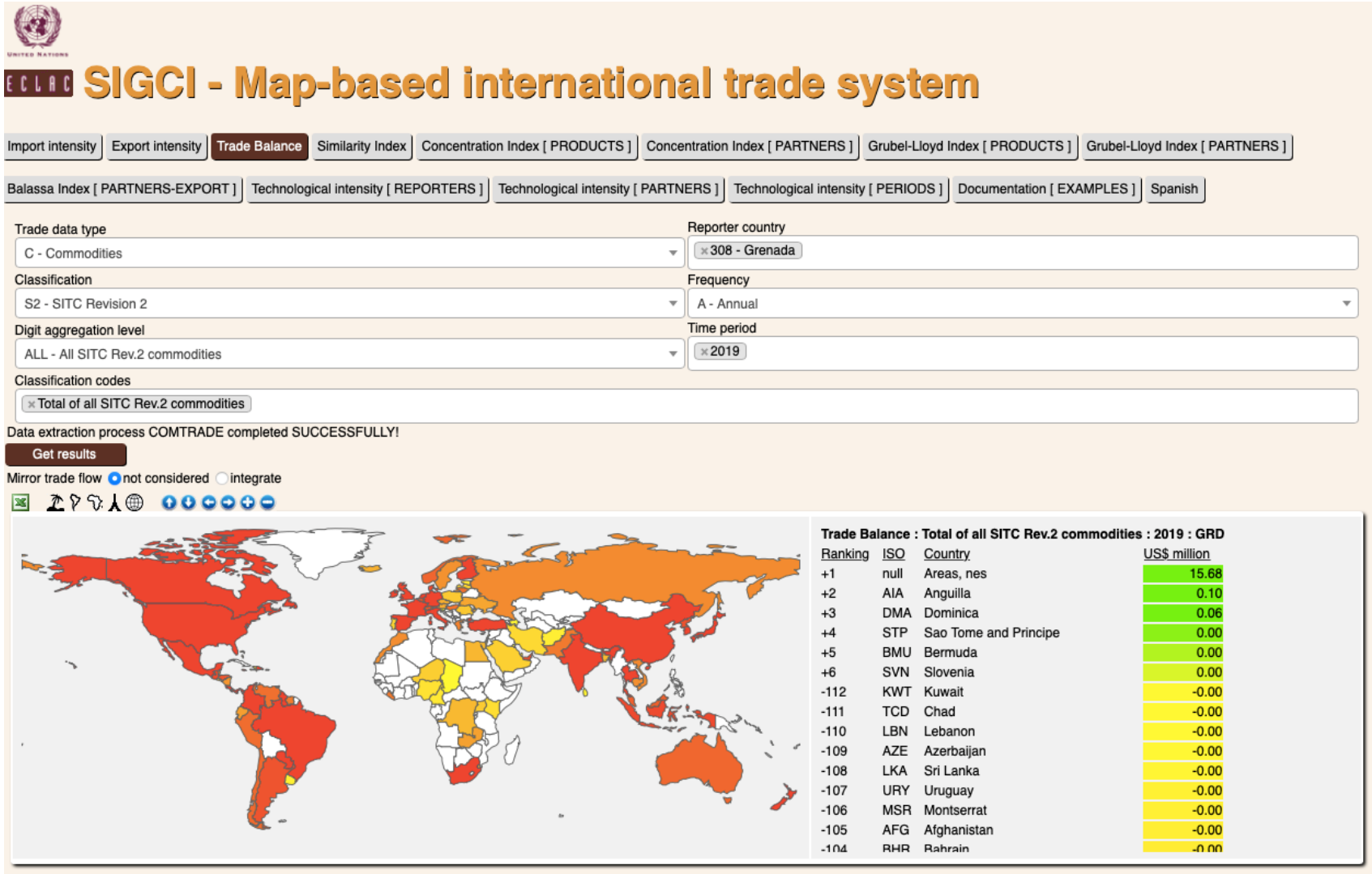
1. *Apply the trade intensity indicator by partners (country of your preference).*
2. *Market share of exports by ISTC (country of your preference).*
3. *Calculate the relative Trade Balance Index for Jamaica compared to Santa Lucia and Saint Vincent using the SITC Rev. 2 (3-digit) trade classification for 2019.*
4. *Calculate the similarity index for Antigua and Barbuda and Jamaica using the SITC Rev. 2 3-digit trade classification for 2019 and present your results graphically.*

***Exercises in SIGCI***

1. *Using SIGCI, compute the Balance of Trade for Grenada for 2019.*
2. *Compute the Trade Balance of Jamaican coffee for 2019 in SIGCI.*
3. *In SIGCI, calculate the similarity index for Antigua and Barbuda, Barbados, Chile, Colombia, and Barbados*

EXAMPLE: GOODS

# Balance of Trade Index: Example SIGCI




Source: ECLAC, based on the SIGCI System.

**The map shows in red the countries with which Grenada has a deficit. In the table, those partners with which Grenada has a surplus are shaded in green.**

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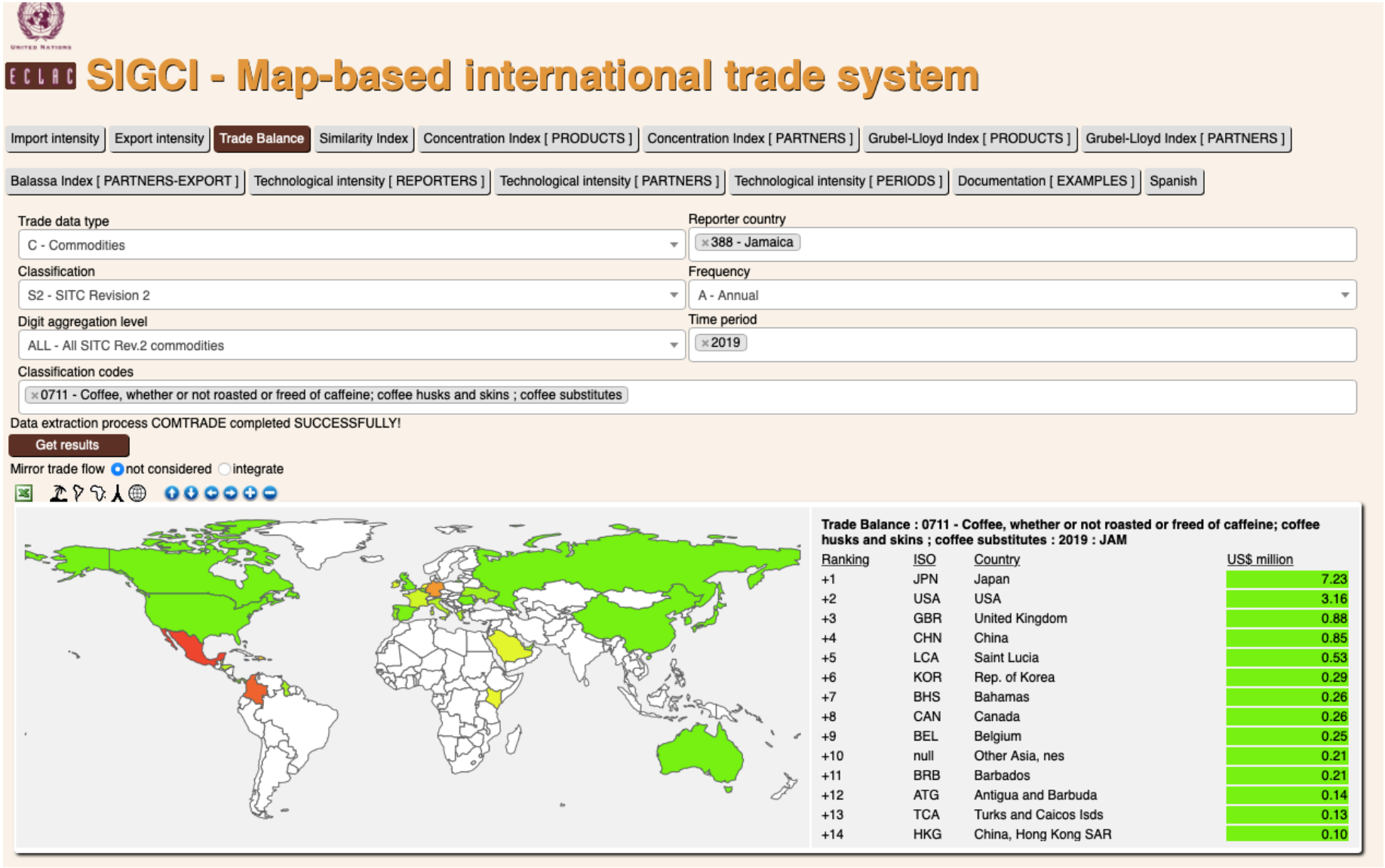
EXAMPLE: GOODS

# Balance of Trade Index: Example SIGCI




Source: ECLAC, based on the SIGCI System.

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EXAMPLE: SIGCI

# Similarity Analysis: Similar Export Baskets: SIGCI Example


Source: ECLAC, based on the SIGCI System.

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# WRAPUP SESSION

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# More advanced trade indicators: intra-industrial trade relations, technological intensity and trade concentration

*Techn. Intensity, Grubel-Lloyd, HHI*

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# Technological Intensity (Lall)

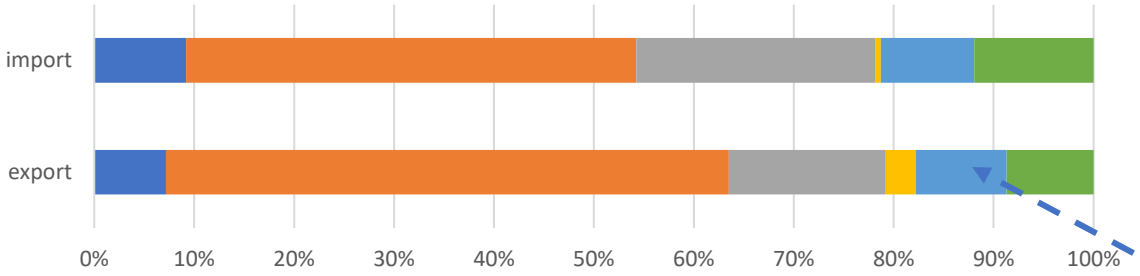
- Products (SITC Rev. 2) are categorized according to their technological intensity and belong to one of the groups:
  - **Primary products:** Primary products are not elaborated, but must still undergo transformation processes to be converted into goods (agricultural, mining, products etc.)
  - **Manufactures based on natural resources:** Generally, products derived from natural resources are simple and labor-intensive (e.g. simple food and leather processing), but there are segments that use capital-intensive technologies and technical specialization and require significant economies of scale (e.g. petroleum refining or food processing with modern techniques).
  - **Manufactures low technology:** Stable and well-known technologies are used, embedded in capital goods, with low R&D expenditures and simple skill requirements. Wage costs are generally an important cost component and barriers to entry are relatively low.
  - **Manufactures medium technology:** They comprise the bulk of products manufactured with technologies with a high level of technical specialization and high economies of scale, corresponding to the group of capital and intermediate goods. They generally require the use of complex technologies, with moderate levels of research and development activities and advanced technical capacity requirements.
  - **High technology manufactures:** High-tech products require advanced, rapidly evolving technologies that require high investments in research and development, with product design playing a key role. For the most innovative technologies, high-tech infrastructures and close links between companies and between companies and research institutions may also be necessary.
  - Others

**Industrialized products**

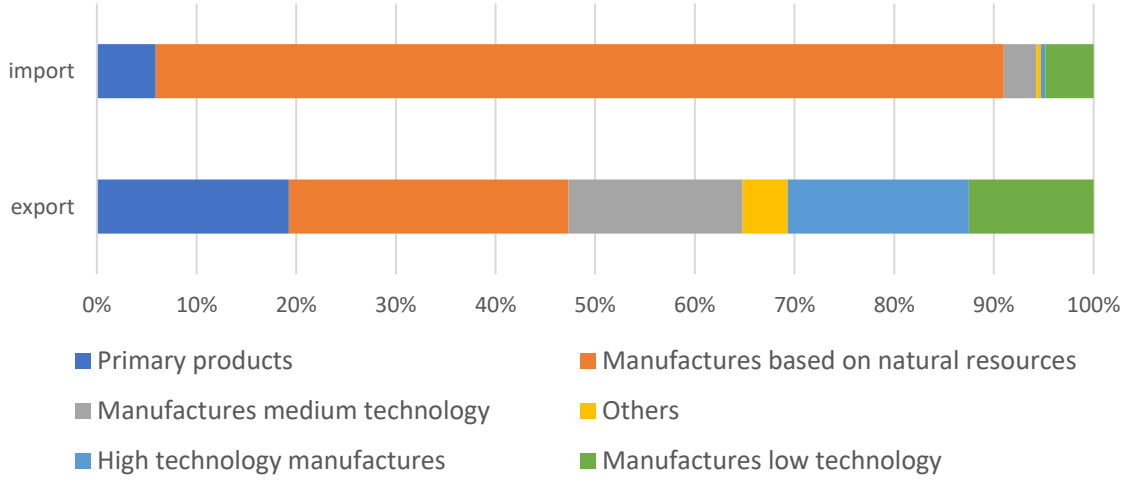
Trade Indicators

# Technological Intensity (Lall)

Barbados: Global trade by technological intensity, 2019




Barbados: Trade with selected Caribbean partners by technological intensity, 2019




The export of high technology manufacturers refers almost exclusively to medicinal and pharmaceutical products, these represent 7% of total exports for Barbados in 2019. However, Barbados also imports products from this sectors, resulting in a trade deficit equal to 19,0 Mio. USD in 2019.

*Caribbean countries include: Montserrat, Saint Kitts and Nevis, Grenada, Jamaica, Antigua and Barbuda, Dominica, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago, Haiti, Bahamas, Belize*

Source: ECLAC, based on COMTRADE data.

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# Grubel & Lloyd Index (Intra-industry Trade)

It measures the degree of exchange at the level of products of the same industry; that is, intra-industry trade.

The index is sensitive to the aggregation used; for industries it is recommended to implement the SITC at 3 digits.

It yields results ranging from 0 to 1; three levels are defined:

- greater than 0.33 (signs of **intra-industry trade**),
- greater than 0.10 and less than 0.33 (**potential intra-industry trade**), and
- less than 0.10 (**inter-industry relations**).

This can be done for a single sector or for the country as a whole, but not directly. In turn, it must be weighted for groups of countries.

Mechanically, the share of intra-industry trade rises with the level of sectoral aggregation

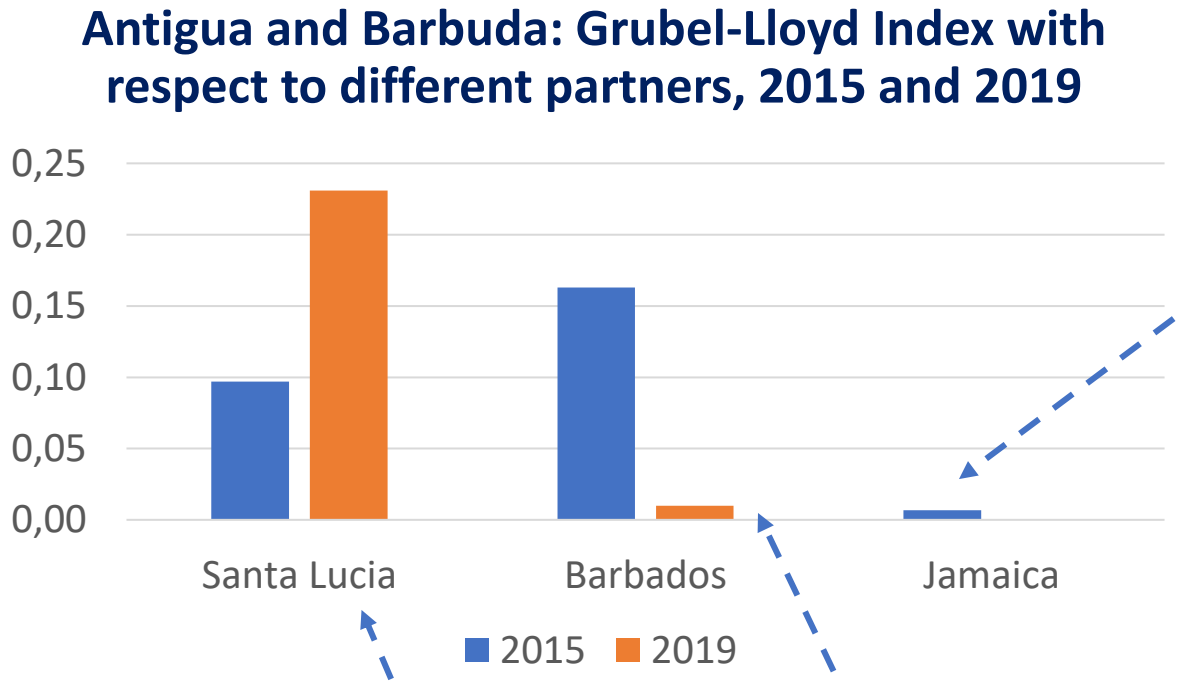
$$For\ industries \quad = 1 - \frac{\left| X_{ij}^{k} - M_{ij}^{k} \right|}{X_{ij}^{k} + M_{ij}^{k}} \qquad Between\ partners \quad = 1 - \frac{\sum \left| X_{ij}^{k} - M_{ij}^{k} \right|}{\sum \left( X_{ij}^{k} + M_{ij}^{k} \right)}$$

The absolute amount of exports (X), imports (M) of a given product (k) by the reporting country (i) to its partner (j)

Exports (X), imports (M) of a given product (k) by the reporting country (i) to its partner (j)

Trade Indicators

# Grubel & Lloyd Index (Intra-industry Trade)




Overall, the trade volume between Antigua and Barbuda and Jamaica is very low with a trade deficit of 8,6 Mio. USD for Antigua and Barbuda in 2019.

Sectors with high intra-industrial relations are:

- Alcoholic beverages
- Other non-electric machinery, tools and mechanical apparatus, nes.
- Household type equipment

These three sectors make up for 43 of bilateral exports in 2019.

In 2015, a range of products were traded bilaterally intra-industrially, driving up the Grubel-Lloyd Index e.g.:

- mineral manufactures
- non-alcoholic beverage
- Gramophones
- paper and paperboard. In 2019, only household equipment and pottery has been traded intra-industrially.

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# Herfindahl-Hirschman Index

It measures the degree of diversification / concentration; weighting the share of each product or country in its total trade.

The index varies between 0 and 1; an index greater than 0.18 is considered a "concentrated" market, between 0.10 and 0.18 "moderately concentrated", while the range between 0.0 and 0.10 is considered "diversified". High values are indicative of high concentration.

$$IH = \sum_{i=1}^{n} \left( \frac{X_i^k}{X_i} \right)^2$$

Export of a given service by the reporting country

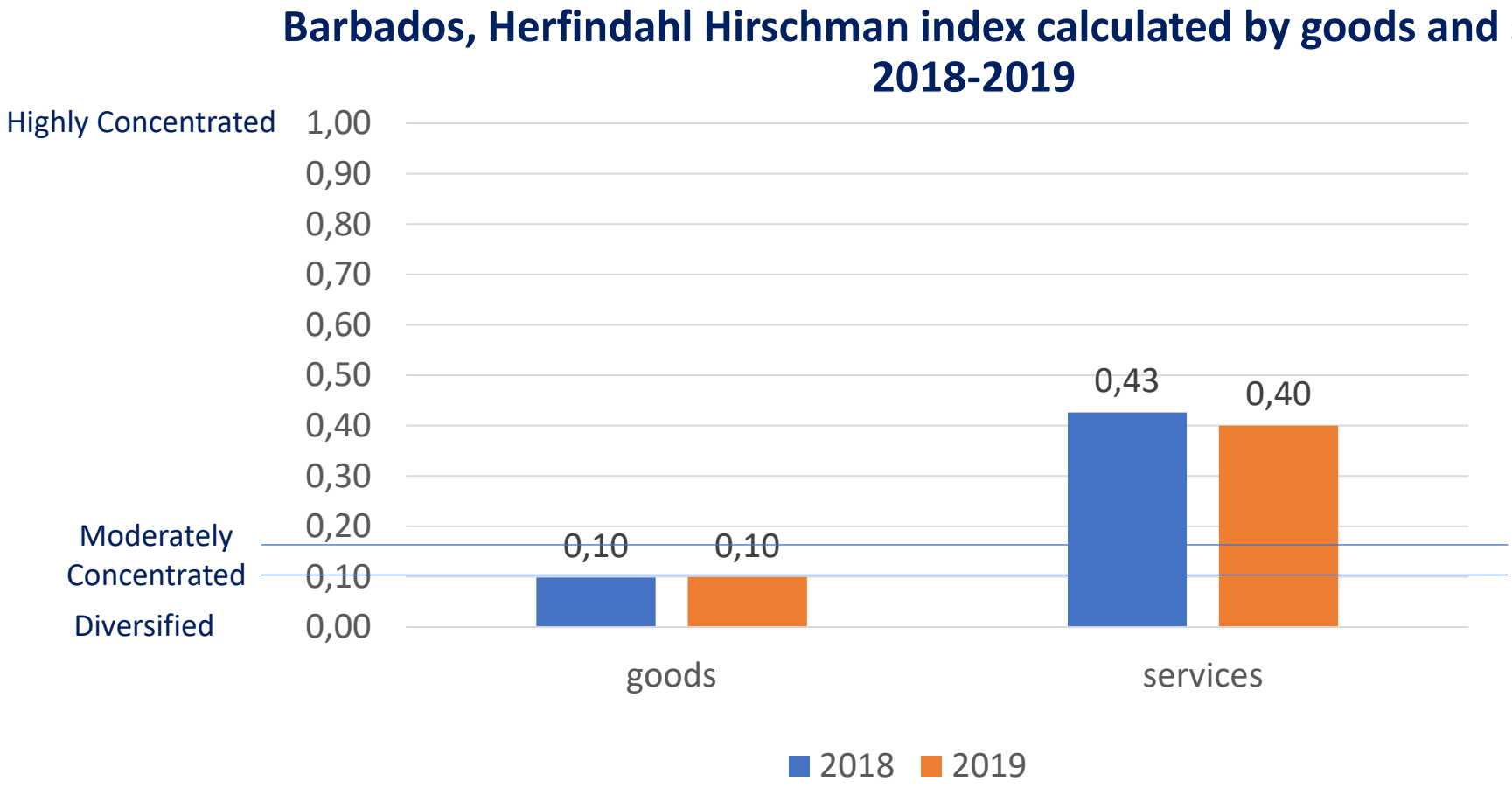
Total exports of the reporting country

*The IHH adds up the square of the shares each service has among the total exports of services.*

*It is recommended that this index be corrected for the number of sectors and/or countries, especially because when only a few sectors are involved, with some having a higher relative weight in the total, the index tends to be higher.*

$$IHHnorm = \frac{IH - \frac{1}{n}}{1 - \frac{1}{n}}$$

# Herfindahl-Hirschman Index




Source: ECLAC, based on Comtrade.

# TUTORIAL
# More advanced trade indicators: intra-industrial trade relations, technological intensity and trade concentration
## *Grubel-Lloyd, Techn. Intensity, HHI*

1. *Calculate the Grubel-Lloyd Index for Guyana and Jamaica for 2019 using the SITC Rev. 2 on the level of three digits.*
   - *Identify the top 3 sectors in each of the relations (intra-industrial, inter-industrial, potentially intra-industrial)*
2. *Graph the aggregated exports and imports by Antigua and Barbuda, Barbados, Belize, Grenada, Jamaica, Santa Lucia and Saint Vincent and the Grenadines including their composition of technological intensity for 2019,*
   - *Using the world as partner*
   - *Using the Caribbean countries available in the data base as partners (aggregated)*
   - *For a country of interest, check which sectors are represented by the different levels of technological intensity*
3. *Calculate the HHI for St. Kitts and Nevis by product and destination for the last available year.*

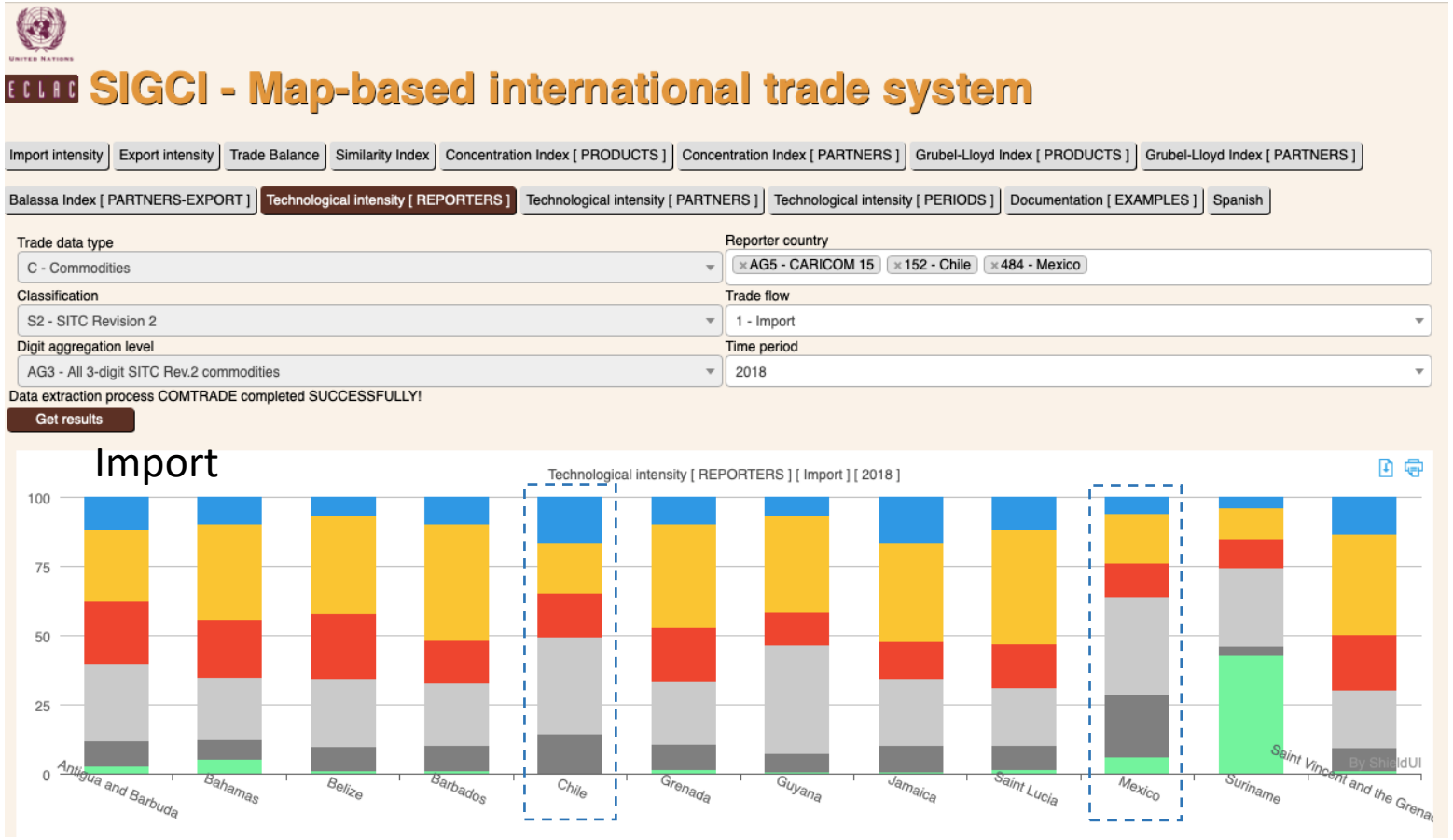
## ***SIGCI***

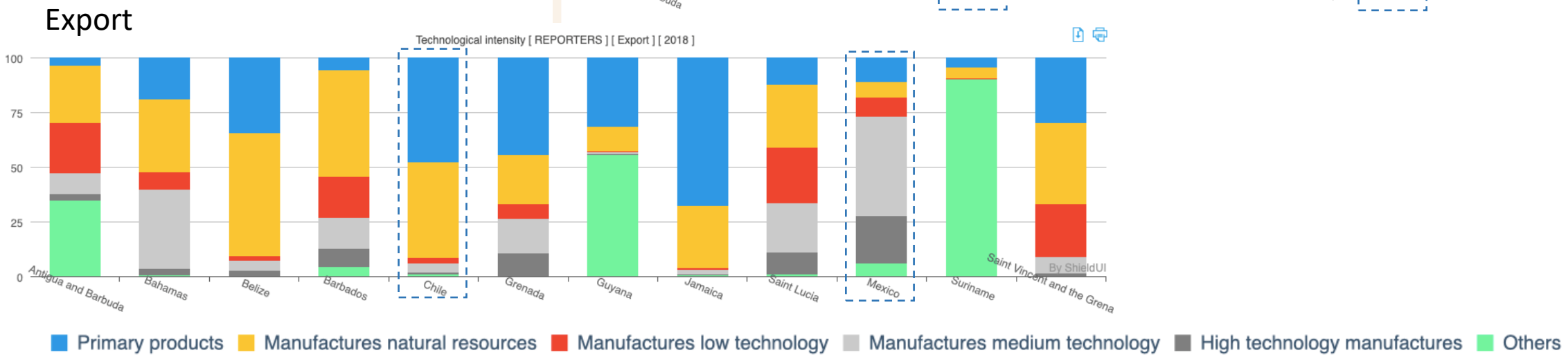
1. Use SIGCI to calculate the Grubel & Lloyd Index for products for Grenada and the USA for 2018, using SITC Rev. 2.
2. Use SIGCI to calculate the Grubel & Lloyd Index for partners for Jamaica and the other CARICOM countries for 2017, using SITC Rev. 2.
3. Compute the IHH for the exports of services for Antigua y Barbuda, Dominica, Granada, Saint Kitts and Nevis, Santa Lucia and Trinidad and Tobago for the years 2018 and 2019.
4. Compute the IHH for exports in commodities for Antigua and Barbuda, Barbados, Grenada and Saint Vincent and the Grenadines in SIGCI with respect to i. products and ii. Partners.

EXAMPLE: SIGCI

# Technological Intensity (Lall)

Technological intensity of CARICOM countries compared to Chile and Mexico in 2018.




Source: ECLAC, based on the SIGCI System.

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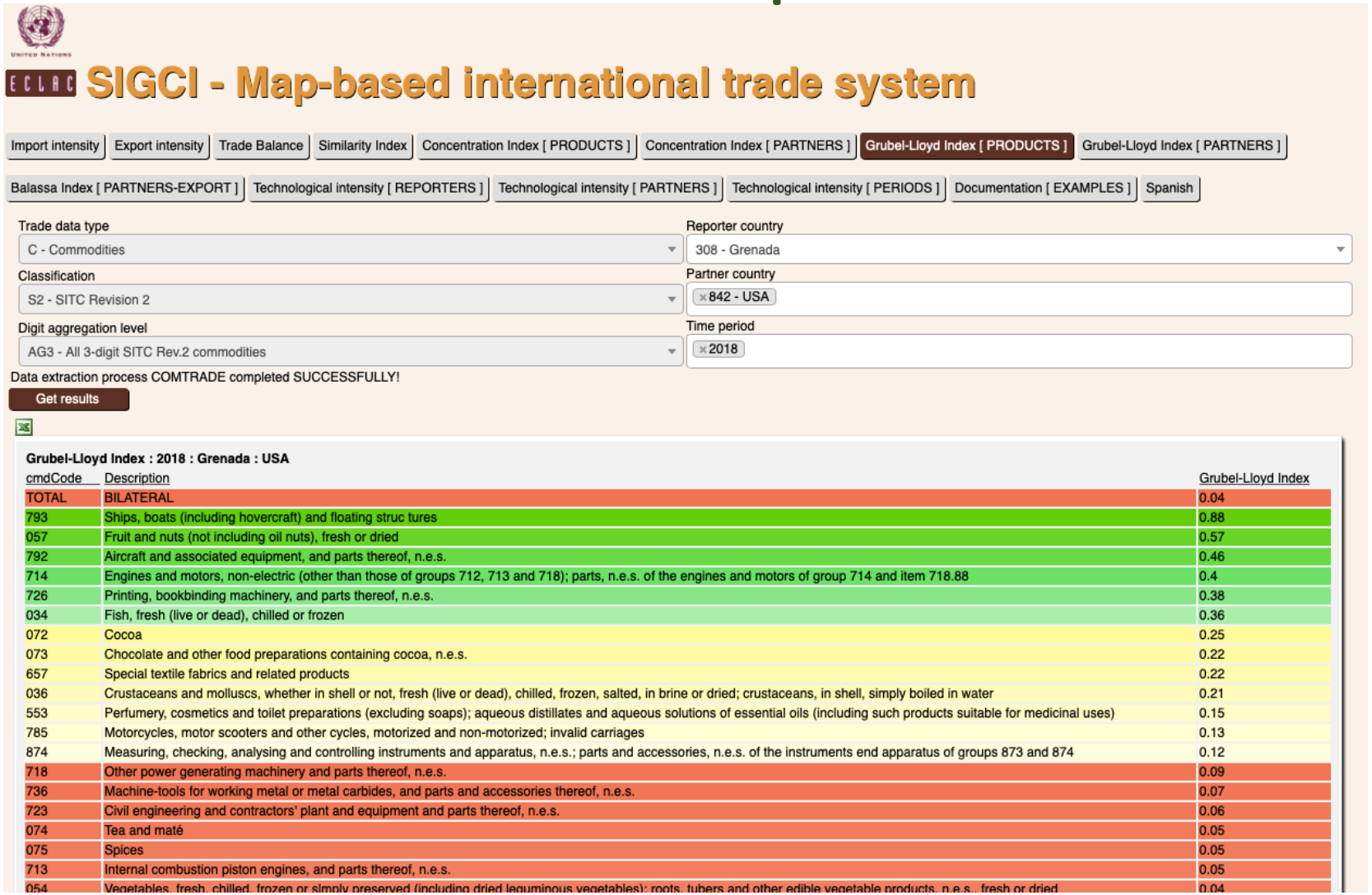
EXAMPLE: SIGCI

# Grubel & Lloyd Index (Intra-industry Trade): Example SIGCI 1



ECLAC SIGCI - Map-based international trade system

Import intensity | Export intensity | Trade Balance | Similarity Index | Concentration Index [ PRODUCTS ] | Concentration Index [ PARTNERS ] | Grubel-Lloyd Index [ PRODUCTS ] | Grubel-Lloyd Index [ PARTNERS ]

Balassa Index [ PARTNERS-EXPORT ] | Technological intensity [ REPORTERS ] | Technological intensity [ PARTNERS ] | Technological intensity [ PERIODS ] | Documentation [ EXAMPLES ] | Spanish

Trade data type: C - Commodities
Reporter country: 308 - Grenada
Classification: S2 - SITC Revision 2
Partner country: 842 - USA
Digit aggregation level: AG3 - All 3-digit SITC Rev.2 commodities
Time period: 2018

Data extraction process COMTRADE completed SUCCESSFULLY!

Get results

**Grubel-Lloyd Index : 2018 : Grenada : USA**

| cmdCode | Description | Grubel-Lloyd Index |
|---|---|---|
| TOTAL | BILATERAL | 0.04 |
| 793 | Ships, boats (including hovercraft) and floating struc tures | 0.88 |
| 057 | Fruit and nuts (not including oil nuts), fresh or dried | 0.57 |
| 792 | Aircraft and associated equipment, and parts thereof, n.e.s. | 0.46 |
| 714 | Engines and motors, non-electric (other than those of groups 712, 713 and 718); parts, n.e.s. of the engines and motors of group 714 and item 718.88 | 0.4 |
| 726 | Printing, bookbinding machinery, and parts thereof, n.e.s. | 0.38 |
| 034 | Fish, fresh (live or dead), chilled or frozen | 0.36 |
| 072 | Cocoa | 0.25 |
| 073 | Chocolate and other food preparations containing cocoa, n.e.s. | 0.22 |
| 657 | Special textile fabrics and related products | 0.22 |
| 036 | Crustaceans and molluscs, whether in shell or not, fresh (live or dead), chilled, frozen, salted, in brine or dried; crustaceans, in shell, simply boiled in water | 0.21 |
| 553 | Perfumery, cosmetics and toilet preparations (excluding soaps); aqueous distillates and aqueous solutions of essential oils (including such products suitable for medicinal uses) | 0.15 |
| 785 | Motorcycles, motor scooters and other cycles, motorized and non-motorized; invalid carriages | 0.13 |
| 874 | Measuring, checking, analysing and controlling instruments and apparatus, n.e.s.; parts and accessories, n.e.s. of the instruments end apparatus of groups 873 and 874 | 0.12 |
| 718 | Other power generating machinery and parts thereof, n.e.s. | 0.09 |
| 736 | Machine-tools for working metal or metal carbides, and parts and accessories thereof, n.e.s. | 0.07 |
| 723 | Civil engineering and contractors' plant and equipment and parts thereof, n.e.s. | 0.06 |
| 074 | Tea and maté | 0.05 |
| 075 | Spices | 0.05 |
| 713 | Internal combustion piston engines, and parts thereof, n.e.s. | 0.05 |
| 054 | Vegetables, fresh, chilled, frozen or simply preserved (including dried leguminous vegetables); roots, tubers and other edible vegetable products, n.e.s., fresh or dried | 0.04 |

The System shows the list of products in which the bilateral trade relationship is complementary, i.e. there is two-way trade. The countries trade especially ships and fruits.

Source: ECLAC, based on the SIGCI System.

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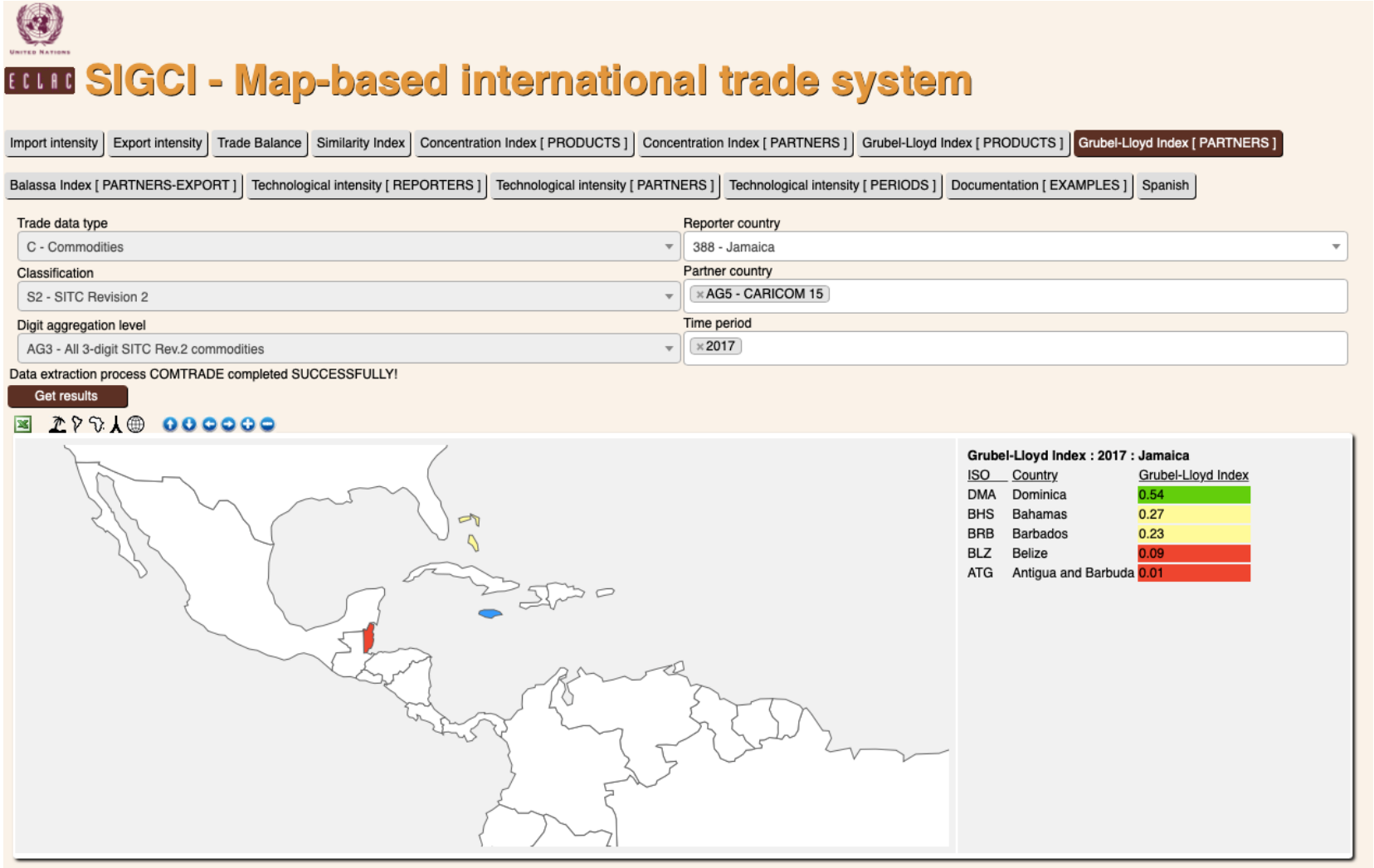
EXAMPLE: SIGCI

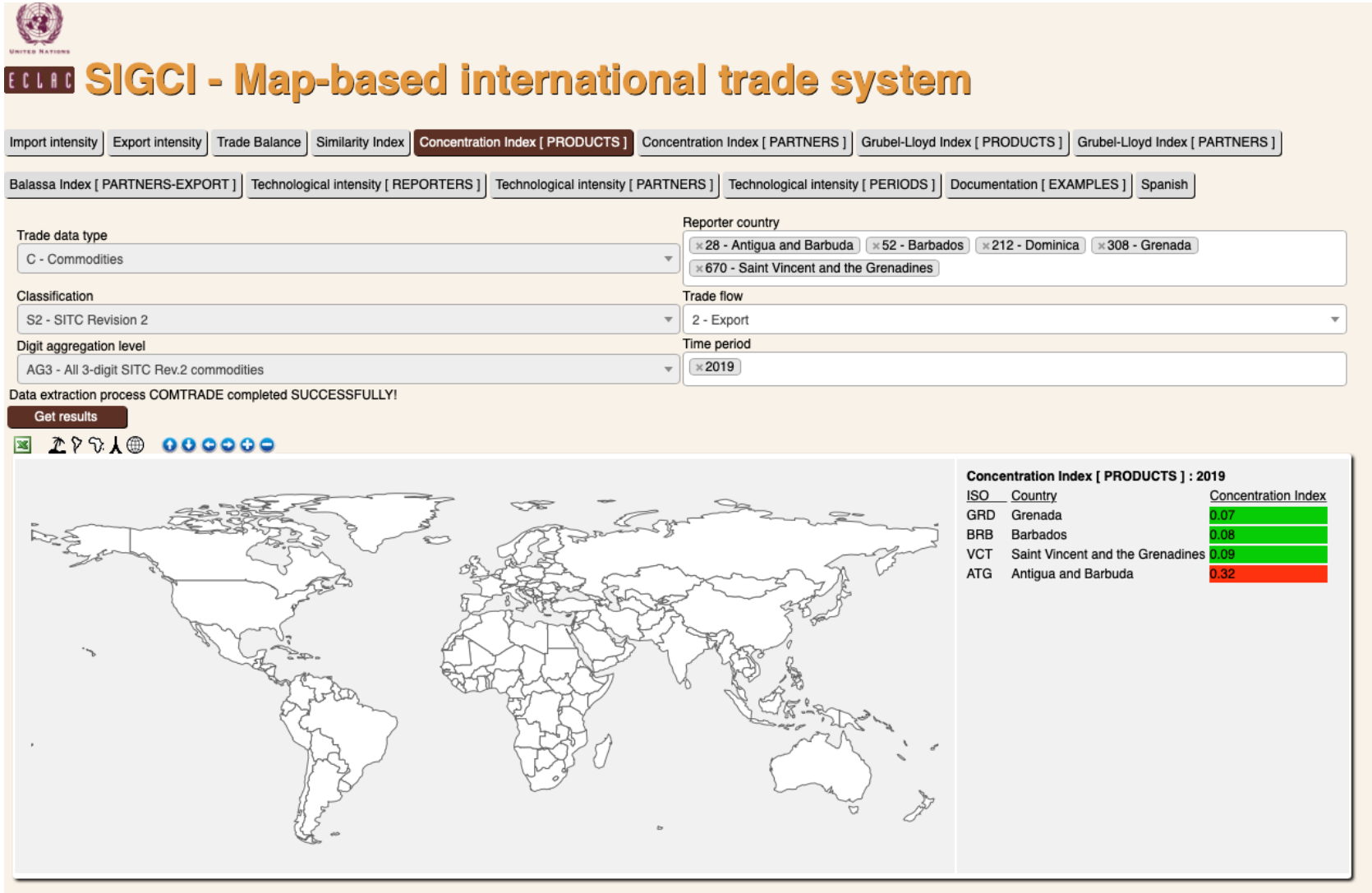
# Grubel & Lloyd Index (Intra-industry Trade): Example SIGCI 2




Source: ECLAC, based on the SIGCI System.

EXAMPLE: SERVICES

# Herfindahl-Hirschman Index: Example i. SIGCI




Except of Antigua and Barbuda, all countries have a low product concentration with respect to their exports.

Source: ECLAC, based on the SIGCI System.

EXAMPLE: SERVICES

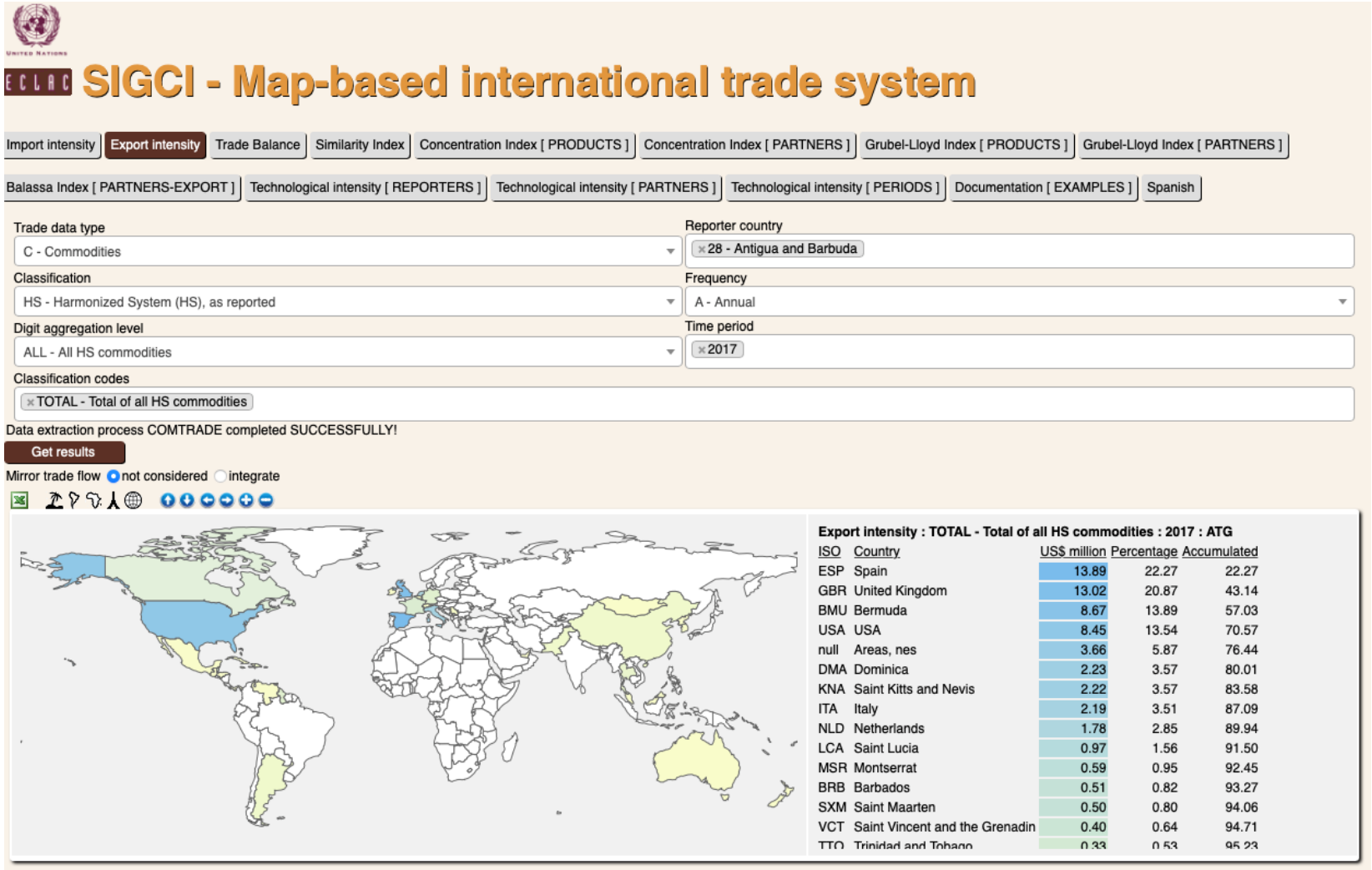
# Herfindahl-Hirschman Index: Example ii. SIGCI


Saint Vincent and the Grenadines as well as Barbados have relatively diversified trading partners with respect to their exports while those of Grenada are only moderately diversified. The countries of exports from Antigua and Barbuda display a very low level of diversification.

Source: ECLAC, based on the SIGCI System.

EXAMPLE: SERVICES

# Herfindahl-Hirschman Index: Example ii. SIGCI continued




Source: ECLAC, based on the SIGCI System.

Analyzing the export intensity of Antigua and Barbuda reveals the relatively low level of diversification regarding its export destinations.

# WRAPUP SESSION

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# BREAK

# More advanced trade indicators: Market share, comparative advantages

*Balassa index, revealed comparative advantage*

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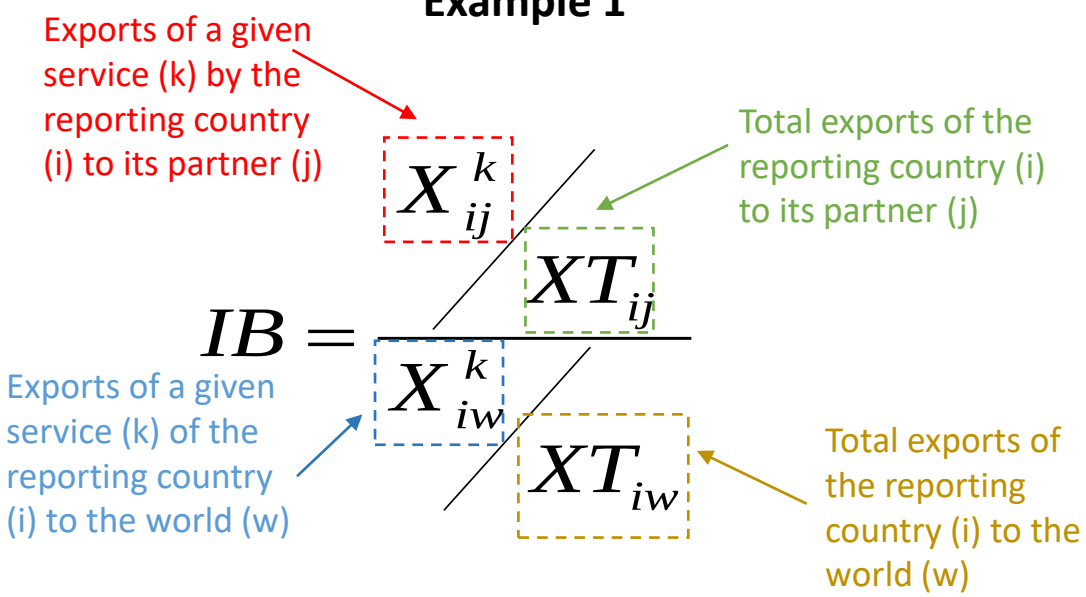
# Balassa Index

It belongs to the family of comparative advantage indicators. It measures the degree of importance of a product in the exports of one country to another, versus the importance of exports of the same product in the exports of the same country to the world.

The following scales are recommended for reading the normalized indicator: between +0.33 and +1 (advantage for the country); between -0.33 and -1 (disadvantage for the country).

It can also be calculated for individual cases.

**Example 1**




$$Normalize = \frac{Index - 1}{Index + 1}$$

*IB and IB2 are then normalized according to the formula above.*

# Balassa Index Analysis: Example

**Barbados: Balassa Index in selected products and partners**

| HS-6d | Product description | United States | Jamaica | Trinidad and Tobago | Saint Lucia |
|---|---|---|---|---|---|
| 271019 | Petroleum oils and oils from bituminous minerals | -1.00 | -1.00 | -1.00 | -1.00 |
| 220840 | Rum and other spirits | **0.29** | -0.88 | -0.96 | -0.82 |
| 252329 | Cement; portland, other than white | -1.00 | -1.00 | -1.00 | -0.35 |
| 300490 | Medicaments; consisting of mixed or unmixed products | -0.95 | **0.39** | **0.35** | **0.43** |
| 711319 | Jewellery; of precious metal (excluding silver) | **0.65** | -1.00 | -1.00 | -1.00 |
| 270900 | Oils; petroleum oils | -1.00 | **0.80** | **0.70** | -1.00 |
| 902139 | Artificial parts of the body; excluding artificial joints | -0.26 | -0.99 | -0.79 | -1.00 |
| 482110 | Paper and paperboard; labels or all kinds, printed | -0.71 | **0.57** | **0.09** | -0.28 |
| 999999 | Commodities not specified according to kind | -0.21 | -0.09 | **0.43** | **0.17** |
| 151710 | Margarine; excluding liquid margarine | -0.96 | -0.32 | **0.76** | **0.61** |
| 190531 | Food preparations; sweet biscuits | -0.02 | **0.54** | **0.40** | **0.15** |
| 321000 | Paints and varnishes; | -1.00 | -0.22 | -1.00 | **0.48** |
| 853339 | Electrical resistors; wirewound variable | **0.53** | -1.00 | -1.00 | -1.00 |
| 910119 | Wrist-watches; electrically operated | **0.65** | -1.00 | -1.00 | -1.00 |
| 681091 | Cement, concrete or artificial stone | -1.00 | -1.00 | -1.00 | -1.00 |

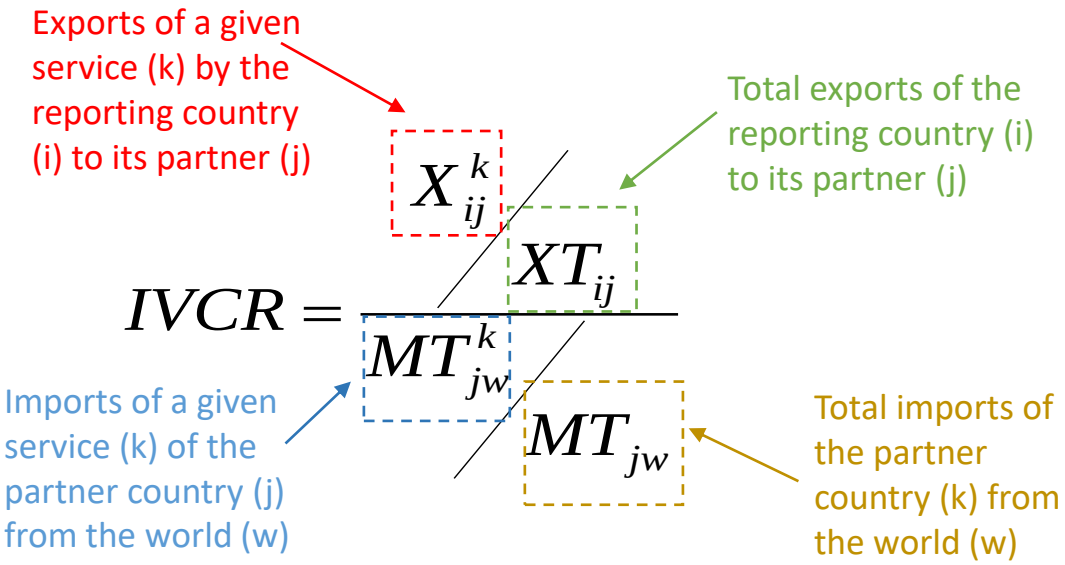
Source: ECLAC, based on COMTRADE data.

# Revealed Comparative Advantage

This second variant measures the degree of importance of a product within the exports of one country to another, versus the importance of imports of the same product in the imports of the destination country from the world; allowing comparison with other countries.

The following scales are recommended for reading the normalized indicator: between +0.33 and +1 (advantage for the country); between -0.33 and -1 (disadvantage for the country).

**Example 1**




$$Normalize = \frac{Index - 1}{Index + 1}$$

# TUTORIAL

## More advanced trade indicators: Market share, comparative advantages

### *Balassa index, revealed comparative advantage*

1. *Compute the Balassa Index for a country of your preference.*
2. *Calculate the Revealed Comparative Advantage Index for a country of your preference.*

*SIGCI*

- Compute the Balassa Index for the commodities sugar and honey for Colombia with its partners Jamaica, Santa Lucia, Barbados and Antigua and Barbuda.

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EXAMPLE: SIGCI

# Balassa Index Analysis: SICGI Example


Source: ECLAC, based on the SIGCI System.

Colombia has an advantage over Antigua and Barbuda and Jamaica and a disadvantage in case of Barbados and Santa Lucia in the exports of sugar and honey in 2018.

# WRAPUP SESSION

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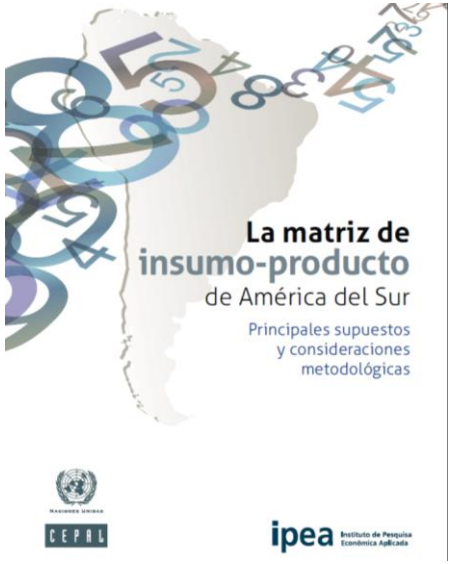
# **5.** Use of Input-Output-Table in value chain analysis

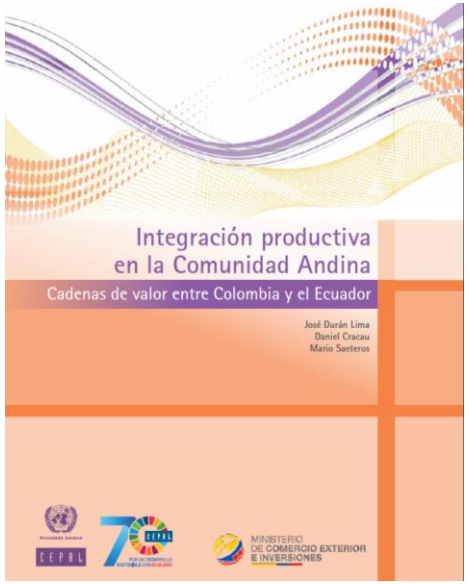
# Summary

- **Value chain analysis with IOT**
- Convergence of Regional IOT initiatives
- Progress between 2020 and 2021
- Challenges ahead and next steps

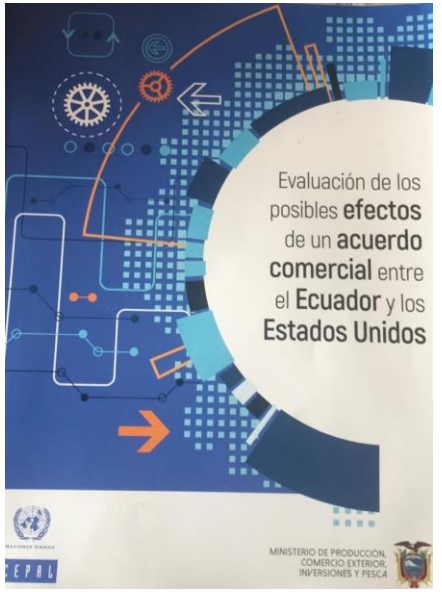
RESPONDING TO QUESTIONS FROM *POLICYMAKERS*

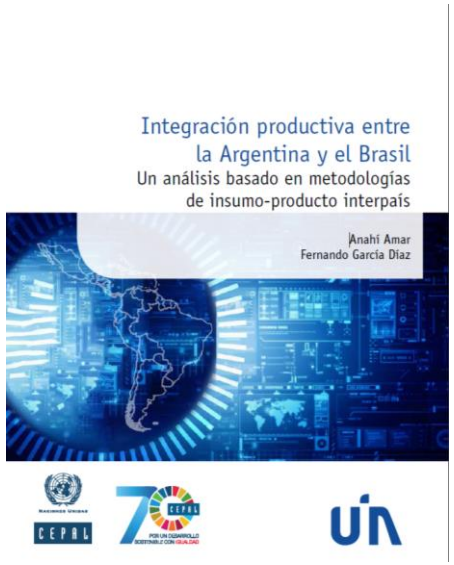
# The demand for the use of IOT LA ECLAC: Examples of Impact Assessments and public policy analysis

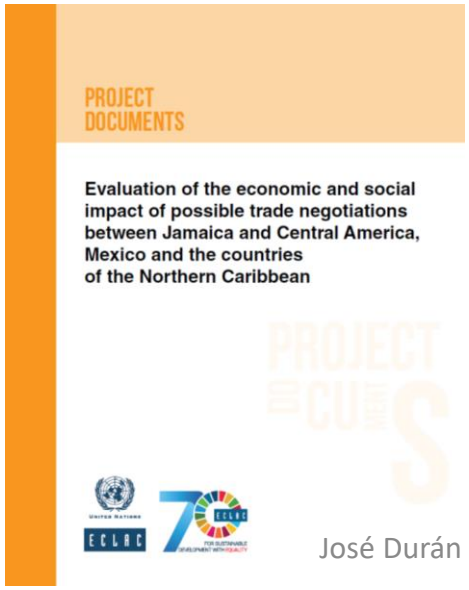


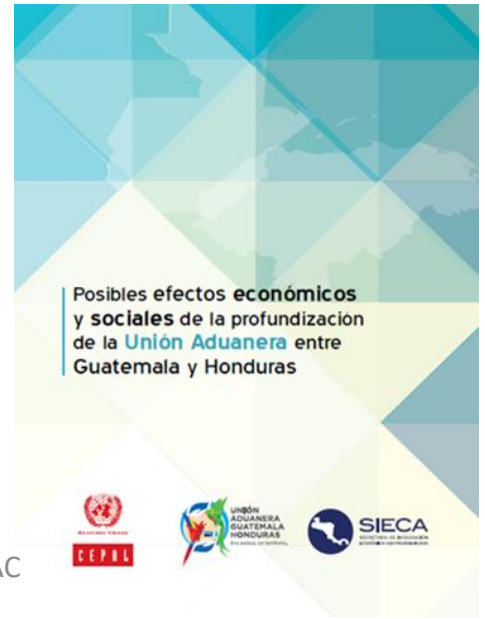








- **Effects on GDP**
- **Welfare**
- **Employment**
- **Winning and losing sectors**

# Requests of national governments and regional institutions

- Support for the re-launching of the **MERCOSUR** Business Forum (at the request of the Argentine Foreign Ministry). Continued support at the request of the Government of Brazil
- Sectoral analysis of the productive capacities of the **pharmaceutical and medical equipment sector** (CELAC)
- Support to the **Value Chains program** in the countries of the **Andean Community** through sectoral analysis of productive integration for the section of strategic sectors in their intra-regional trade.
- Technical Assistance to the Pro-Tempore Presidency of the **Pacific Alliance** (Colombia) in the development of: New input-output matrix 2018; analysis of good practices in trade in services.
- Technical Assistance to the **Secretariat for Central American Integration** (SIECA) in the development of a new input-output matrix for the subregion and Mexico.
- Assistance to the **Association of Caribbean States** (ACS) in defining its Strategic Program for the period 2021-2022, identifying a set of challenges to boost and relaunch intra-ACS trade. (PS)
- Support in the design of a strategy for the **inclusion of gender statistics in trade**. Chile (SUBREI); Uruguay (Ministry of Foreign Affairs); El Salvador (DIGESTYCI) In conjunction with the DAG.
- Advised the Government of Bolivia on the **identification of sectors with productive potential for an Import Substitution Program**. In conjunction with DEPE and DE.
- Technical assistance to the government of **Ecuador** in feasibility studies for possible **trade agreements with China and Mexico**, within the **framework of an eventual access to the Pacific Alliance**.
- Analysis of the wounds of the COVID-19 crisis on **Costa Rica**'s business fabric (COMEX-PROCOMER).
- Technical assistance to the Central Bank of **Paraguay** in the development of a **new Input-Output Matrix for 2018 for inclusion in the Latin American regional matrix**.

The Covid-19 **pandemic has increased the demand for intra- and inter-regional value chain analysis in order to estimate the pandemic's impact and to develop recovery measures.**
**This requires the IOTs to be up to date and a large regional coverage.**

# Starting point: A simplified view of the national I-O, built using data from National Accounts

| | Sectors *j*<br>1 2 3 … N | Final demand | | | Total Employment |
|---|---|---|---|---|---|
| | | C | FBC | e | |
| **Sectors *i***<br>**1**<br>**2**<br>**3**<br>?<br>**N** | *Intermediate Demand:* Inputs, consumption or intermediate use (Z) | y | | | Gross Value of Production<br>(VBP) |
| **Imports** | Intermediate imported inputs ($Z^M$) | | | | |
| **Value added (VA)** | Wages and salaries | | | | |
| | Gross Operating Surplus | | | | |
| | Taxes minus subsidies | | | | |
| **Total resources** | Gross Value of Production<br>(VBP) | | | | |

Source: CEPAL, technical Manual: “Análisis Económicos a partir de matrices insumo producto: definiciones, indicadores y aplicaciones para América Latina

# Different frameworks of I-O tables that include more than one country

## Regional Matrices (RIOT)

| | Consumos intermedios | | | | Demanda final | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | País A | País B | País C | RoW | País A | País B | País C | RoW | Output total |
| País A | $Z^{A,A}$ | $Z^{A,B}$ | $Z^{A,C}$ | | $Y^{A,A}$ | $Y^{A,B}$ | $Y^{A,C}$ | $R^{A,\ RoW}$ | Output $^{A}$ |
| País B | $Z^{B,A}$ | $Z^{B,B}$ | $Z^{B,C}$ | | $Y^{B,A}$ | $Y^{B,B}$ | $Y^{B,C}$ | $R^{B,\ RoW}$ | Output $^{B}$ |
| País C | $Z^{C,A}$ | $Z^{C,B}$ | $Z^{C,C}$ | | $Y^{C,A}$ | $Y^{C,B}$ | $Y^{C,C}$ | $R^{C,\ RoW}$ | Output $^{C}$ |
| Resto mundo (RoW) | $Z^{RoW,A}$ | $Z^{RoW,B}$ | $Z^{RoW,C}$ | | | | | | |
| Fletes y seguros | $FI^{A}$ | $FI^{B}$ | $FI^{C}$ | | | | | | |
| Total c. intermedios | $TI^{A}$ | $TI^{B}$ | $TI^{C}$ | | | | | | |
| Valor añadido (precios básicos) | $VA^{A}$ | $VA^{B}$ | $VA^{C}$ | | | | | | |
| Output total | Output $^{A}$ | Output $^{B}$ | Output $^{C}$ | | | | | | |

| Cuentas satélite | $f^{A}$ | $f^{B}$ | $f^{C}$ |
|---|---|---|---|

## Multiregional Matrices (MRIOT)

| | Consumos intermedios | | | | Demanda final | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | País A | País B | País C | RoW | País A | País B | País C | RoW | Output total |
| País A | $Z^{A,A}$ | $Z^{A,B}$ | $Z^{A,C}$ | $Z^{A,RoW}$ | $Y^{A,A}$ | $Y^{A,B}$ | $Y^{A,C}$ | $Y^{A,\ RoW}$ | Output $^{A}$ |
| País B | $Z^{B,A}$ | $Z^{B,B}$ | $Z^{B,C}$ | $Z^{B,RoW}$ | $Y^{B,A}$ | $Y^{B,B}$ | $Y^{B,C}$ | $Y^{B,\ RoW}$ | Output $^{B}$ |
| País C | $Z^{C,A}$ | $Z^{C,B}$ | $Z^{C,C}$ | $Z^{C,RoW}$ | $Y^{C,A}$ | $Y^{C,B}$ | $Y^{C,C}$ | $Y^{C,\ RoW}$ | Output $^{C}$ |
| Resto mundo (RoW) | $Z^{RoW,A}$ | $Z^{RoW,B}$ | $Z^{RoW,C}$ | $Z^{RoW,RoW}$ | $Y^{RoW,A}$ | $Y^{RoW,B}$ | $Y^{RoW,C}$ | $Y^{RoW,RoW}$ | Output $^{RoW}$ |
| Fletes y seguros | $FI^{A}$ | $FI^{B}$ | $FI^{C}$ | $FI^{RoW}$ | | | | | |
| Total c. intermedios | $TI^{A}$ | $TI^{B}$ | $TI^{C}$ | $TI^{RoW}$ | | | | | |
| Valor añadido (precios básicos) | $VA^{A}$ | $VA^{B}$ | $VA^{C}$ | $VA^{RoW}$ | | | | | |
| | Output $^{A}$ | Output $^{B}$ | Output $^{C}$ | Output $^{RoW}$ | | | | | |

| Cuentas satélite | $f^{A}$ | $f^{B}$ | $f^{C}$ | $f^{D}$ |
|---|---|---|---|---|

Source: CEPAL, Technical Manual: “Análisis Económicos a partir de matrices insumo producto: definiciones, indicadores y aplicaciones para América Latina

# Practical applications

We can present results on:

1. Product structure;
2. Trade structure (exports and imports)
3. Internal linkages;
    - Forward
    - Backward
4. Vertical integration (sub-regional value chains)
5. Export related employment;
    - Importance of subregional markets
    - Indirect employment intensity
    - Employment by gender and employment (household surveys)

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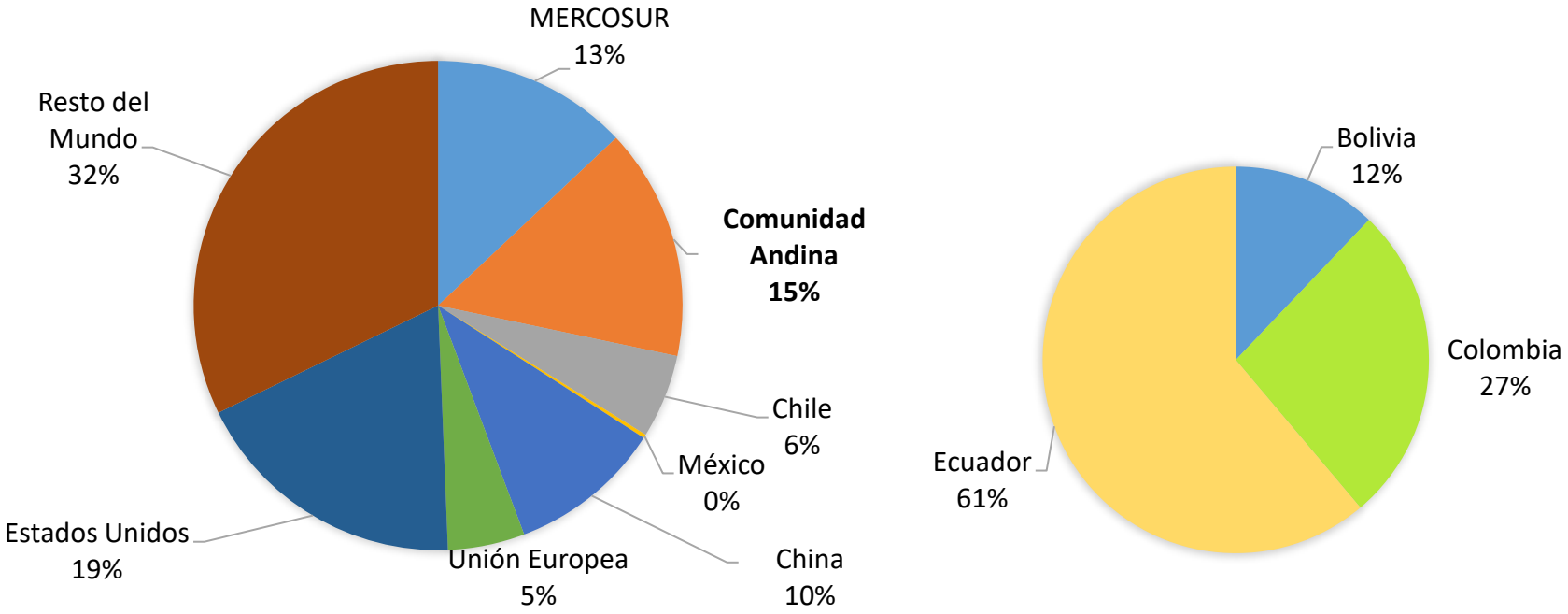
# The IOT of Peru shows the importance of Andean Community over the rest of the commercial partners in the region. Ecuador and Colombia are its main partners

## Peru: Import structure of intermediate goods, 2011

***(Percentage of total)***




Source: CEPAL based on the IOT of the Andean Community 2011

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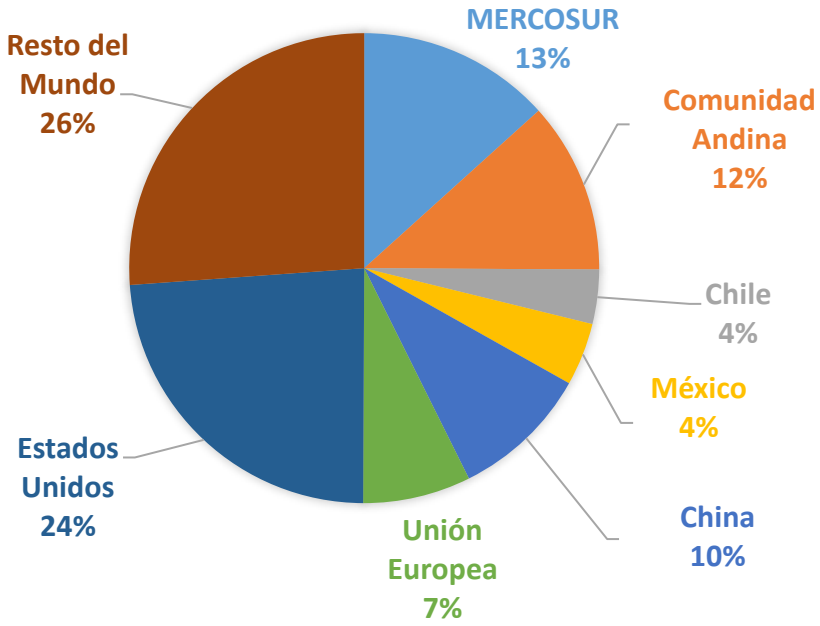
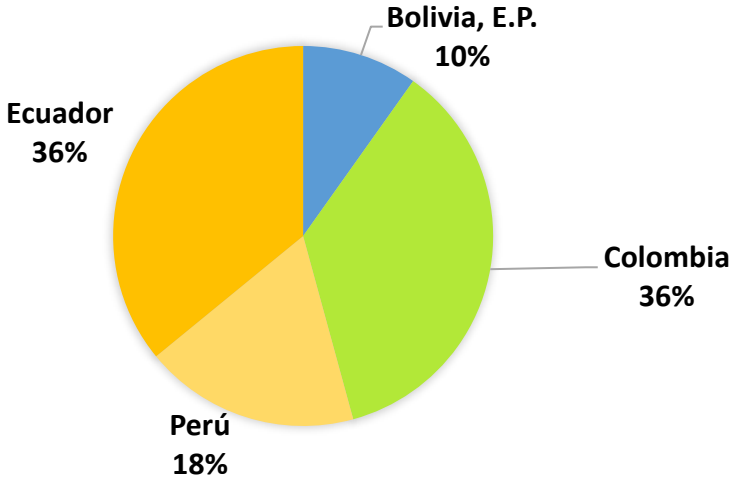
# The Intra-AC trade is even lower relative to the imports from other partners

## Andean Community (AC): Import structure of intermediate goods, 2011

*(Percentage of total)*




Source: CEPAL based on the IOT of the Andean Community 2011

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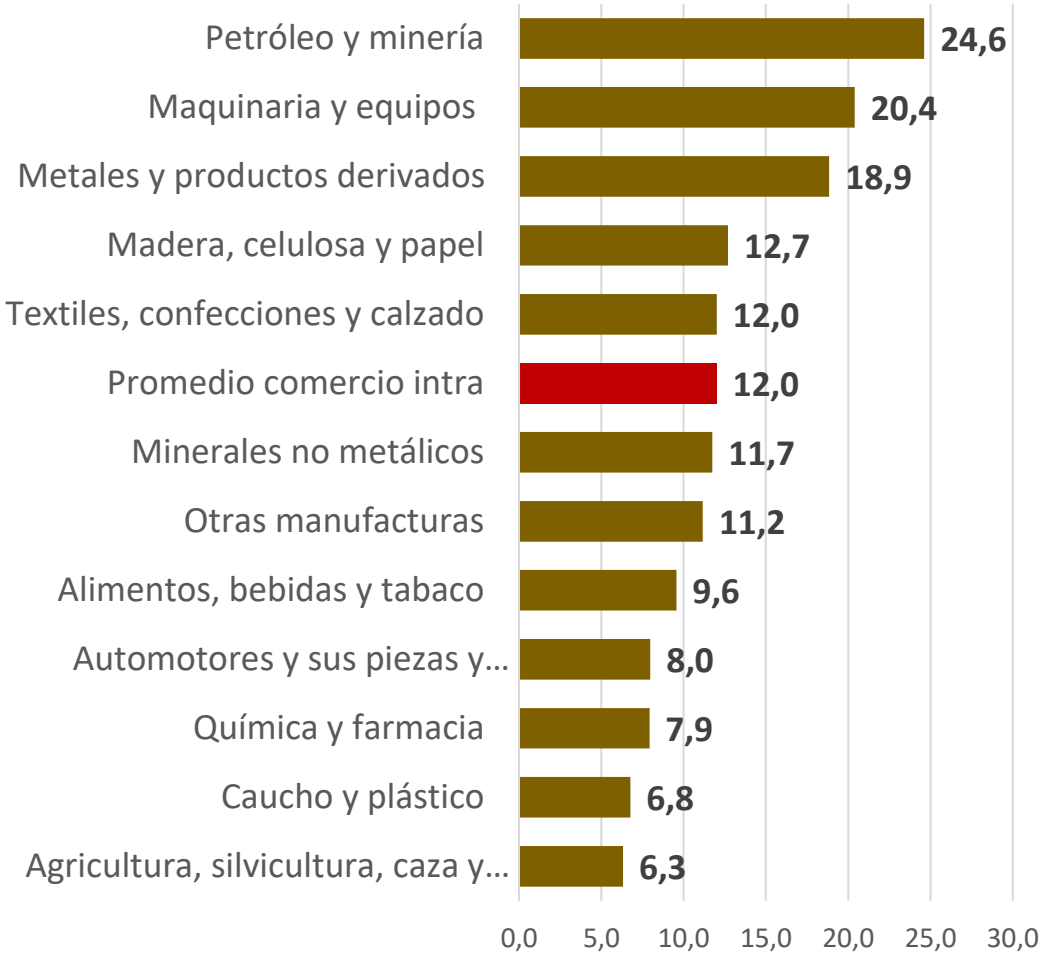
# The largest import intensities of intermediate goods are in only a few sectors

**Andean Community : Import structure of intermediate goods of main sectors, 2011**

***(Percentage of total)***




Source: CEPAL based on the IOT of the Andean Community 2011

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# Inter-industry linkages between sectors

- **The chains analysis carried out considers the National IOTs to obtain the Rasmunsen Hirschmann Index (RHI):**
  - **Backward linkages:** Capacity of a sector to drag other sectors linked to it due to its demand for intermediate goods required from other sectors.
  - **Forward linkages:** Capacity of a sector to promote other sectors due to its supply capacity, that is, the sale of its products, which in turn are intermediate inputs of other industries.

# And linkages with the rest of the world (global/regional value chains)

- **The participation of external content in the country, or in neighboring countries**
  - **Backward linkages:** Value of imported inputs incorporated in domestic production for the foreign market. The external supply of country B drives the exportable domestic production in country A
  - **Forward linkages:** Domestic added value embedded in the exported production of a third country. ($IM_{BA}/VAX_{BC} = X_{AB}/VAX_{BC}$).

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# Inter-industry linkages between sectors - Rasmunsen Hirschmann Index (RHI)

- **Backward linkage (power of dispersion)**: Index describes the relative extent to which an increase in final demand for the products of a given industry is dispersed throughout the total system of industries.

$$\sum_i U_{ij} = \frac{\frac{1}{n}\sum_i B_{ij}}{\frac{1}{n^2}\sum_{ij} B_{ij}}$$

- where *n* is the number of industries, and *Σi **B**ij* is the sum of the column elements in the Leontief inverse matrix ***B**=(**I**-**A**)-1*. It can be interpreted as the total increase in output from the entire system of industries needed to cope with an increase in the final demand for the products of industry *j* by one unit.

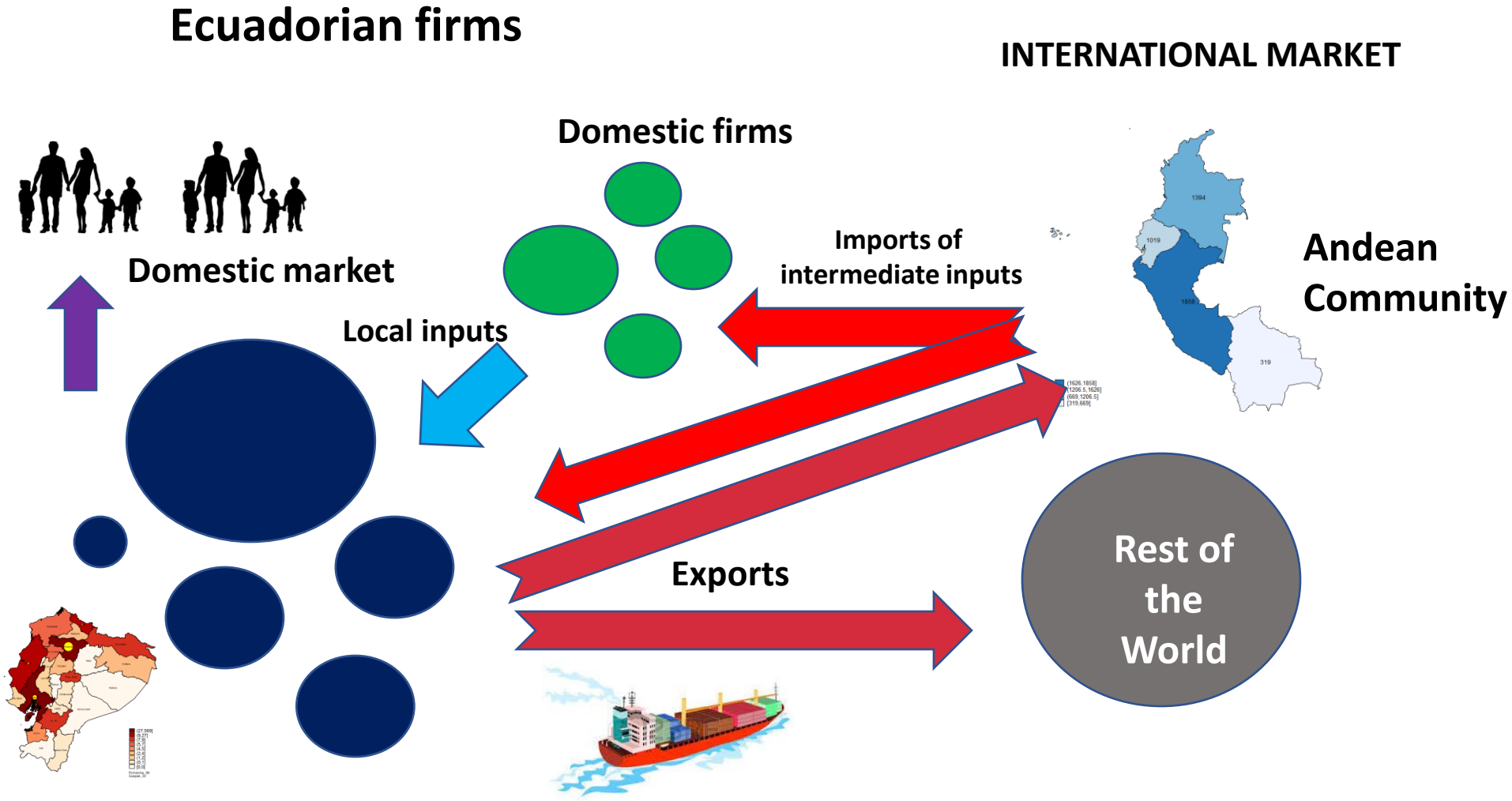
# Inter-industry linkages between sectors - Rasmunsen Hirschmann Index (RHI)

- **Forward linkage (sensitivity of dispersion)**: Index describes the extent to which the system of industries draws upon a given industry. The sensitivity of dispersion index measures the increase in the production of industry *i*, driven by a unit increase in the final demand for all industries in the system.

$$\sum_j U_{ij} = \frac{\frac{1}{n}\sum_j B_{ij}}{\frac{1}{n^2}\sum_{ij} B_{ij}}$$

- where *Σj* ***B****ij* is the sum of the row elements, which is interpreted as the increase in output in industry *i* needed in order to cope with a unit increase in the final demand for the product of each industry. The sensitivity of dispersion index has been interpreted as a measure of forward

# In the conception of a regional value chain, exporting also requires importing. Also to serve the domestic market.

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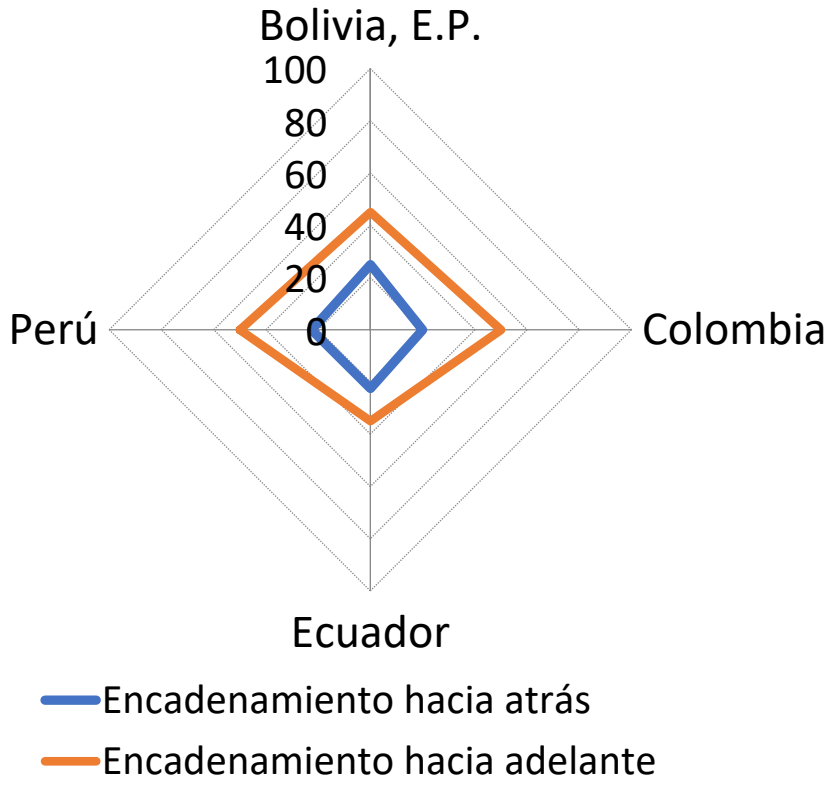
# AC countries show few sectors internally chained backwards and much more chained forward in 2005

## Analysis of inter-industry linkages: An approximation of the RH Index, 2005




Source: CEPAL based on the IOT of South America

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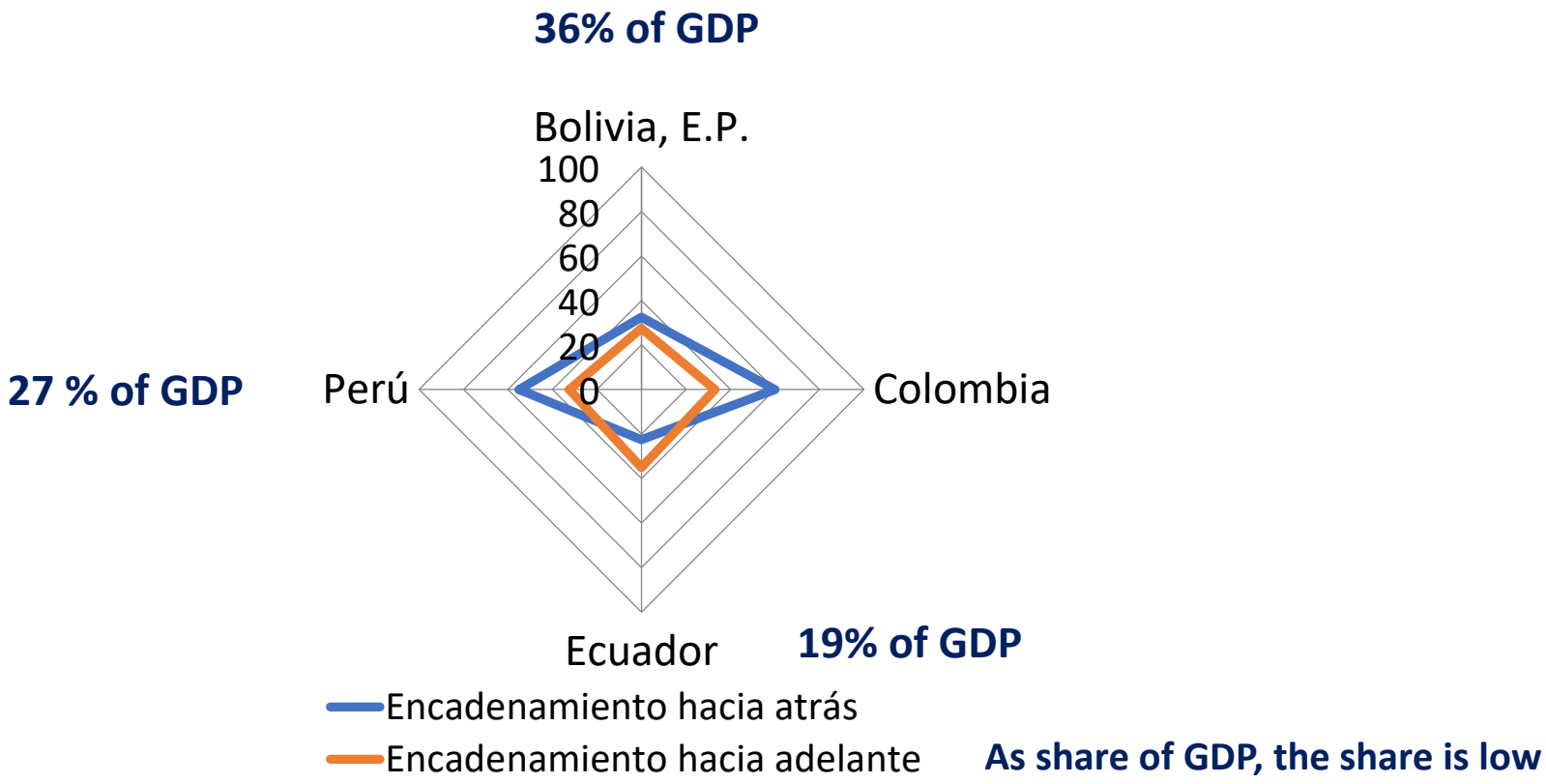
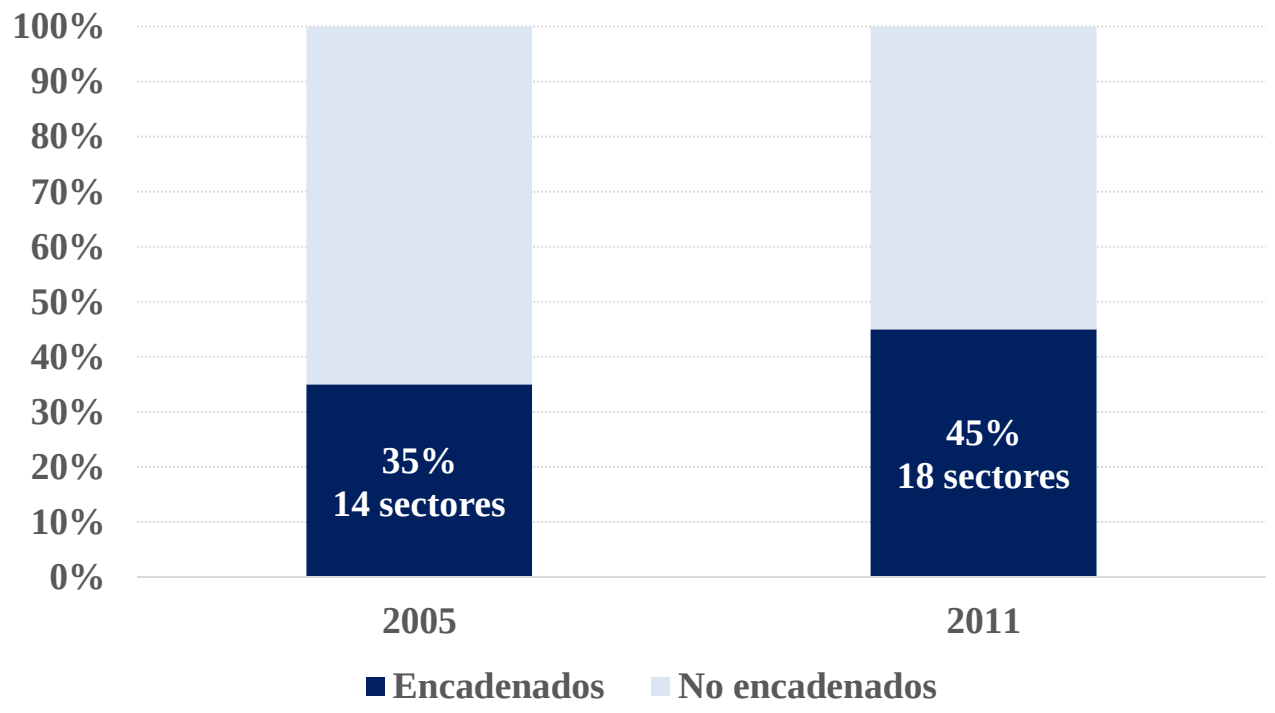
# With the 2011 IOT we can see an improvement in the backward linkages (in the number of sectors)

**Analysis of inter-industry linkages: An approximation of the RH Index, 2011**




Source: CEPAL based on the IOT of Andean countries

# Colombia, forward linkages, 2005 and 2011




Wood and Wood products
Textiles
Chemical products
transport

have increased their forward linkages

Source: CEPAL based on the IOT of Andean countries (IOT Colombia)

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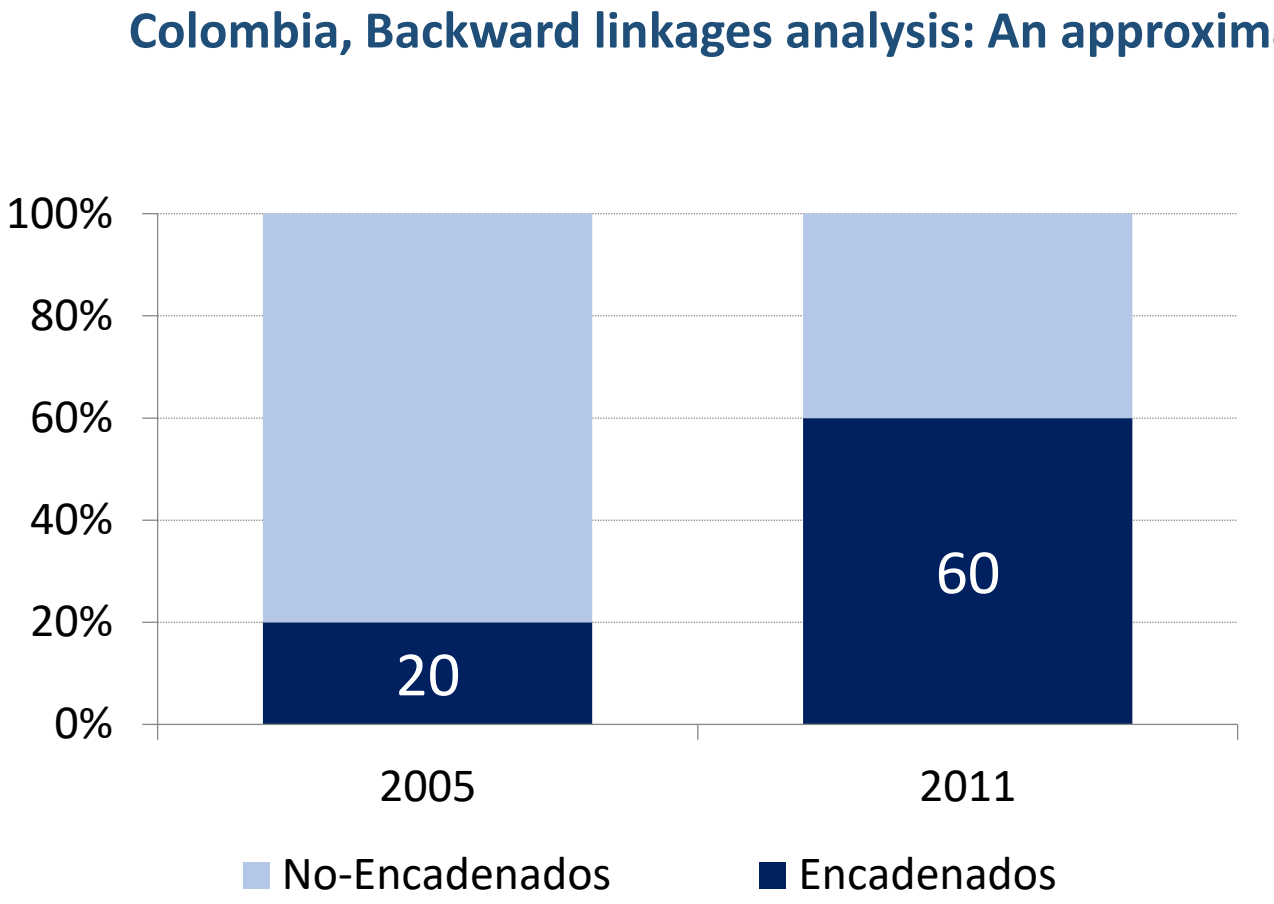
# Colombia, backward linkages, 2005 and 2011




**Wood and Wood products, textiles, wearing apparel, leather products, agroindustry and machinery and equipment increased their backward linkages**

Source: CEPAL based on the IOT of Andean countries (IOT Colombia)

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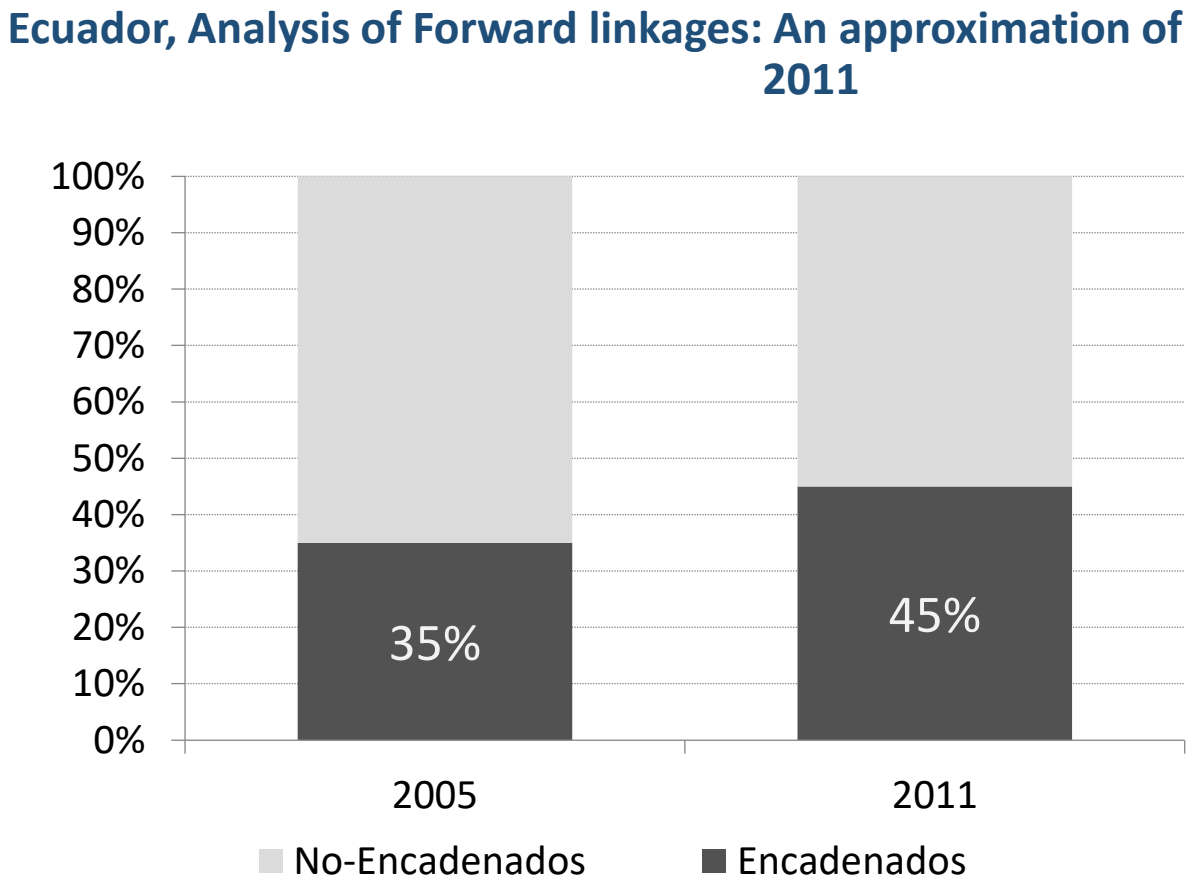
# Ecuador, forward linkages, 2005 and 2011




Non ferrous metals
Pharmaceuticals
Medical equipment

Increased their forward linkages
**19% of GDP**

Source: CEPAL based on the IOT of Andean countries (IOT Ecuador)

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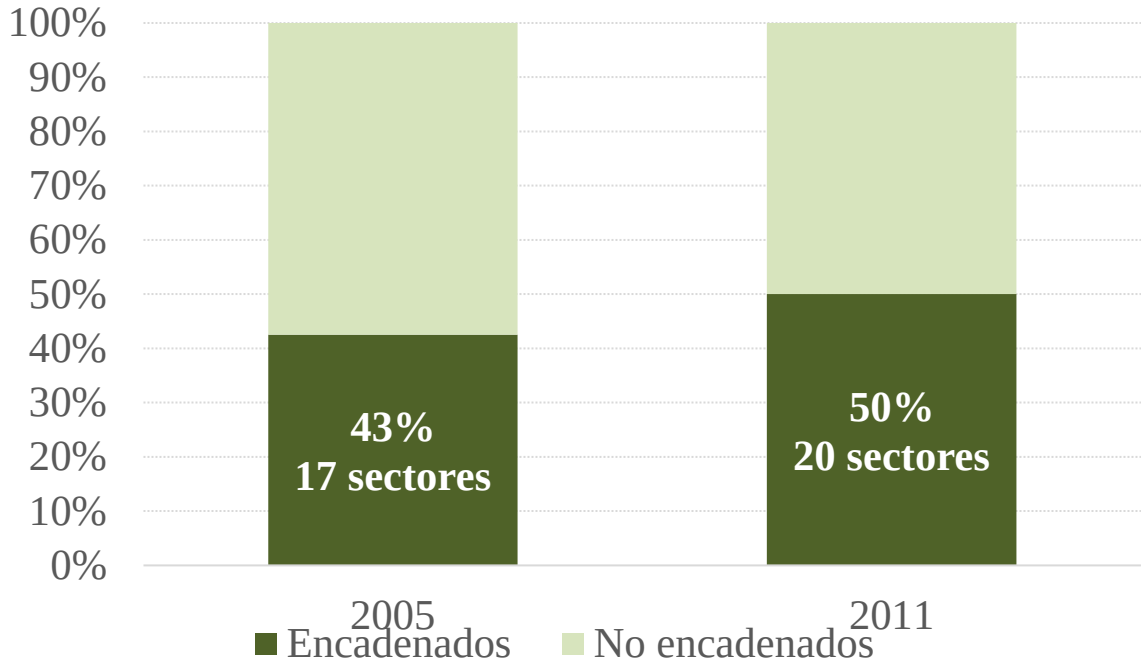
# Ecuador, backward linkages, 2005 and 2011

**Ecuador, Backward linkages analysis: An approximation of the RH Index**

**(number of sectors)**




**Meat and meat products**
**Cereal flours**
**Other food products**
**Beverages**
**Wood and Wood products**
**textiles, wearing apparel, leather products**
**Machinery and equipment**

**have increased their backward linkages**

**26% of GDP**

Source: CEPAL based on the IOT of Andean countries (IOT Ecuador)

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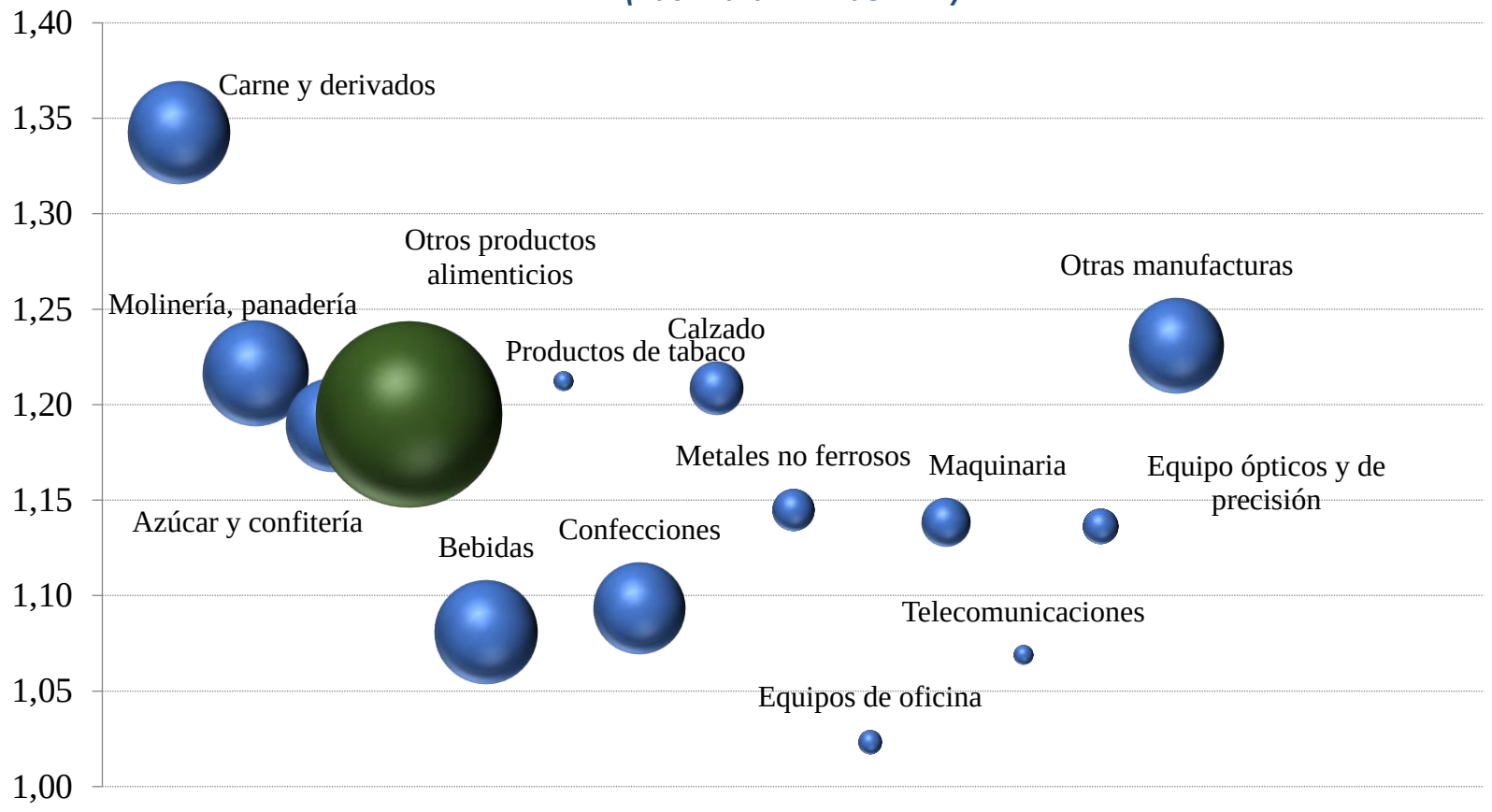
# The main driving sectors in Ecuador comprise 6.3% of GDP. Agroindustry is the most important (65% pushed own sectors, and 45% for other sectors)

## Ecuador, main driving sectors, 2005

*(Backward RH Index > 1)*




**Main Driven Sectors**
**Meat and meat products**
**Bakery products**
**Sugar and sugar products**
**Other food products**
**Other manufactures**

Source: CEPAL based on the IOT Ecuador

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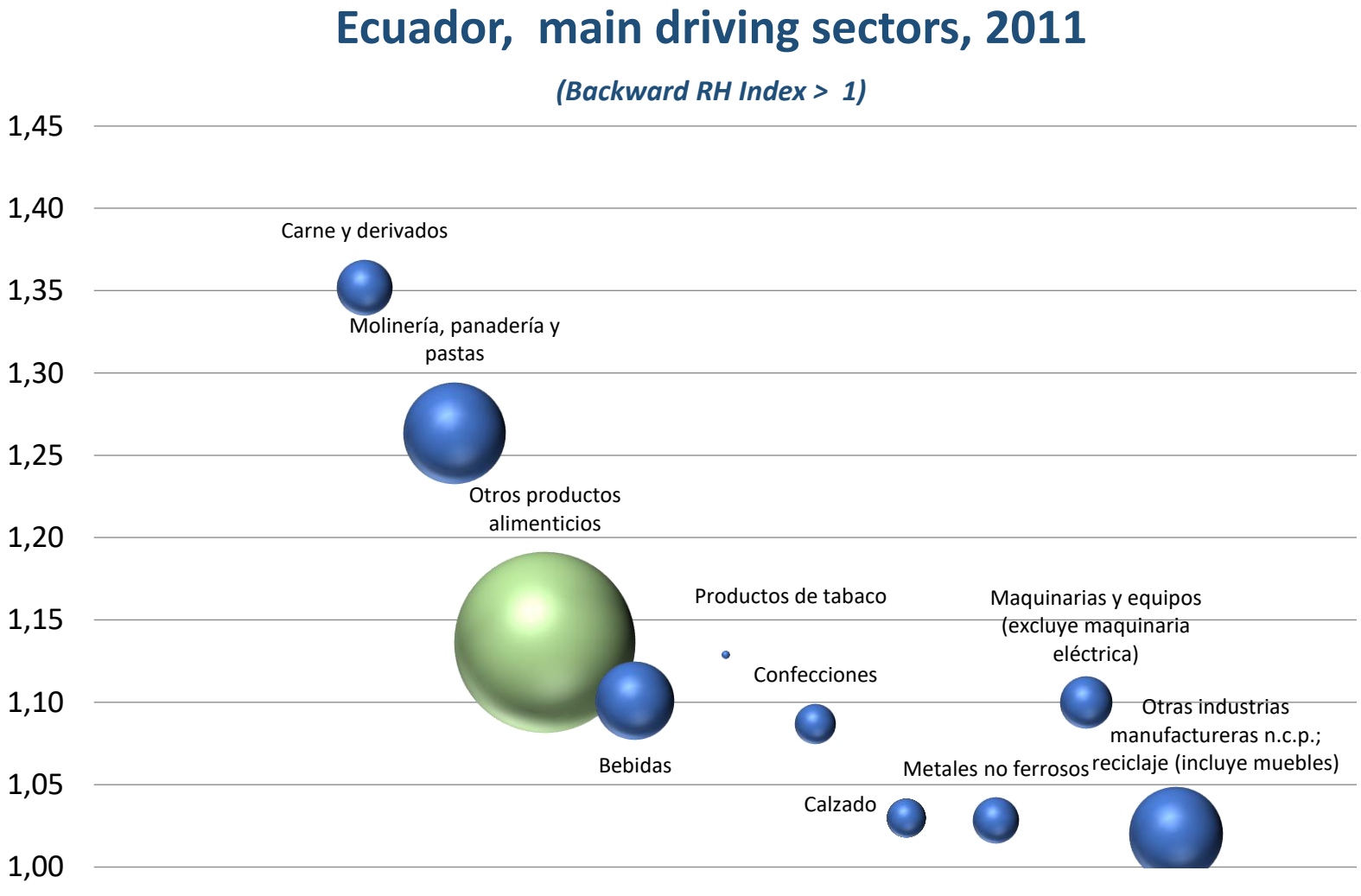
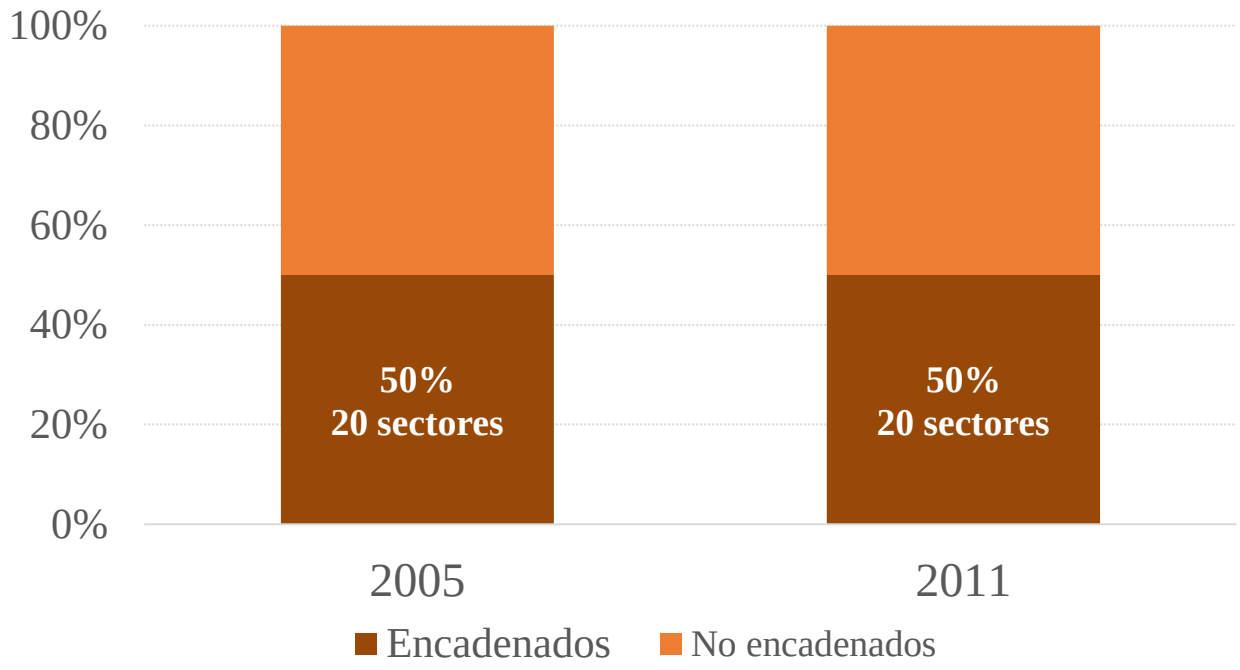
# For 2011 its weight increased to 8.1% of GDP. The agroindustry becomes the most important




Source: CEPAL based on the IOT Ecuador

# Peru, forward linkages, 2005 and 2011

**Peru, Forward linkage analysis: An approximation of the RH Index, 2005 & 2011 (number of sectors)**




50% of sectors

Agriculture
Hunting
Mining
Non metallic minerals
Iron and Steel
Chemicals
Business Services

**27% of GDP**

Source: CEPAL based on the IOT of Andean countries (IOT Peru)

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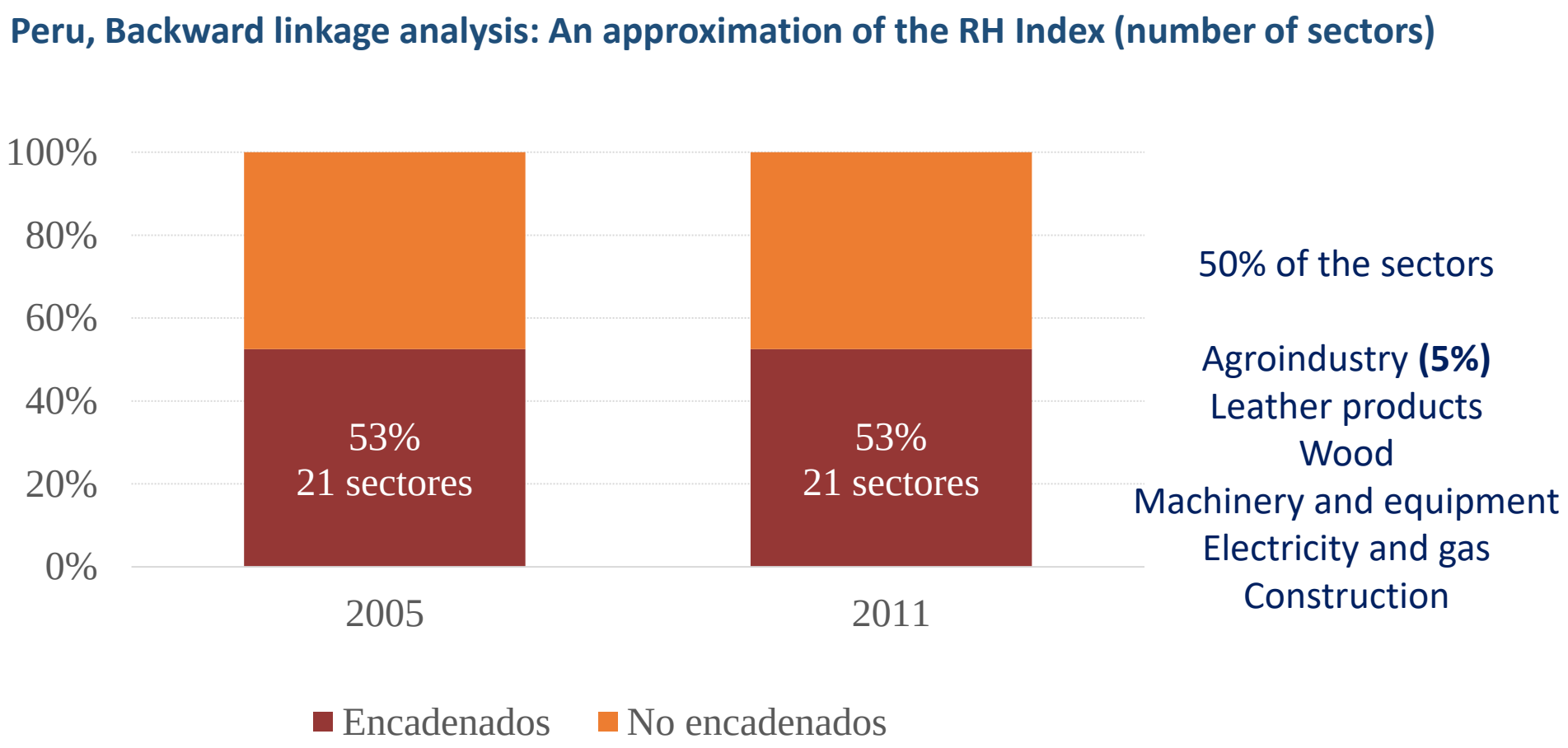
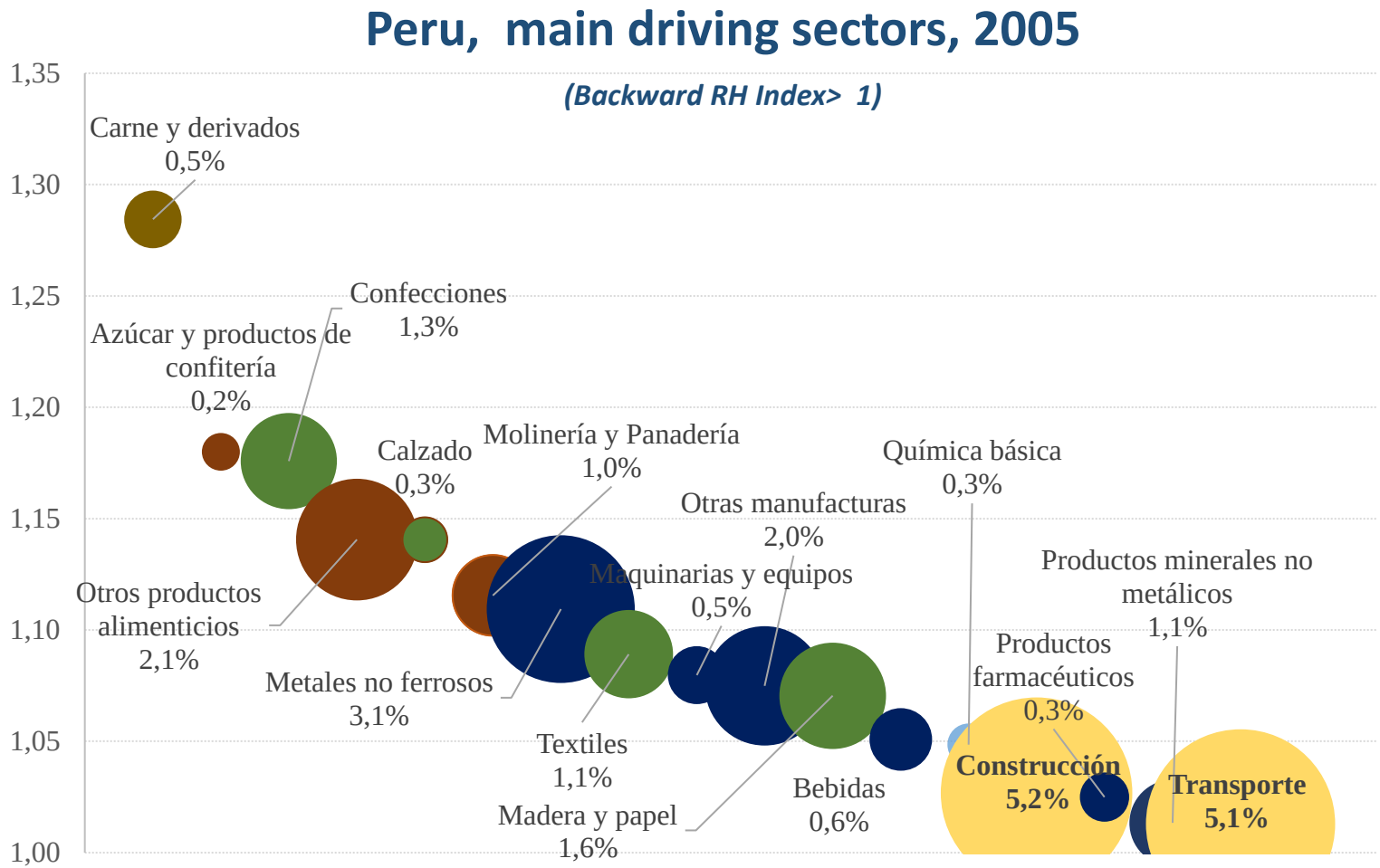
# Peru, backward linkages, 2005 and 2011




Source: CEPAL based on the IOT of Andean countries (IOT Peru)

# The main driving sectors in Peru in 2005 represented 26.4% of GDP (besides services, agroindustry, non ferrous metals and very important drivers).

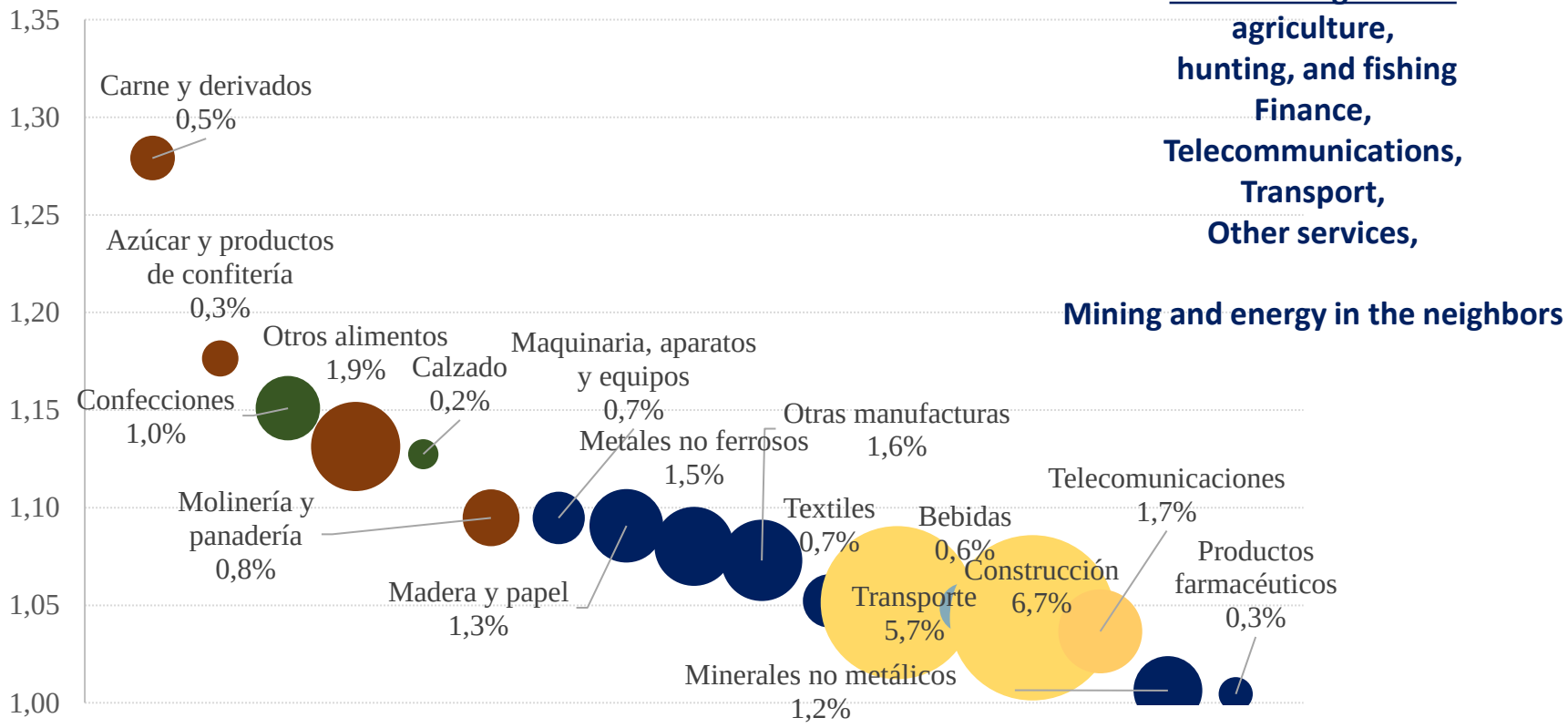



Source: CEPAL based on the IOT Peru, 2005

# In 2011, the weight of GDP of the main driving sectors increased to 28% (in 2011 services and agroindustry consolidate)

## Peru, main driving sectors, 2011

*(Backward linkage RH Index > 1)*




**Main driving sectors**
**agriculture, hunting, and fishing**
**Finance, Telecommunications, Transport, Other services,**

**Mining and energy in the neighbors**

Source: CEPAL based on the IOT Peru, 2011

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# Main sectors of Peru, linked forward

- **A third of all sectors considered in the South American IOT and Andean IOT**
  - **- Agriculture and forestry**
  - **- Mining (copper, zinc, silver, …)**
  - **- Textiles**
  - **- Pulp, wood and paper**
  - **- Rubber and plastic**
  - **- Non ferrous minerals**
  - **- Electricity and gas**
  - **- Transport**
  - **- Financing**
  - **- Business services (legal, accounting)**

**GOODS**

**SERVICES**

- **Main markets with linkages**
  - **China, Japan**
  - **CAN countries: Ecuador and Colombia;**
  - **Pacific Alliance: Chile and Mexico**

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# Main sectors of Peru backward linkage

- **53% of all sectors considered for Peru in the South American IOT(40) and Andean IOT (2011)**

- Meat and meat products
- Milling products
- Other food products
- Wearing apparel
- Non metallic minerals
- Non ferrous minerals
- Machinery and equipment
- Other manufacturing
- Construction;
- Transport;
- Business Services (legal, accounting, logistics,…)

2 indirect Jobs for each direct job

3 indirect jobs for each direct job

GOODS

Intensive in direct employment and generate indirect employment

SERVICES

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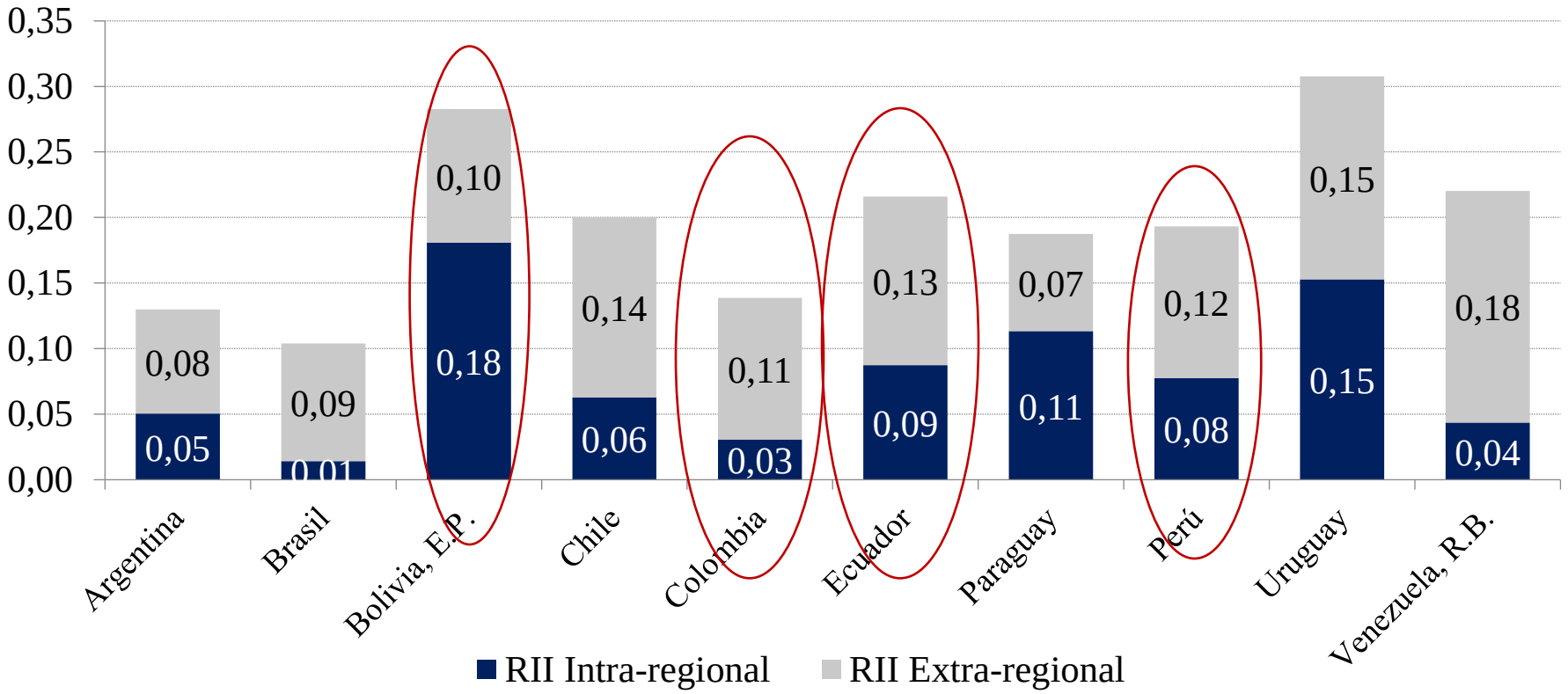
# The requirements of imported inputs of total production show that the AC countries require more intermediate inputs

## South America: Requirements of intermediate inputs in total production, 2005




Source: CEPAL based on the IOT of South America

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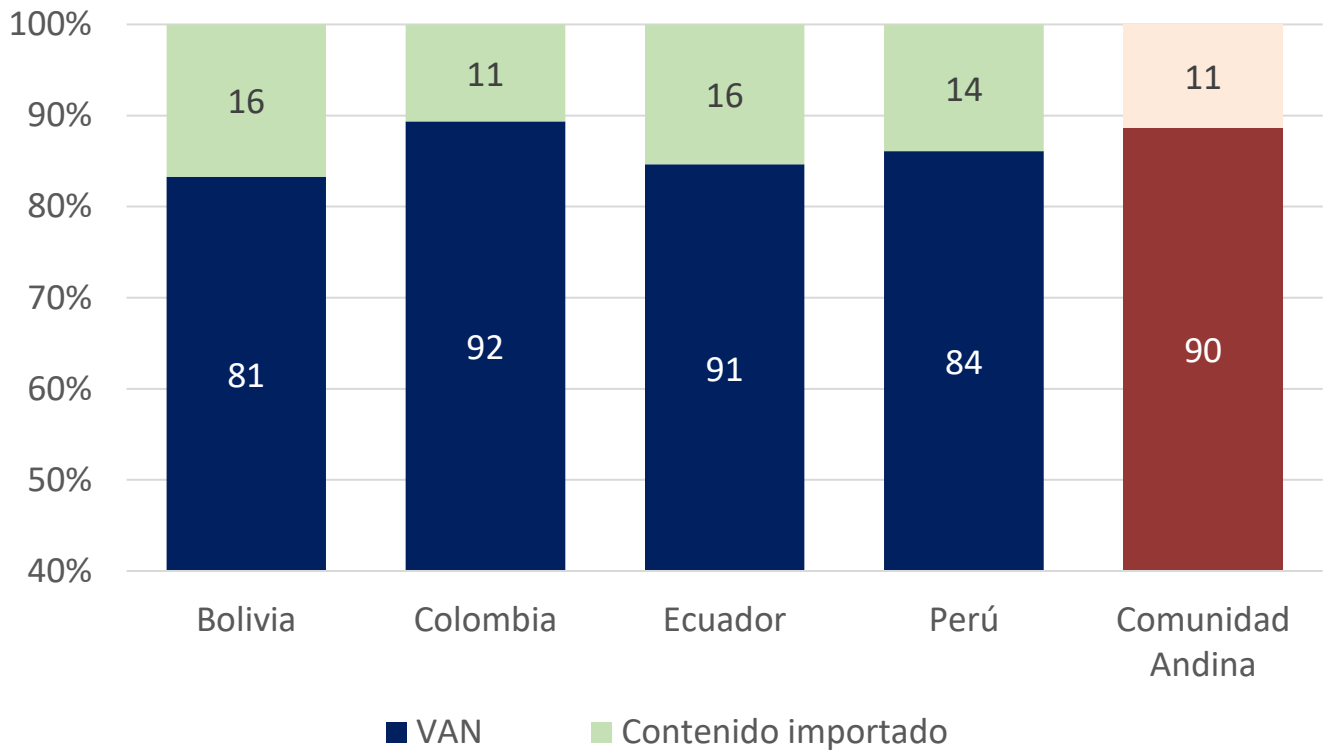
# In the Andean Community, on average, more than 80% of value added included in exports is domestic content. It is a little higher in Bolivia and Ecuador

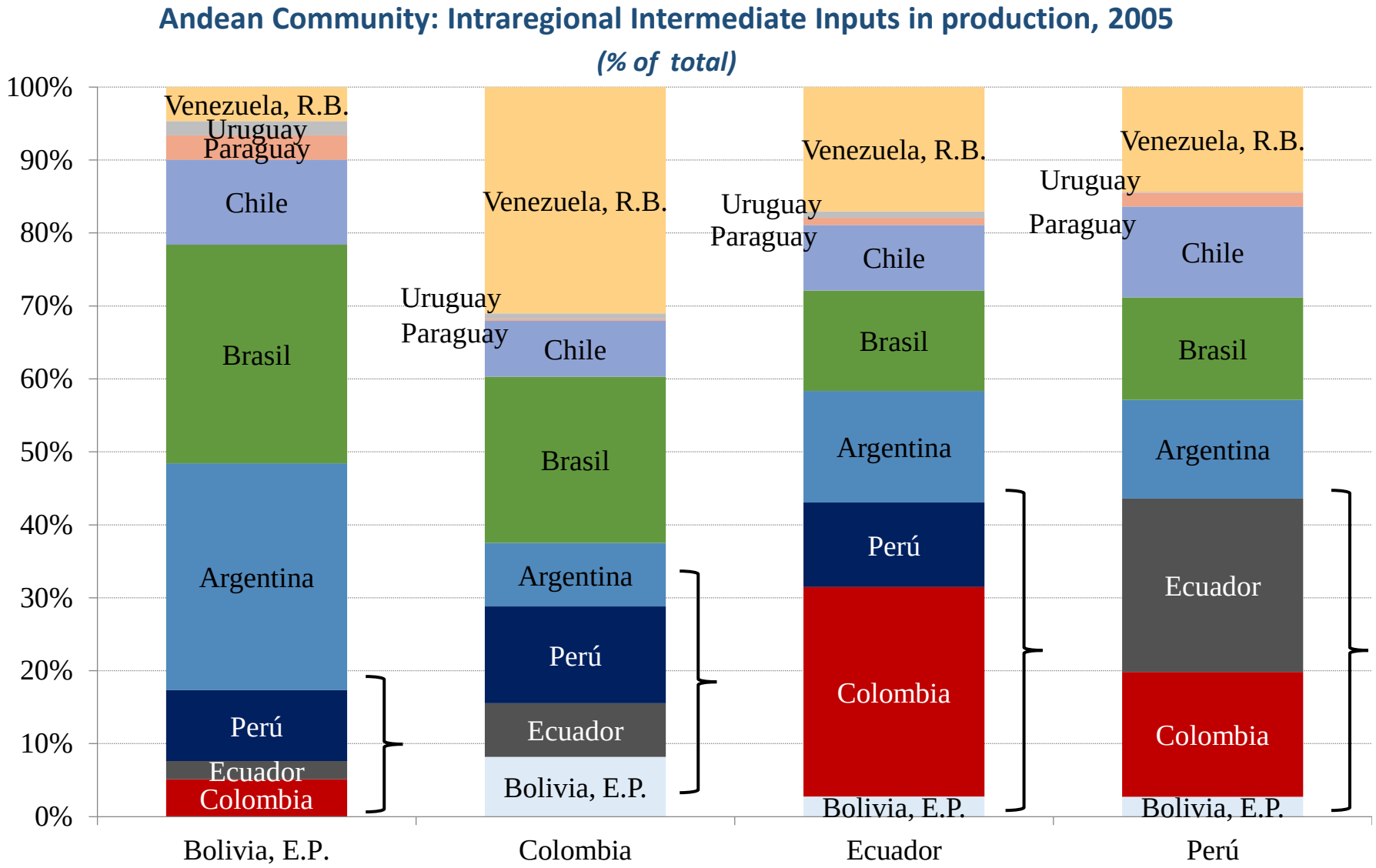
**Andean Community: Domestic Value Added content in exports, 2011**

***(Percentage of total)***




Source: CEPAL based on the IOT of Andean Community

# The decomposition of the origin on intra-regional intermediate inputs shows the linkages between Ecuador, Colombia and Peru

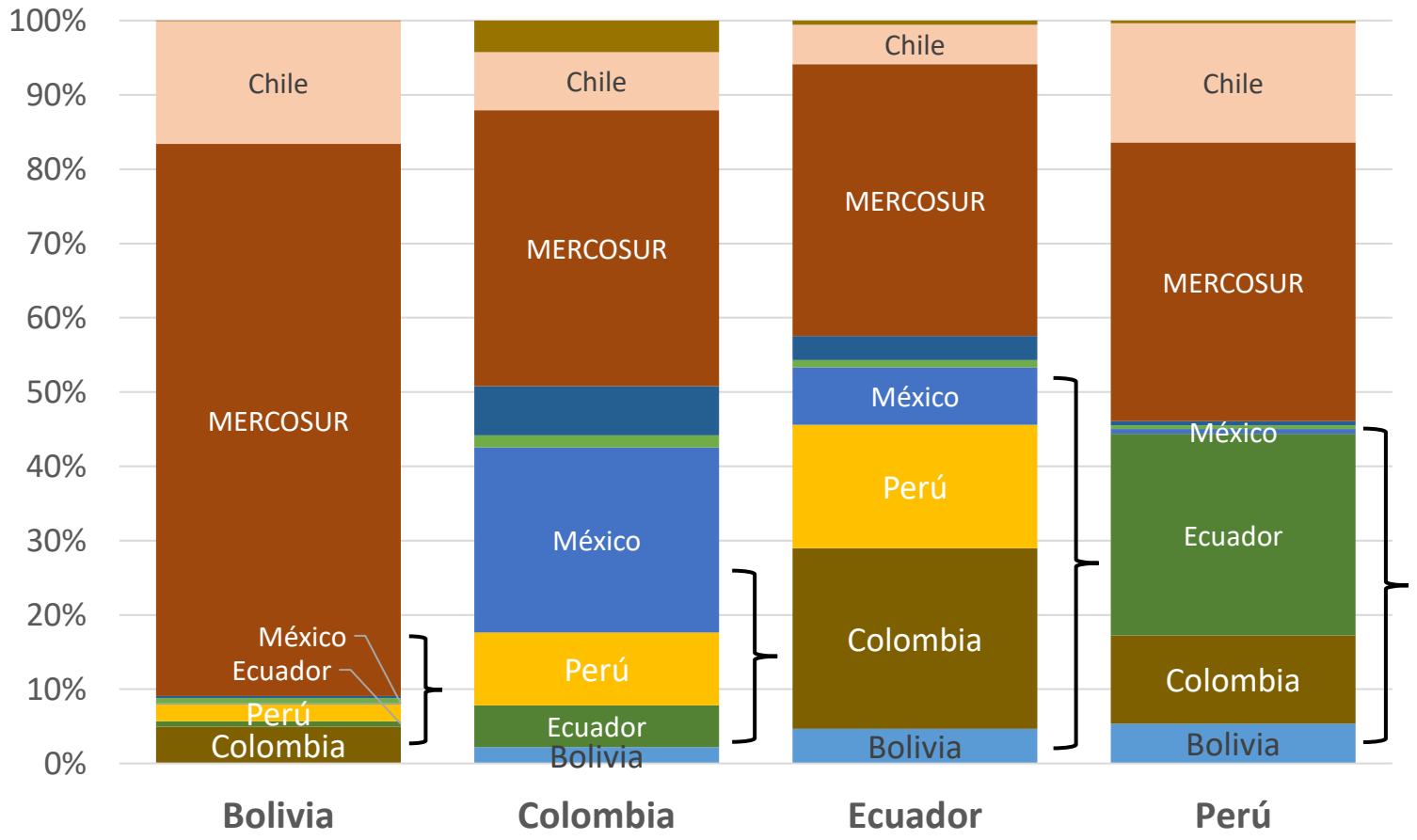



Source: CEPAL based on the IOT of South America, 2005

# Such linkage maintains in 2011. In the case of Bolivia is higher with MERCOSUR

**Andean Community: Intrarregional intermediate inputs in production, 2011**

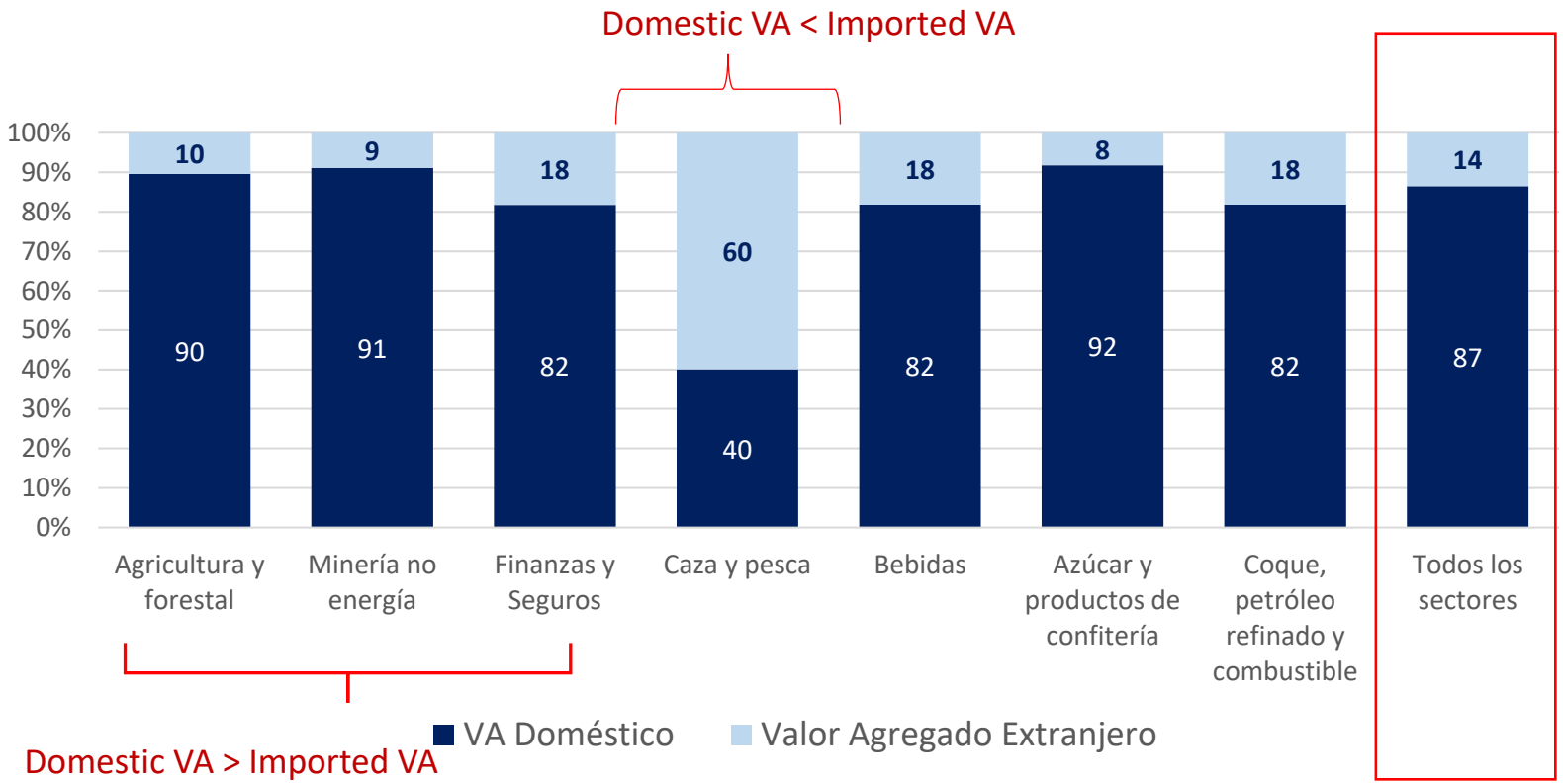
***(% of total)***




Source: CEPAL based on the IOT of South America, 2011

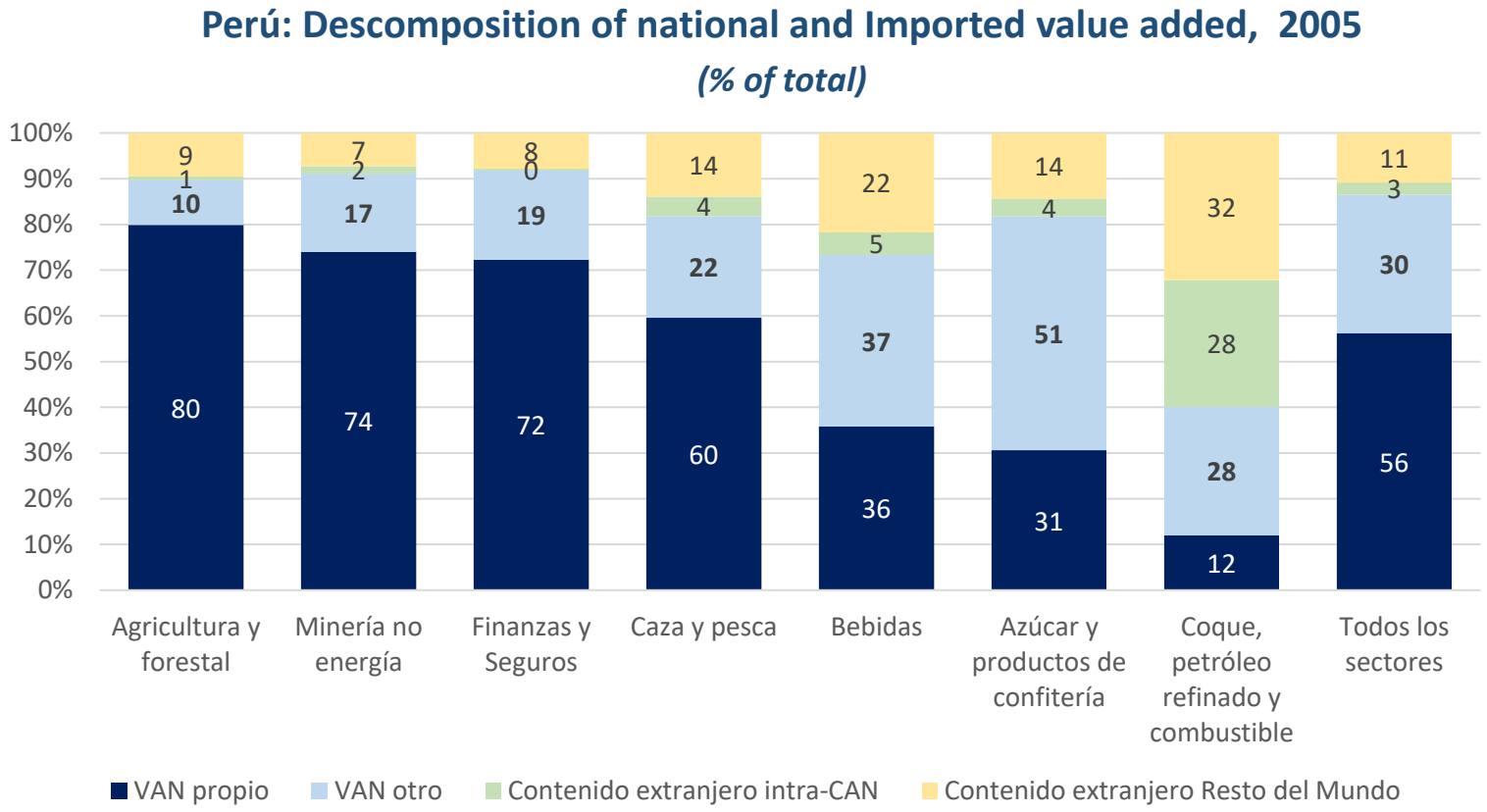
# The share of VA in exports can be decomposed in domestic value added and imported. The composition of this varies between sectors.

**Peru (2005): Value added in exports, by type (selected sectors)**
**(Percentage of total)**




Source: CEPAL based on the IOT of Andean Community and IOT Peru, 2005

# The imported value added can be decomposed in VA of the own sector, the VA of other national sectors, and the imported content can be intra and extra-regional

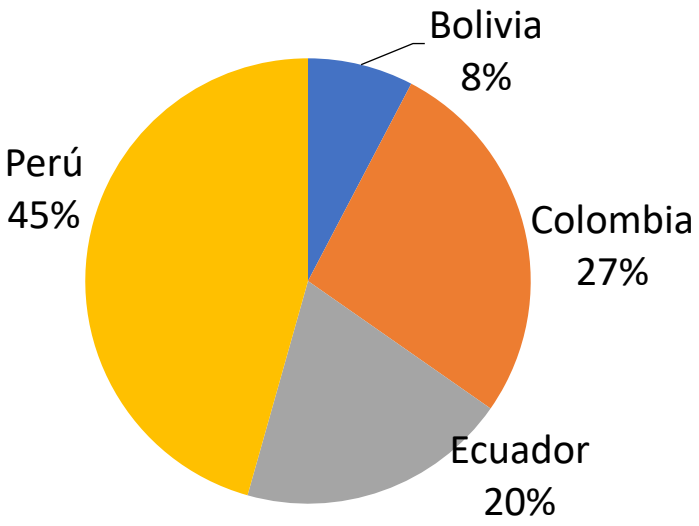



Source: CEPAL based on the IOT of Andean Community and IOT Peru, 2005

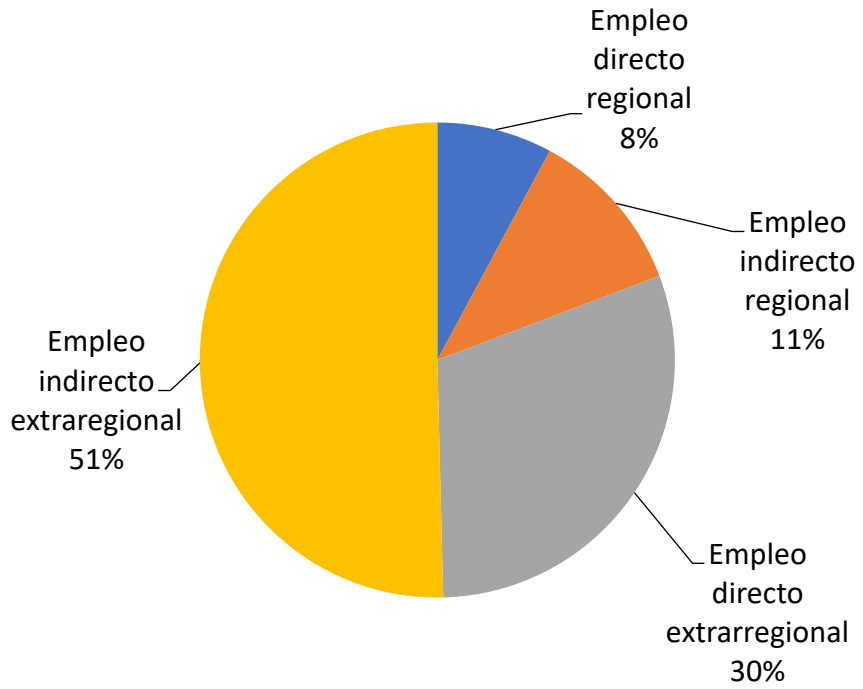
# By 2005, exports of the Andean Community helped 8 million jobs. 1.54 million, exports from CAN to South America

## South America, Employment estimates related to exports

**8 000 000 jobs**




**1 540 000 exporting jobs**
**CAN – South America**




**6 460 000 jobs (other destinations)**

Source: CEPAL based on the IOT of South America

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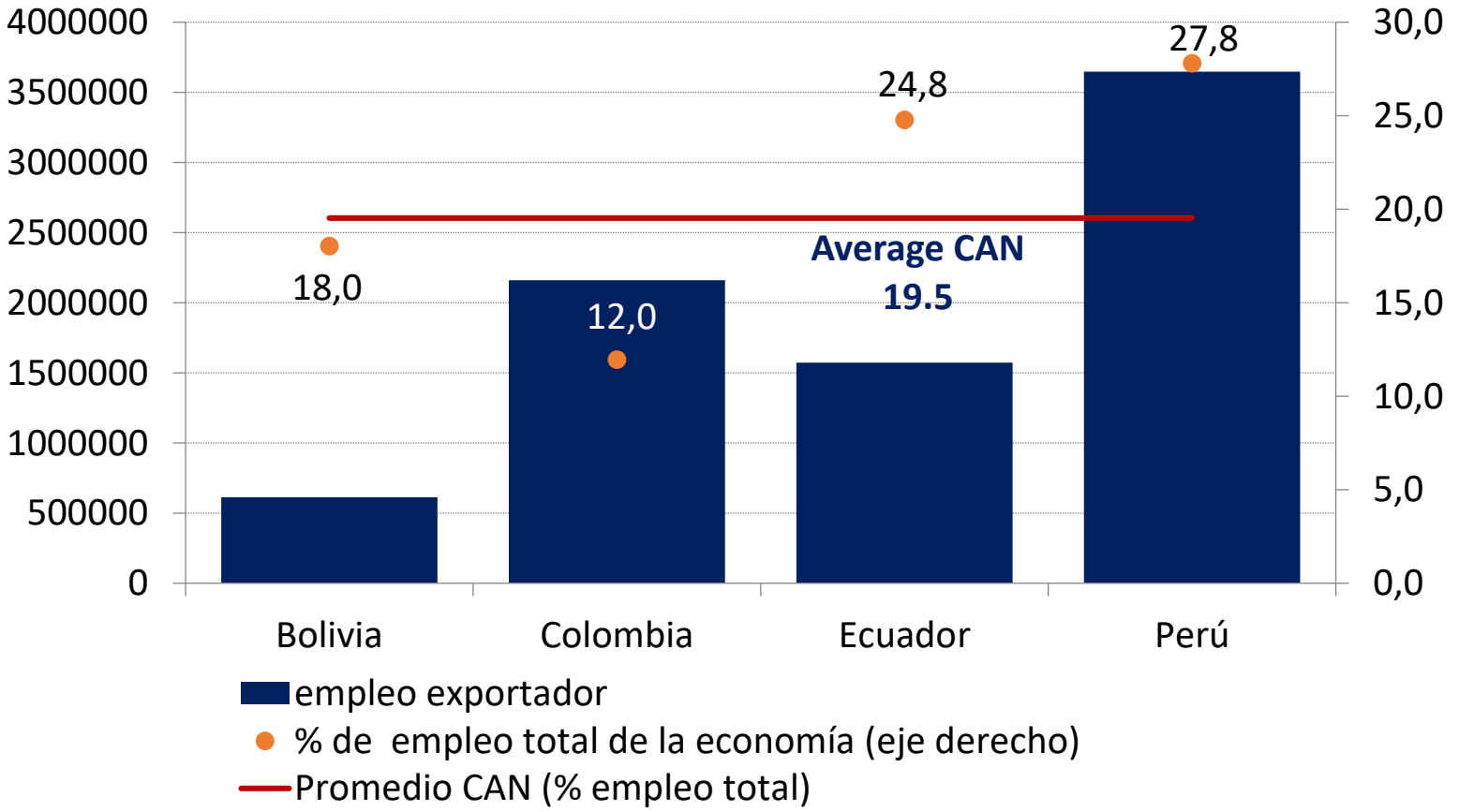
# In 2005, export related jobs represented 20% of total economic active population in AC

## Employment estimates related to exports in the Andean Community




Source: CEPAL based on the IOT of South America and employment data

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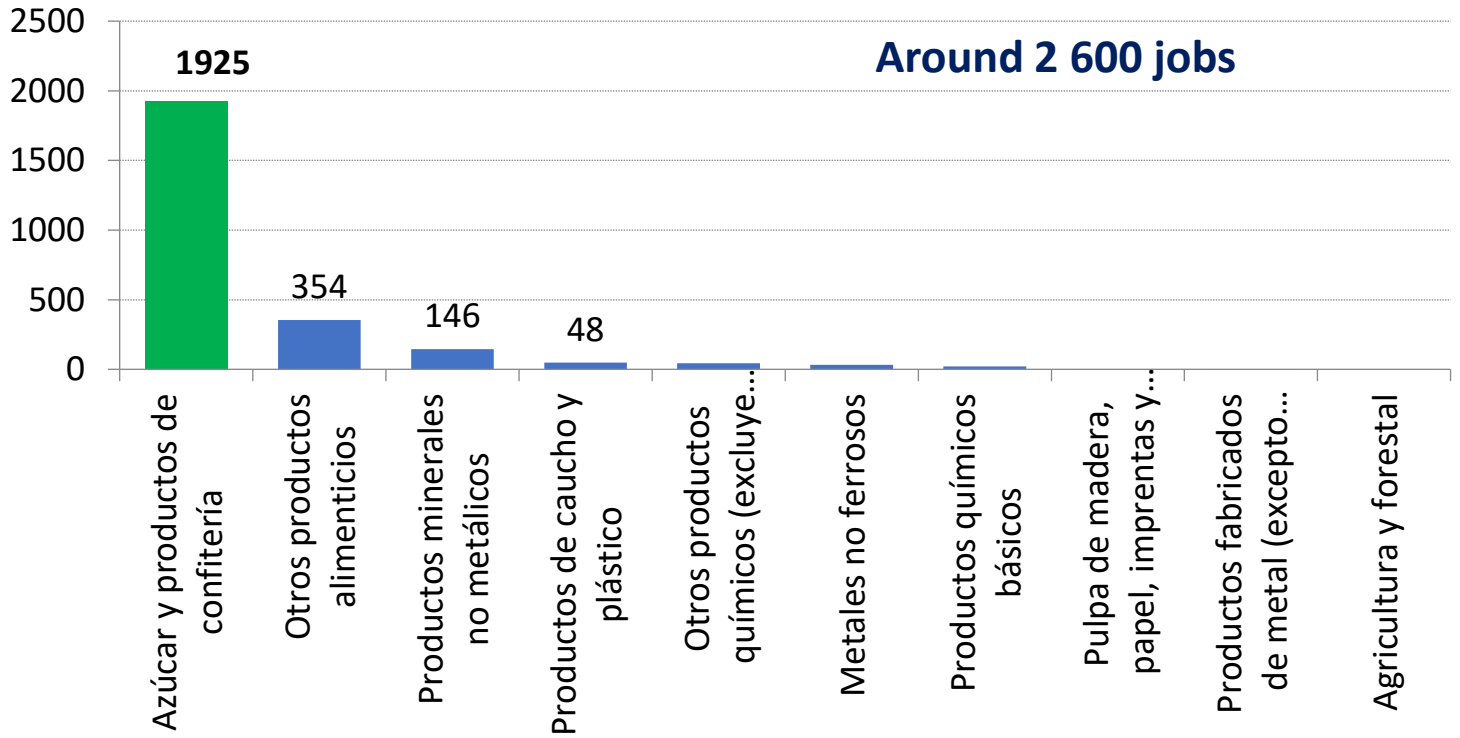
# The IOT from South America allows to answer the following questions: ¿How much employment will the beverage sector in Peru will create in Colombia?

## Employment estimates associated to Colombian exports in the beverage sector of Peru

*(Number of Jobs created in various sectors of Colombia)*




Source: CEPAL based on the IOT of South America, employment data, and sectoral exports

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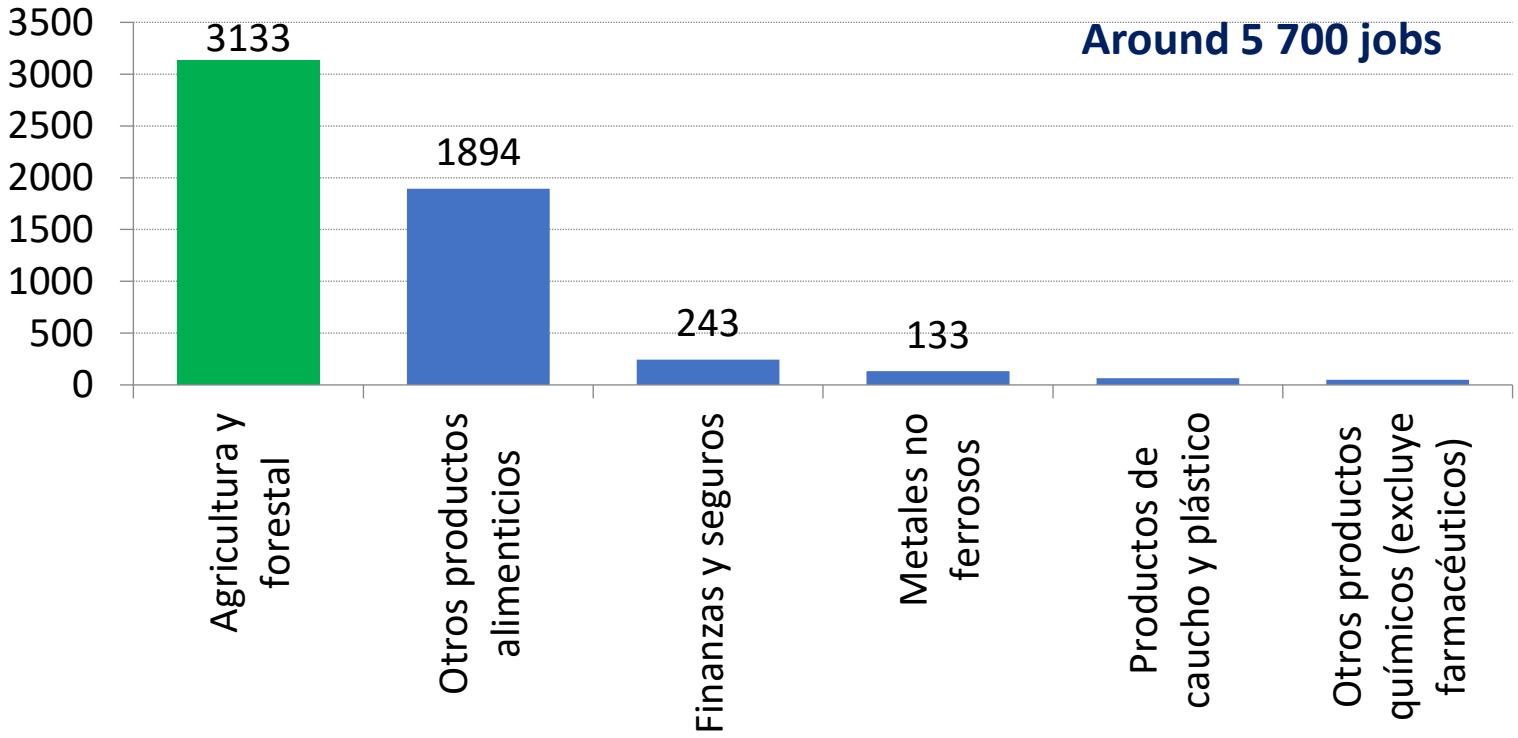
# Or : ¿How much employment does the food, beverages and tobacco sector in Colombia drives in Peru?

## Export related employment estimates of the food, beverages and tobacco sector in Peru to Colombia

*(Number of Jobs created in various sector in Colombia)*




Source: CEPAL based on the IOT of South America, employment data, and sectoral exports

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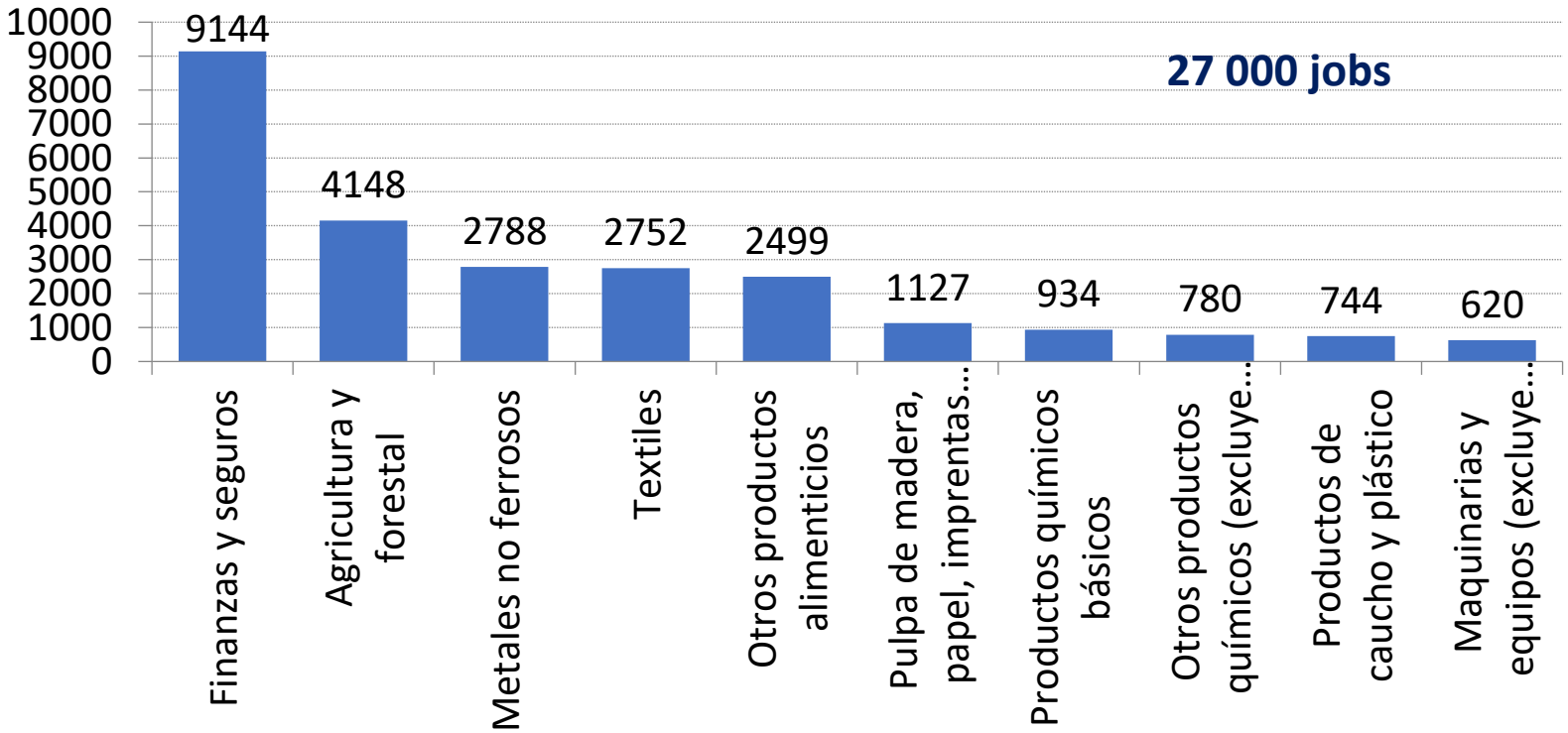
# How many jobs does the demand of intermediate goods of Colombia to Peru create?

## Export related employment from Peru to Colombia (all sectors)

*(Number of jobs created in various sectors of Peru)*




Source: CEPAL based on the IOT of South America, employment data, and sectoral exports

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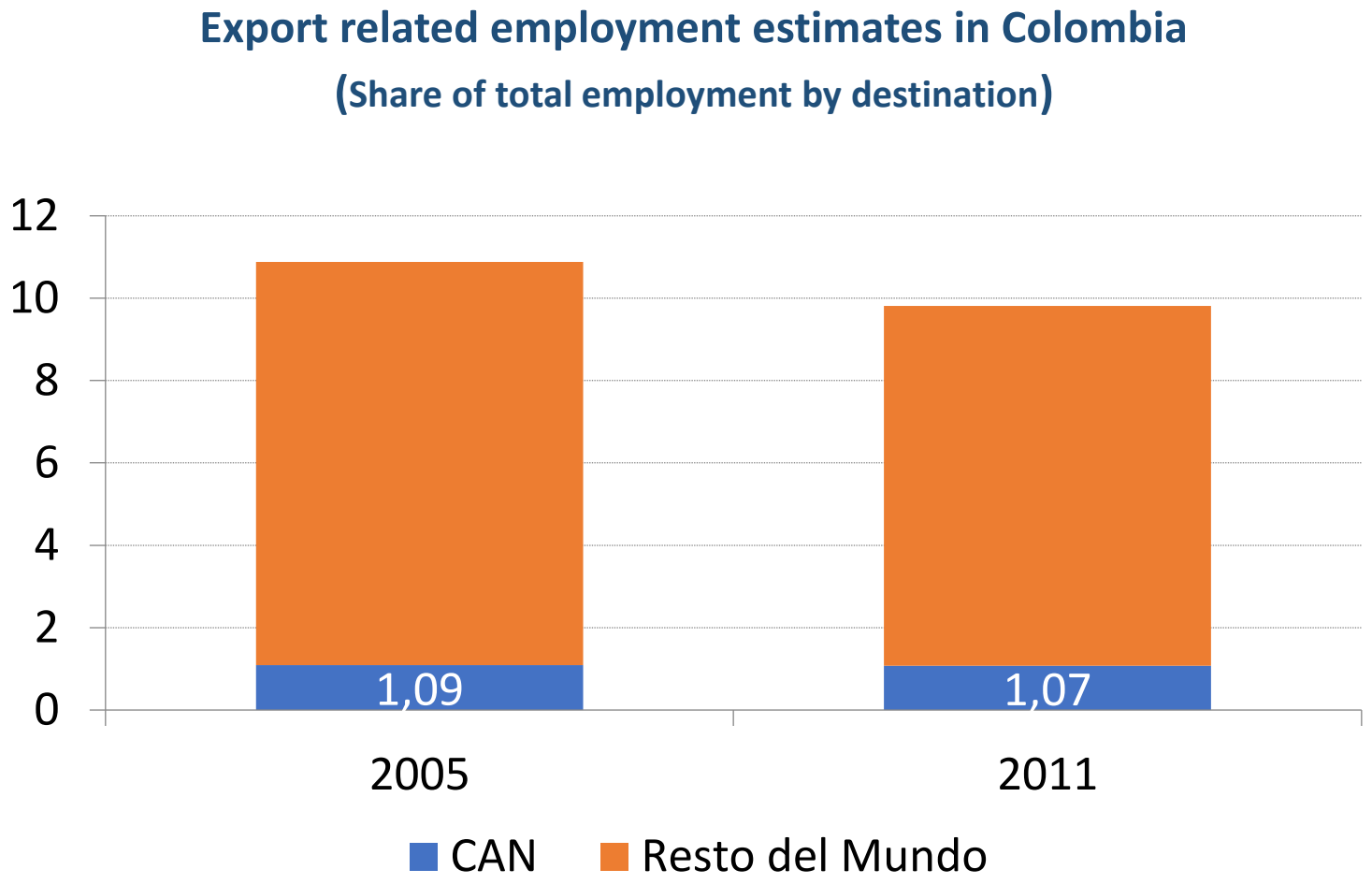
# For Colombia, 10% of total employment is related to exports (2011). AC explains 10% of that total.




Source: CEPAL based on the IOT of South America and IOT of Andean Community, and employment data

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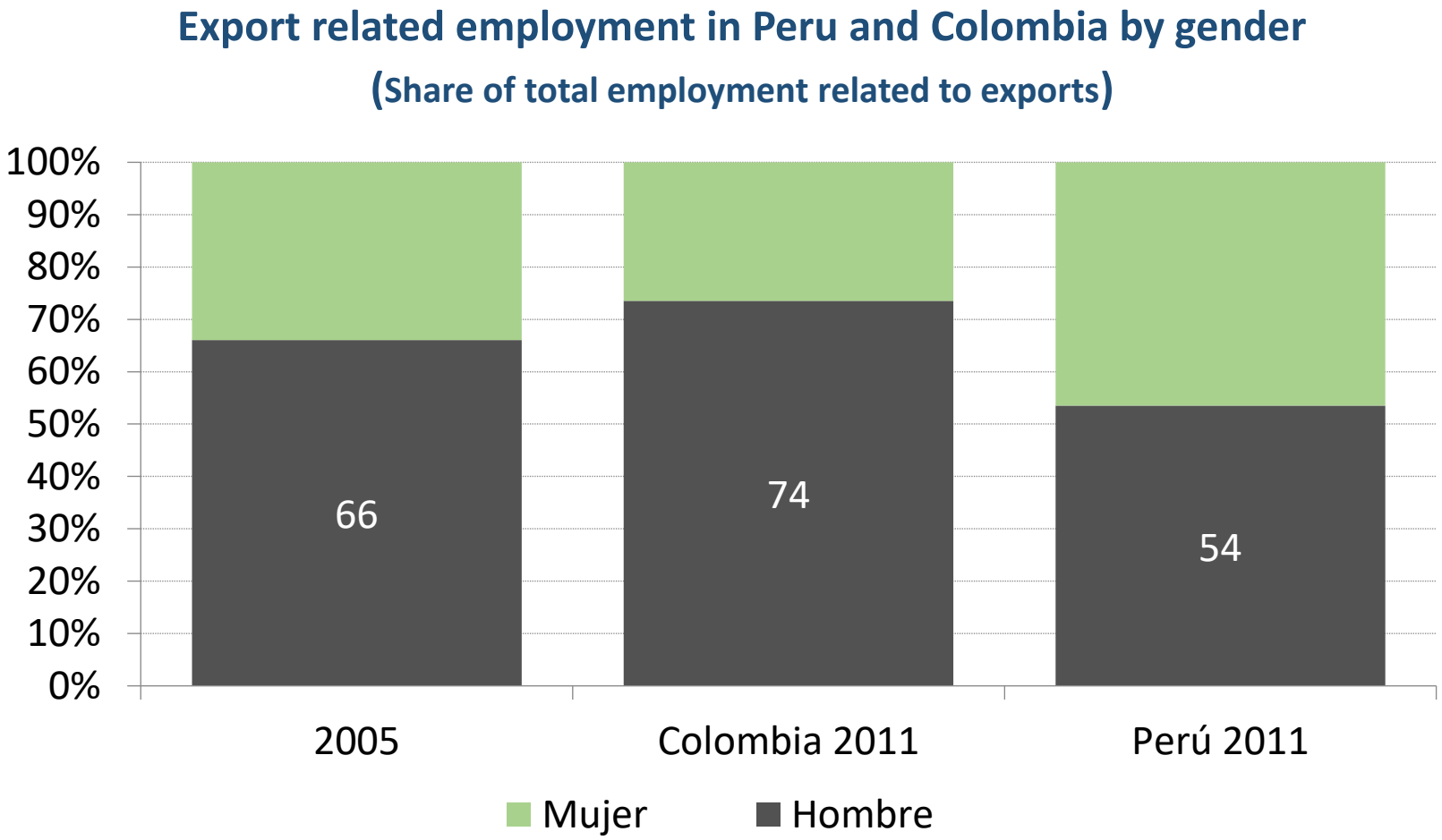
# 74% of export related employment in Colombia are men. In Peru is 54%; with 73% of qualified labor.




Source: CEPAL based on the IOT of South America and IOT of Andean Community, employment data, and household surveys for 2005 and 2011.

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# Exports of goods to AC generate around 148 000 Jobs in various sectors

**Ecuador: Employment generated from exports to CAN, 2014**
(In number of people and percentages)

| Sectors | Emplopment explained from exports to CAN | Female Employments | Export employment structure | EI/ED |
|---|---|---|---|---|
| Agriculture, forestry, hunting and fishing | 17.730 | 5196 | 12.0 | 1.3 |
| Oil and mining | 23.380 | 4770 | 15.8 | 0.1 |
| Food, beverages and tobacco | 23.936 | 8845 | 16.2 | 3.5 |
| Wood, Pulp and paper | 9.025 | 1968 | 6.1 | 0.9 |
| Chemical and Pharmaceutical | 2.641 | 882 | 1.8 | 1.3 |
| Rubber and plastic | 3.635 | 754 | 2.5 | 0.5 |
| Non metallic minerals | 5.024 | 813 | 3.4 | 0.3 |
| Metals and other products | 2.379 | 85 | 1.6 | 3.1 |
| Machinery and equipment | 8.097 | 1196 | 5.5 | 0.8 |
| Motor vehicles and parts | 2.853 | 346 | 1.9 | 1.6 |
| Other manufactures | 788 | 192 | 0.5 | 0.6 |
| Services | 35.340 | 15626 | 23.9 | 0.1 |
| All sectors | 147.903 | 48760 | 100.0 | 0.8 |

**Source:** CEPAL, estimates based on the IOT of Ecuador

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# Colombia: Employment pattern according to intensity (Direct and/or Indirect), IOT 2011

**Colombia, typology of export related employment by sectors and products**

| Direct Employment Intensive Sectors<br>RDE > RIE | Indirect Employment Intensive Sectors<br>RDE< RIE |
|---|---|
| Agriculture and forestry<br>Hunting and fishing<br>Mining (no energy)<br>Textiles, wearing apparel and leather products<br>Wood and Wood products<br>Metal products<br>Office equipment, machinery and electronic products<br>Services (water, gas, construction, trade, hotels, restaurants, transport, insurance, business services, private education, health, recreational, and domestic services) | Mining (energy)<br>Meat and meat products<br>Milling, bakery and pasta products<br>Sugar and confectionary products<br>Other food products<br>Beverages<br>Tobacco products<br>Paper products, publishing<br>Basic chemical products<br>Pharmaceutical products<br>Rubber and plastic<br>Iron and steel<br>Non ferrous metals<br>Machinery and equipment<br>Medical equipment and precision instruments<br>Other transport equipment<br>Vehicles<br>Airplanes<br>Other transport equipment<br>Electricity and gas |

# Peru: : Employment pattern according to intensity (Direct and/or Indirect), IOT 2005

**Peru, typology of export related employment by sectors and products**

| Direct Employment Intensive Sectors/Products RDE > RIE | Indirect Employment Intensive Sectors/Products RIE > RDE |
|---|---|
| Agriculture and forestry | Energy and non energy mining |
| Hunting and fishing | Meat products |
| Textiles, wearing apparel and leather products | Other food products |
| Wood pulp | Beverages |
| Pharmaceuticals | Wood |
| Rubber and plastic | Oil and petroleum coke |
| Non metallic minerals | Basic chemicals |
| Iron and steel | Non ferrous metals |
| Metal products | Machinery and electric equipment |
| Transport Equipment | Other manufactures |
| Services (electricity and gas, other services) | Services (transport, construction and finance) |

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# Conclusions on analysis of value chains that complement the I-O approach

- **There are important linkages between countries regarding demand of exports/imports and intermediate goods**
  - For example, in Ecuador is 20% del domestic value added (US$ 20 MM)
- **¿What does it mean the value chains in terms of VA, trade and employment?**
  - 90% of manufacturing sectors
  - 76% of employment generated by exports in CAN (42% of employment from exports to CAN 63000 to 148000 jobs) **12% export related employment**
- **Main sectors involved in the supply of intermediate godos, domestic and imported**
  - For example, in Ecuador: Agriculture and fishing, Food, Chemicals, Plastics, Wood and paper, Metal and machinery products.

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# Agenda

- Value chain analysis with IOT
- **Convergence of Regional IOT initiatives**
- Progress between 2020 and 2021
- Challenges ahead and next steps

# Stock of IOTs in Latina American region

MERCOSUR IOT
Andean Community IOT
Central America IOT
+
Mexico
+
Chile
+
Dominican Republic


18 National IOTs
40 X 40
Years: 2011, 2014, 2017*
* Only South America

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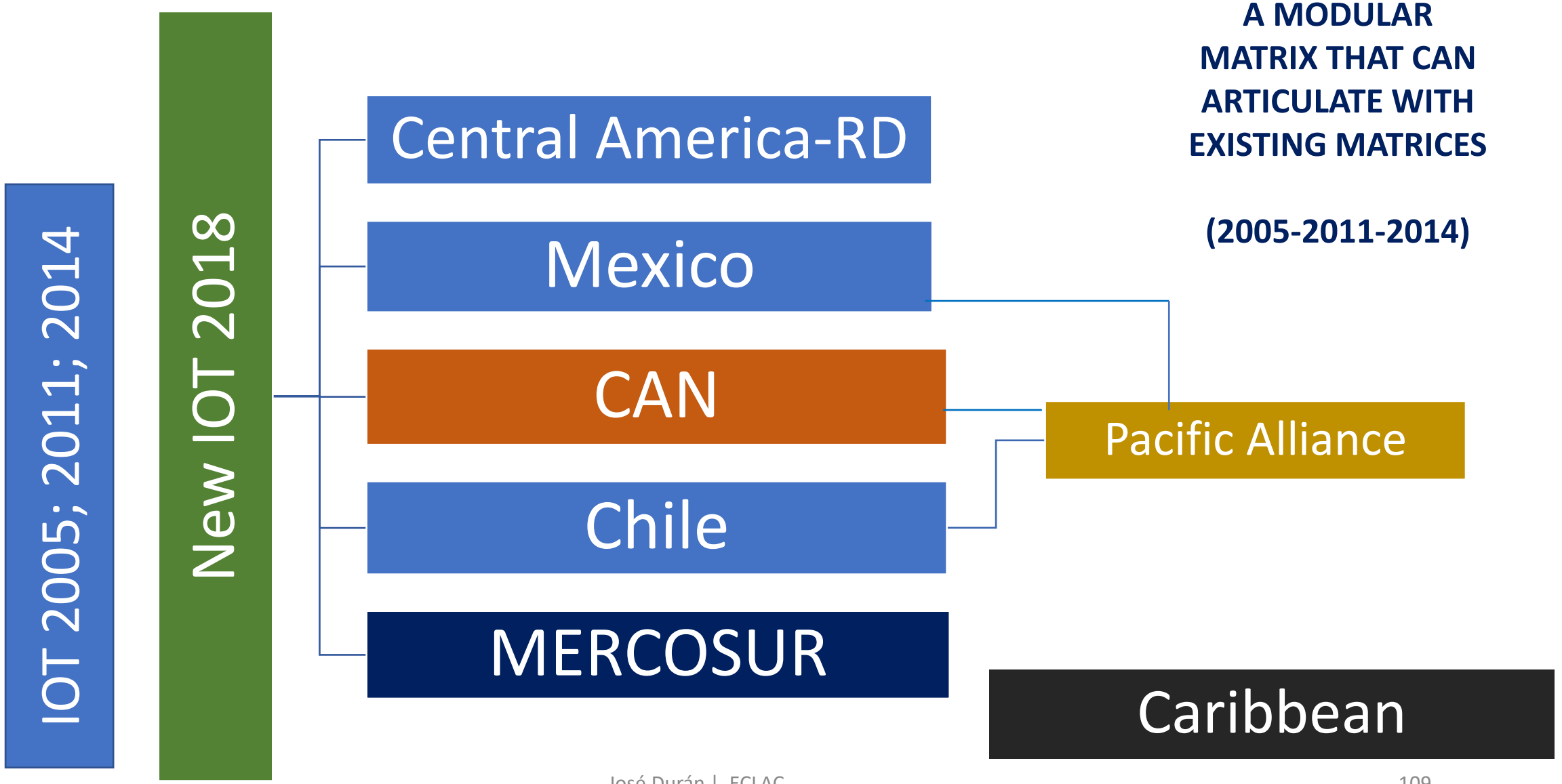
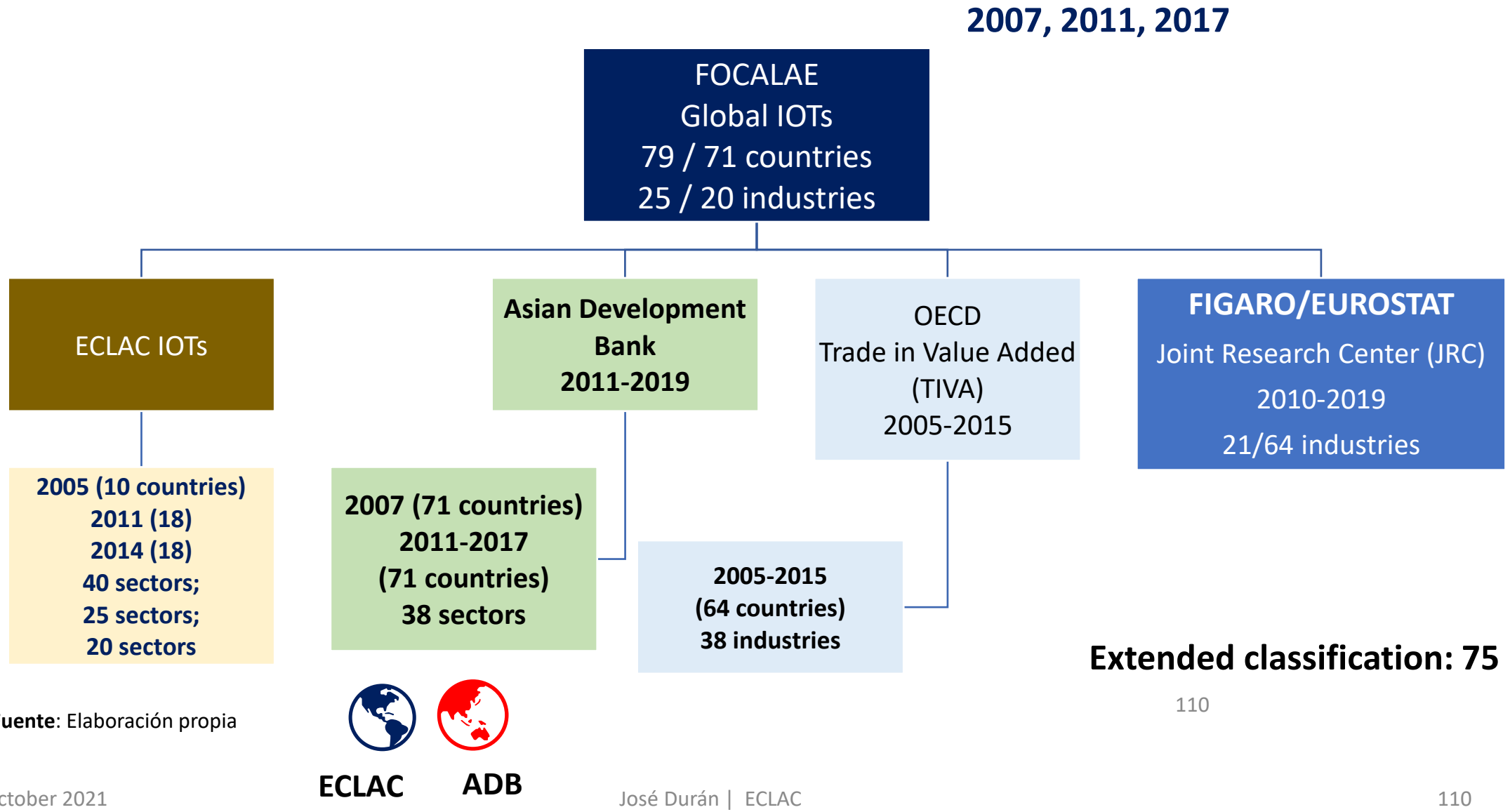
# Thinking about the future of working with input-output matrices (ECLAC side)




**A MODULAR MATRIX THAT CAN ARTICULATE WITH EXISTING MATRICES**

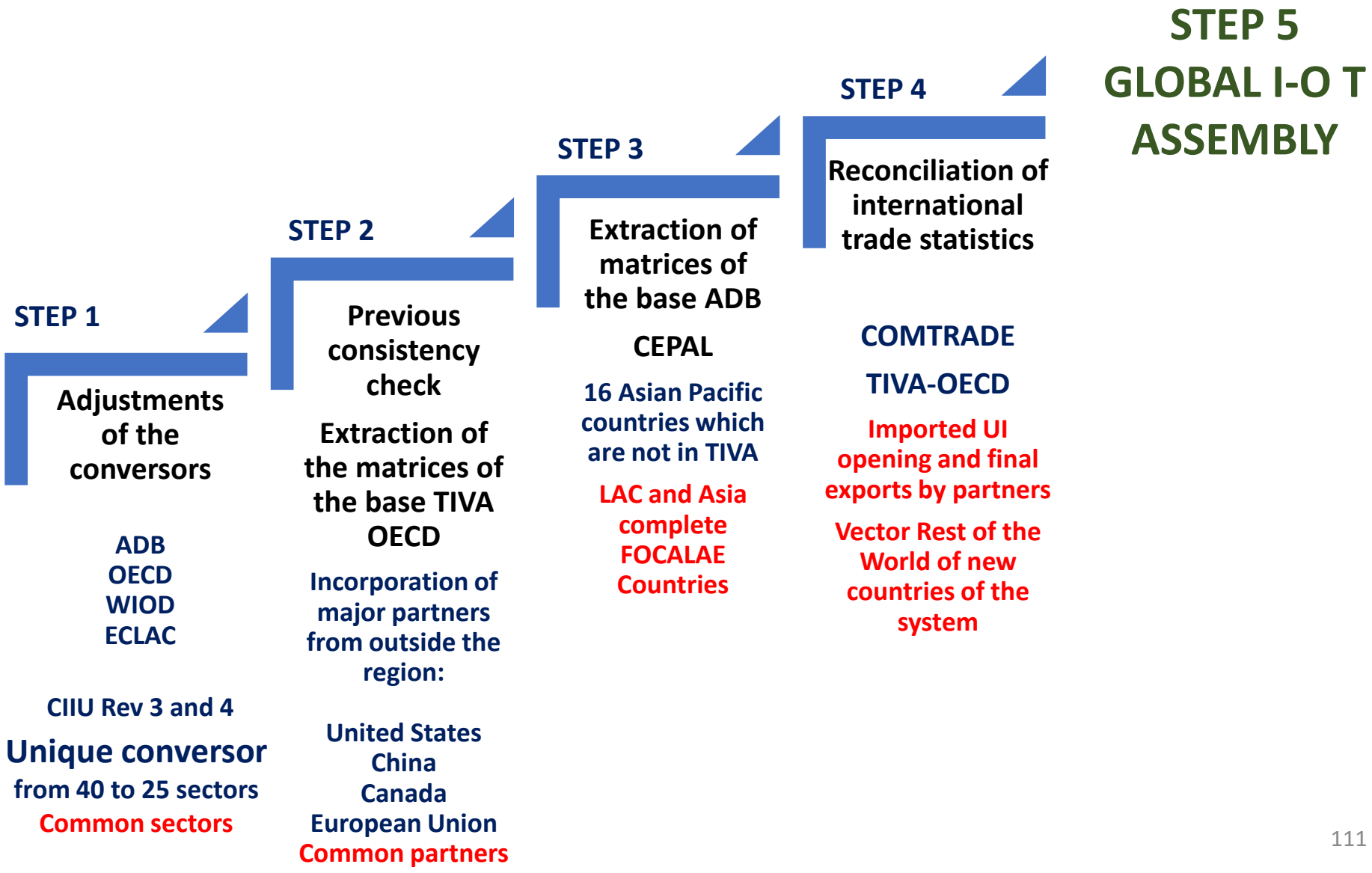
**(2005-2011-2014)**

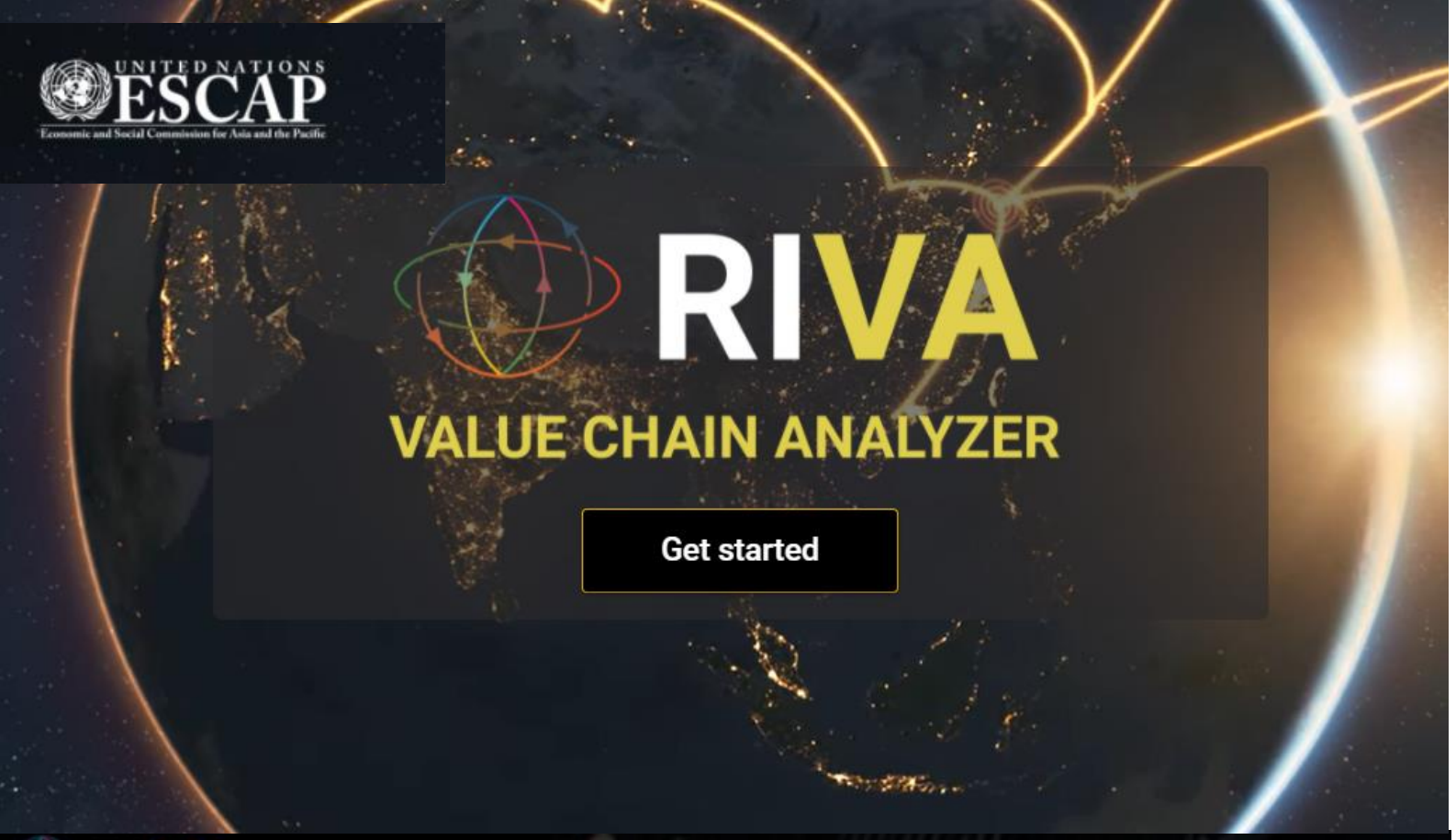
# Latin American IOTs and TIVA Projects (Partner sides)




**Fuente**: Elaboración propia

# Much of the critical path to achieve a Global IOT has already been taken (ADB MRIO) and remains to be consolidated (OECD; EUROSTAT)







| | | | |
|---|---|---|---|
| WIOD | | | |
| | MRIO ADB | | |
| | | ECLAC South America | |
| | | | ECLAC Central America |

**MRIO ADB: 2007,2011,2017**
**71 countries**
**+ ROLAC + RoW**

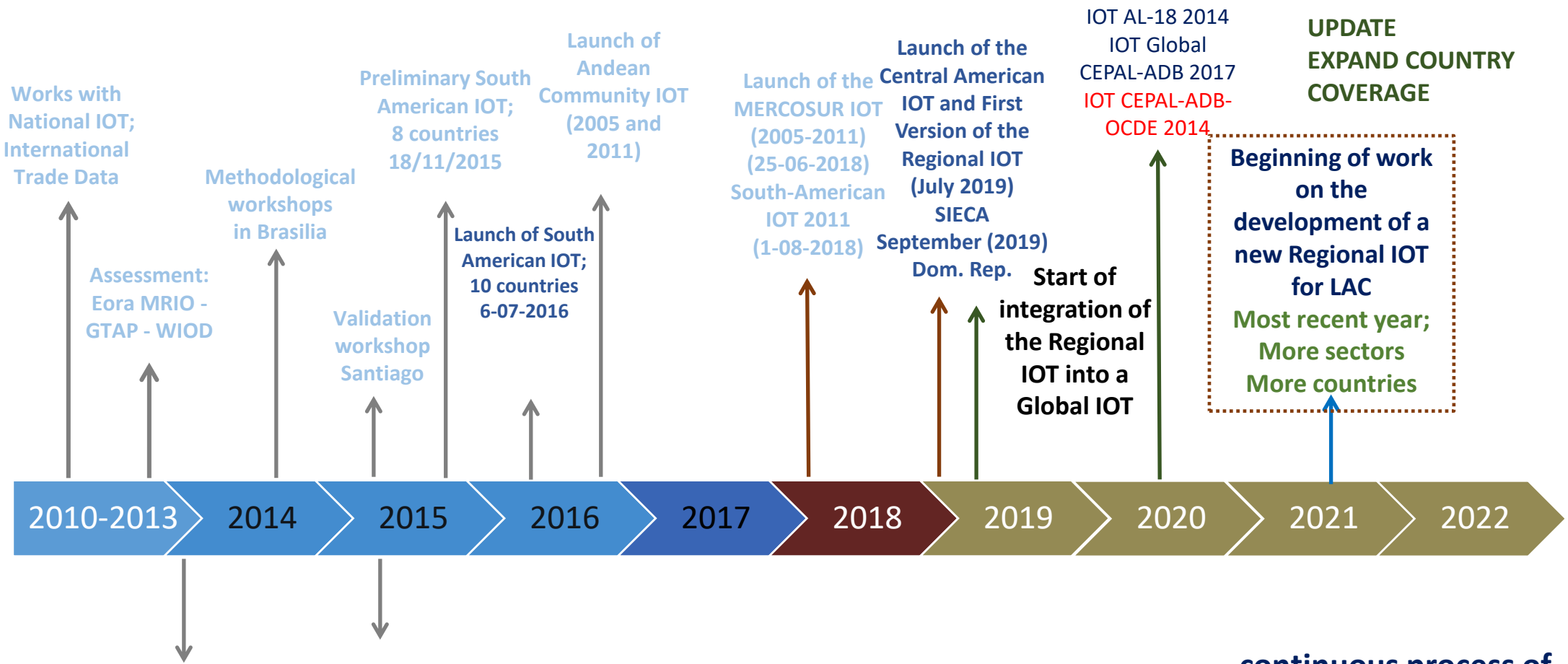
**ECLAC MRIO Table including Central American (2011, 2014)**

**This matrices has been the basis of several studies developed by ECLAC**

# Agenda

- Value chain analysis with IOT
- Convergence of Regional IOT initiatives
- **Progress between 2020 and 2021**
- Challenges ahead and next steps

# Origin, History and Development : Steps to expand coverage in the region




**Project in continuous development:**
**We work to expand the usefulness of IOT approach**
**Employment and CO2 emissions**

**continuous process of convergence to include LAC in global initiatives (ECLAC-ADB-OCDE-FIGARO)**

# Progress during 2020-2021: Updating of matrices and openness

- Between 2020 and 2021, ECLAC began developing a **new Latin American IOT for 2018**. This matrix included a broader opening of partners that included Asia Pacific.
- This new IOT not only includes the updating of the 40 sectors of our previous matrices (2005-2011-2014) but also an expansion of sectors.
- **In each integration scheme (MERCOSUR, CAN, CACM), matrices with a wider range of sectors will be constructed in order to identify subregional value chains and the particularities of each case.**
- The new Latin American IOT will have two versions: The classic one with 40 sectors and an alternative with 56 sectors. ( The pivot IOT for each country : 81 sectors)
- **This Latin American IOT of 56 sectors will allow convergence with other initiatives (EC FIGARO-JRC, OECD) and project the construction of a global matrix with greater representativeness of both countries and sectors.**

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# New challenges: Incorporating the CARIBBEAN

- In 2021, the incorporation of the CARIBBEAN countries into ECLAC's IOT has begun.
- In a first stage, information is being compiled and countries are being contacted for their participation in the project.
- It is a great challenge due to the lack of national accounts information and the lack of updating of the little information available.
- The assembly of the IOTs is also accompanied by capacity building events.

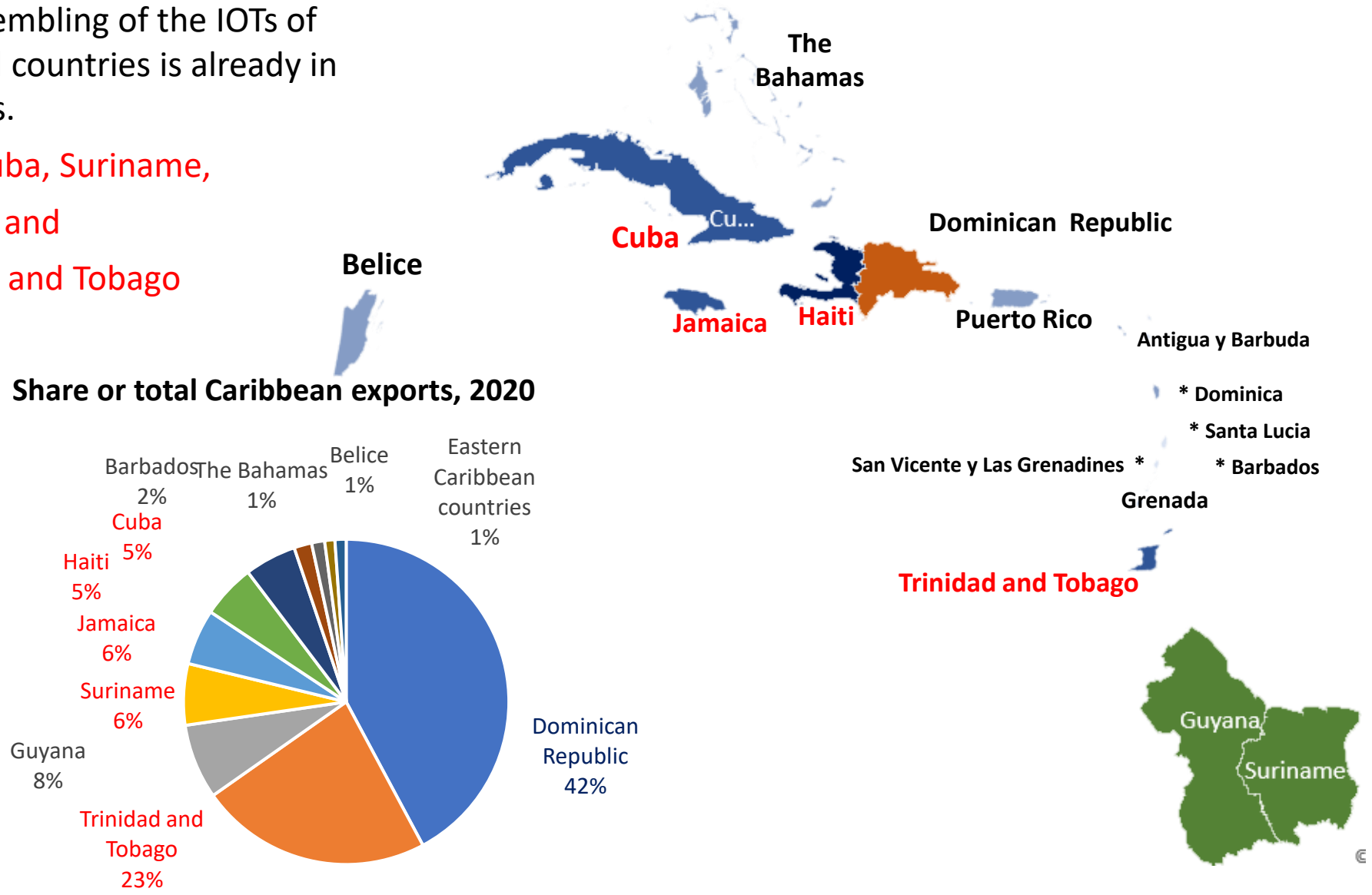
# Our new roadmap: Include more Caribbean countries. A new challenge

The assembling of the IOTs of selected countries is already in progress.

Haiti, Cuba, Suriname,

Jamaica and

Trinidad and Tobago



# Agenda

- Value chain analysis with IOT
- Convergence of Regional IOT initiatives
- Progress between 2020 and 2021
- **Challenges ahead and next steps**

# Work in Progress: ECLAC- EC JRC FIGARO for a bi-regional EU-LAC new Input-Output Matrix

## WHAT'S NEW

- Sectoral expansion from 40 sectors to a larger number of sectors that reflect subregional and regional structures;
- Greater openness in primary products (4) and services (7).
- Convergence with international matrices (OECD; EUROSTAT-FIGARO; Asian Development Bank).

## MAIN OBJECTIVES

- Determine a new baseline Pre-pandemic (2018-2019)
- Conduct assessments of the possibilities of economic recovery, considering broader structures, and especially including the participation of modern commercial services.
- Move towards more frequent economic analyses (quarterly indicators if possible).
- To allow for structural change analysis in the post-pandemic period (2022-2023).
- Not only for ECLAC use but for the public.

**Add countries, split sectors and improve convergency among initiatives incl. FIGARO**

# Work in Progress: ECLAC- EC JRC FIGARO for a bi-regional EU-LAC new Input-Output Matrix

- Analysis of similarities between initiatives (value added, output, consumption, investment, exports, etc.);
- Comparison of TIVA indicators of the multiple projects (TIVA OECD; TIVA CEPAL-ESCAP-ADB; TIVA EUROSTAT); bases 2011, 2014 and 2017;
- Inclusion, as far as possible, of Latin American and Caribbean countries in the FIGARO database;
- Possible training/advice in the treatment of asymmetries;
- Assembly of a global input-output table (which includes all projects). The ultimate objective is to be able to include Latin American and Caribbean countries in global analyses.
- Include indicators on emissions and employment

# What remains to be done?

- At ECLAC, we are working on automating the access to national accounts information in the region, in order to make more frequent updates and help in short-term public policy decisions.
- These frequent updates will help in the incorporation of the countries of the region in the world matrices with official and verified information.
- It will also allow the creation of new bilateral matrices between different initiatives: ECLAC-FIGARO, ECLAC-ADB and ECLAC-OECD.
- **The convergence between all initiatives to a new global matrix, with more sectors, more countries and more reliable information is also on ECLAC's agenda.**

# Challenges and Future Steps

**Lastly but not less importantly:**

- Compatibility of sectoral disaggregation between all TIVA initiatives.
- Shared converters (For production and trade);
- Shared databases and a common methodology;
- Organizing workshops with national institutions to share best practices to help to improve base data;
- Put evidence on the table of policy makers

**We have a fertile field of cooperation between ADB, OECD, JRC, EUROSTAT and ECLAC.**

**we have much more room for fruitful cooperation**

# Conclusion

# 4. Cierre y evaluación

https://es.research.net/r/Caribe_Post-eval

or scan the QR-Code:

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# ONLINE COURSE ON THE USE AND INTERPRETATION OF TRADE INDICATORS, INCLUDING INPUT OUTPUT ANALYSIS


*José Durán Lima*
*Daniel Diaz*

*Ira Ronzheimer*
*Carlos Ludeña*

*Regional Integration Unit*
*International Trade and Integration Division,*
*ECLAC, United Nations*


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DEVELOPMENT in transition

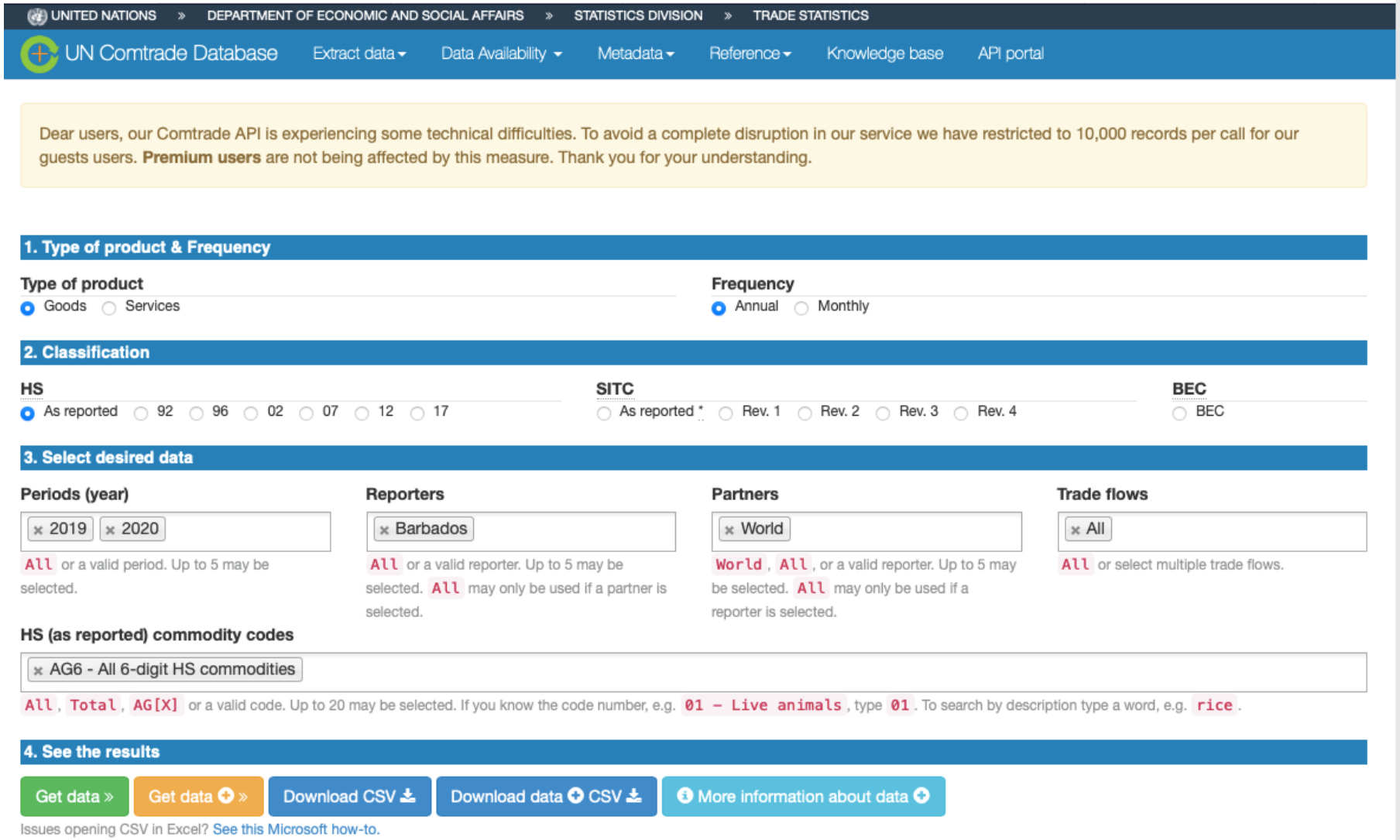
European Union regional facility for Latin America and the Caribbean

**Santiago de Chile, 17th December 2021**

# APPENDIX

EXAMPLE

# Using the Comtrade Data Base




1. Download trade data from the UN's database Comtrade: https://comtrade.un.org/data/

✓ Download the data in HS format and select the number of digits (we choose the highest level of disaggregation available, 6 digits).

✓ The HS as reported for 2019 and 2020 refers to the HS 2017.

✓ Data availability is limited, for example there is no trade data for Trinidad & Tobago in Comtrade.

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EXAMPLE

# Using the Comtrade Data Base

| V | W | X | Y | Z | AA | AB | AC | AD | AE | AF | AG | AH | AI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| commoditycode | commodity | qtyunitcode | qtyunit | qty | altqtyunitcode | altqtyunit | altqty | netweightkg | grossweightkg | tradevalueus | ciftradevalueus | fobtradevalueus | flag |
| 10121 | Horses; live, pure-bred breeding animals | 1 | No Quantit | 0 | | | | 500 | | 6500 | | | 2 |
| 10129 | Horses; live, other than pure-bred breeding animals | 1 | No Quantit | 0 | | | | 4500 | | 56010 | | | 2 |
| 10190 | Mules and hinnies; live | 5 | Number of | 4 | | | | 2000 | | 11885 | | | 0 |
| 10420 | Goats; live | 5 | Number of | 1 | | | | 90 | | 500 | | | 2 |
| 10511 | Poultry; live, fowls of the species Gallus domesticus | 5 | Number of | 745878 | | | | 33881 | | 893844 | | | 0 |
| 10512 | Poultry; live, turkeys, weighing not more than 185g | 5 | Number of | 125715 | | | | 6975 | | 163193 | | | 0 |
| 10619 | Mammals; live, other than primates, whales, dolph | 1 | No Quantit | 0 | | | | 455 | | 6372 | | | 2 |
| 10619 | Mammals; live, other than primates, whales, dolph | 1 | No Quantit | 0 | | | | 492 | | 2600 | | | 2 |
| 10620 | Reptiles; live (including snakes and turtles) | 1 | No Quantit | 0 | | | | 5 | | 2500 | | | 2 |
| 10632 | Birds; live, Psittaciformes | 5 | Number of | 68 | | | | 91 | | 7269 | | | 0 |
| 10639 | Birds; live, other than birds of prey, Psittaciformes, | 5 | Number of | 21 | | | | 130 | | 3893 | | | 0 |
| 10639 | Birds; live, other than birds of prey, Psittaciformes, | 5 | Number of | 57 | | | | 31 | | 6687 | | | 0 |
| 10649 | Insects; live, other than bees | 1 | No Quantit | 0 | | | | 14 | | 5000 | | | 2 |
| 10690 | Animals; live, n.e.c. in chapter 01, other than mam | 5 | Number of | 132 | | | | 3055 | | 45237 | | | 2 |
| 10690 | Animals; live, n.e.c. in chapter 01, other than mam | 5 | Number of | 570 | | | | 2207 | | 27606 | | | 2 |
| 20120 | Meat; of bovine animals, cuts with bone in (excludi | 8 | Weight in k | 6122 | | | | 6122 | | 26397 | | | 0 |
| 20130 | Meat; of bovine animals, boneless cuts, fresh or chi | 8 | Weight in k | 176043 | | | | 176043 | | 1058265 | | | 0 |

- ✓ If you import the downloaded data to excel, the commodity codes may be shortened to five digits in some cases because some chapters start with a 0 which is dropped in the excel's number formatting.
- ✓ Data clearance: classification period perioddesc isleafcode tradeflowcode partneriso ndpartnercode qty ndpartner ndpartneriso customsproccode customs modeoftransportcode modeoftransport altqtyunitcode altqtyunit altqty grossweightkg ciftradevalueus fobtradevalueus flag aggregatelevel reportercode reporteriso partnercode
- ✓ For more information on the Comtrade Methodology: https://unstats.un.org/wiki/display/comtrade

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