

COSTA RICA IMPORT MATRICES COMPILATION: PROPORTIONALITY ASSUMPTION AND TRACKING IMPORTED INPUTS

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ABSTRACT

As a result of the relevance of the import matrix for input-output approach, it is necessary to explore procedures that allow a better tracking of the flow of imports and their uses. The Central Bank of Costa Rica has been working on introducing innovations in the import matrix compilation in order to provide a high quality disaggregation of the use of imported products.

In that sense, the Central Bank of Costa Rica (BCCR) compiled two different import matrices for both 2011 and 2012. One was compiled using the assumption of proportionality and the other one by tracking imports flows that link trade and business statistics.

Both import matrices have similar results in terms of total economy. However, they show significant differences in the distributions of imported inputs among industries. Inputs mainly imported and used by few industries show smaller differences in allocations than inputs that coexist with an important domestic production. Import Matrix tracking helps to balance the supply and use table process as a way to get more accurate and consistent results.

ACRONYMS

AECR	Standard Classification of Economic Activities for Costa Rica
BCCR	Central Bank of Costa Rica
BEC	Broad Economic Categories
CPC	Central Products Classification
EA	Economic Activity
FC	Final Consumption
FTZ	Free-trade Zones
GFCF	Gross Fix Capital Formation
GVC	Global Value Chain
HS	Harmonized System
IC	Intermediate Consumption
IM-P	Import Matrix with Proportionality Assumption
IM-T	Import Matrix based on Tracking Imported Inputs
ISIC	International Standard Industrial Classification
ITR	International Trade Registers
NPCR	Standard Products Classification of Costa Rica
PHC	Private Household Consumption
REVEC	Registry of Economic Variables
SUT	Supply and Use Table
TiVA	Trade in Value Added
VA	Value Added

Content

Acronyms	iii
1. Overview	1
2. Background.....	2
3. Import Matrices Compilation	3
3.1 Assumption of Proportionality.....	3
3.2 Tracking Imported Inputs	3
3.2.1 Sources of data	4
3.2.2 Main Challenges	5
4. Comparison of the Proportionality Assumption and the Tracking Imported Inputs	6
5. Final Remarks.....	9
Bibliography.....	10

1. OVERVIEW

Import matrices allow to break down the use of imported goods and services from the total use. The intermediate use part of an import matrix shows the use of imported goods and services by product and industry in the production process. The final demand part shows the use of imported goods and services by categories of final use (final consumption, gross capital formation). The use table for imports is fundamental for the derivation of the symmetric input-output table.

Fig 1. Use table for imports

Industries (EA)	Agriculture	Manufacture	Construction	Trade	Hotel and transportation	Financial services	Other services	Total	Final consumption expenditure by households	Final consumption expenditure by non profits organisations	Final consumption expenditure by government	Gross fixed capital formation	Changes in inventories	Total	Total use (basic prices)
Products (NPCR)															
Products of agriculture	Imported products for intermediate consumption (c.i.f values)							Imported intermediates	Imported products for final uses (c.i.f. values)					Imported final uses	Imported total uses
Products of manufacture															
Construction work															
Trade															
Hotel and transportation															
Financial services															
Other services															
Total (basic prices)	Intermediate consumption by economic activity								Final uses by category						

Source: Based on SNA2008 and Manual of Supply Use and Input-Output Table, Eurostat.

Different stages in the production process are allocated to countries according to their competitive advantages in the global value chains (GVCs). Therefore, products are moving across countries continuously. Large flows of imports and exports that exist across countries are attributed to a split in the production processes. Costa Rica's participation in GVCs is concentrated in medical devices and offshore services. The country's imports and exports for year 2012 represent 36% and 32% of the Gross Domestic Product, respectively.

Initiatives like Trade in Value Added (TiVA) propose to measure trade flows in terms of the value added (wages, taxes on production, operating surplus) created by exports. Therefore, it is necessary to know the imports required by exports.

As a result of the relevance of the import matrix for input-output approach and for other initiatives like TiVA, it is necessary to explore procedures to allow a better tracking of the flow of imports and their uses. The Macroeconomic Statistics Department of the BCCR has been working on introducing innovations in import matrix compilation in order to provide a high quality disaggregation for the use of imported goods.

2. BACKGROUND

Costa Rica's symmetric input-output table has been split in two tables: one containing only the use of domestically produced products and another one containing the use of imported products. The process to construct the use of imported products for 2011 and 2012 draws upon data from the Supply Use Table (SUT) at basic prices. The SUT includes 183 products and 136 economic activities or industries¹.

The imported component of the symmetric input-output table for 2011 was estimated using in most cases the traditional assumption of proportionality. Then, the Macroeconomic Statistics Department worked in the design of an import matrix compiled through linking trade and business statistics. Since preliminary data showed important differences between both matrices, for some cases it was necessary to drop out the assumption of proportionality.

Consequently, Costa Rican national accounts compiled two different import matrices for both 2011 and 2012. One was created under the assumption of proportionality and the other one by collecting inputs directly from linking trade and business statistics. These imports matrices have the same dimensions than the SUT and exclude both; margins and taxes applying to imports. Hence, they are obtained at basic prices and not at purchase prices.

Some companies in Free-trade zones (FTZ)² received goods for transformation purposes without a change in their economic ownership. According to the Sixth Edition of the Balance of Payments Manual (BPM6), these goods for processing which ownership remain to non-residents should be excluded from the goods account and the value of service is accounted as an export of manufacturing services. Following that recommendation Costa Rica's import matrices exclude goods for processing.

¹ The SUT is classified using the Standard Classification of Economic Activities for Costa Rica, Standard Classification of Products for Costa Rica, the Central Product Classification (Rev. 2), the Central American Tariff System (2013), the Broad Economic Categories (Rev. 4) and the International Standard Industrial Classification (Rev. 4).

² All Free-Trade Zone companies enjoy a 100% tax exemption on imports and exports, and remittances. Companies exporting more than 75% of their production are granted 100% exemption on corporate income tax for a period of 8 years, and 50% exemption during the following 4 years. Within the Central Valley Great Metropolitan Area, a minimum initial investment of US\$150,000 is required; outside of this area, the minimum required investment is of US\$100,000. These investments must be disbursed within three years of a company's approval of the Free-Trade Zones benefits.

3. IMPORT MATRICES COMPILATION

3.1 ASSUMPTION OF PROPORTIONALITY

The method assumes that the share of imports in any product consumed directly as intermediate consumption is the same for all users. This figure corresponds to the share of the imported component with respect to the total intermediate consumption³. Proportional allocations of imports to the various uses would be misleading: as we'll mentioned later, results show that the use of some imported inputs is not scattered even when they are used only for a few industries, and the import content of exports is usually higher than the import content of products for domestic consumption.

The Assumption of Proportionality is applied separately splitting each economic activity between Free-Trade and non-Free-Trade Zones activities.

3.2 TRACKING IMPORTED INPUTS

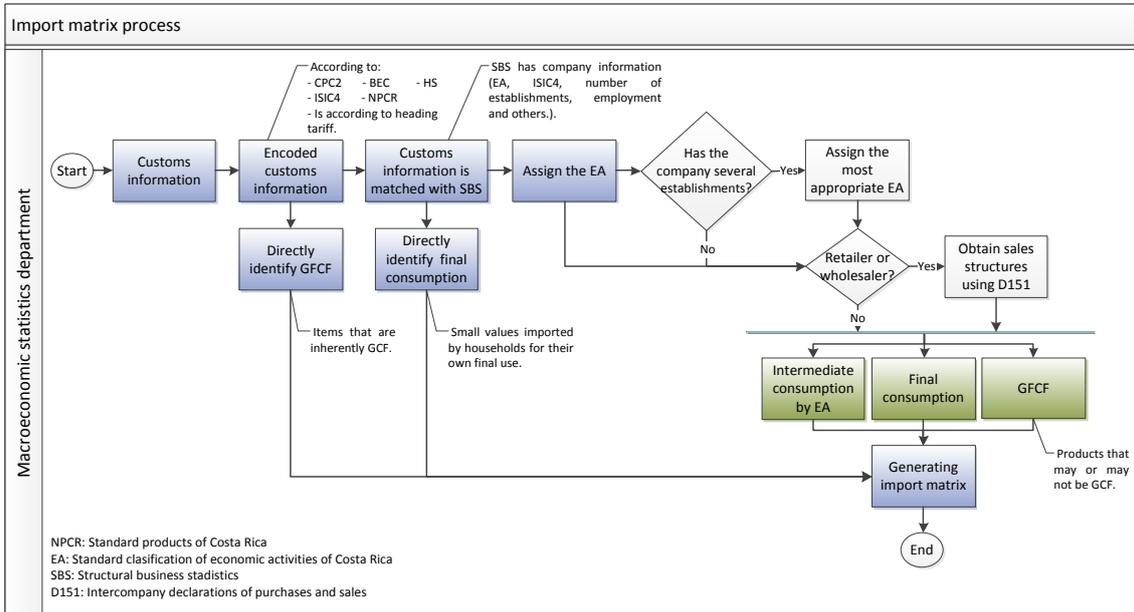
In order to improve the procedure on how imports are allocated to users, the Macroeconomic Statistics Department introduced a different approach to compile an import matrix, which consists of tracking imported inputs linking data of trade and business statistics registers by using the importer's identification (ID). Matching the importer's profile and Harmonized System categories (HS), at the most detailed level allows identifying the users of specific imported products and determines if the products are used for intermediate consumption, final consumption or gross capital formation⁴. Over 90% of imports' value is matched with the importer's profile. Imports are classified by products in a consistent way with that used for domestic production.

All data is compiled by a software developed by the BCCR. The system receives information from the data sources.

³ This figure could be obtained from product balances.

⁴ In cases of one-purpose only products, the Broad Economic Category (BEC) is used. It categorizes each HS on Intermediate Consumption, Final Consumption and Gross capital formation.

Fig 2. Import Matrix Tracking Inputs ^{a/}



Source: Elaborated by authors...

3.2.1 SOURCES OF DATA

Bold sources used are integrated and notably are:

- **Economic Variables Register (REVEC).** The Registry of Economic Variables of BCCR has company statistics (classification ISIC rev.4, AEER, sales and employment) according to their respective ID's.
- **International trade registers (ITR).** The Customs office of Costa Rica provide a dataset for exports and imports comprising tariff heading and their respective codes of harmonized system (HS), CPC ver. 2, country of departure, importer's ID, insurance, freight, and others. The Macroeconomic Statistics Department makes a match of ITR and REVEC according to the ID of the importer. In this way, it is possible to know which company is importing which product and its related data (ISIC and Standard Classification of Economic Activities for Costa Rica, Standard Classification of Products for Costa Rica, sales, number of employees, turnover).
- **Ministry of Finance special report form "D151".** All companies must submit this declaration to the Ministry of Finance each year. This is a very detailed

administrative record that shows who-to-whom transactions annually. It is provided by companies with information about their sales and purchases. Each company declares its sales and purchases by counterpart for amounts higher than the equivalent of 4.700 US dollars in a fiscal year. The firm that makes the declaration is called the “reporter”. Each reporter must record the company’s ID (“reported”) and the value involved in the specific sale or purchase. This database is also matched with REVEC, which makes it possible to classify wholesaler’s sales by economic activity.

3.2.2 MAIN CHALLENGES

Some problems to be addressed:

1. The reporting unit is the enterprise rather than the establishment. According to REVEC, some companies undertake more than one economic activity. Thus, depending on its intrinsic type, the imported product is assigned to the corresponding economic activity that uses it. For example, if one company undertakes two economic activities, e.g. footwear and wearing apparel, those tariff headings associated with fabrics are allocated to wearing apparel and those associated with leather are allocated to footwear. The software keeps these links between tariff heading and economic activities of the company.
2. Certain imported products can be used for intermediate consumption or for capital formation. A threshold was defined (US\$500 dollars) based on the import’s value.
3. A significant portion of imports (46%) are carried out by traders. Wholesalers and retailers sales are tracked by using data from the D151 form. As mentioned earlier, this database is matched with REVEC, making it possible to classify wholesalers and retailers’ sales by economic activity. Intermediate consumption is allocated according to 136 economic activities. Also, it is possible to estimate final consumption and gross capital formation, especially for products such as computers and passengers vehicles.
4. Low value imports undertaken by households and courier companies. These imports are considered as final consumption.
5. Time of recording and use of imports in the production process. Due to inventories, imports may not be used in the same year that they were purchased.

4. COMPARISON OF THE PROPORTIONALITY ASSUMPTION AND THE TRACKING IMPORTED INPUTS

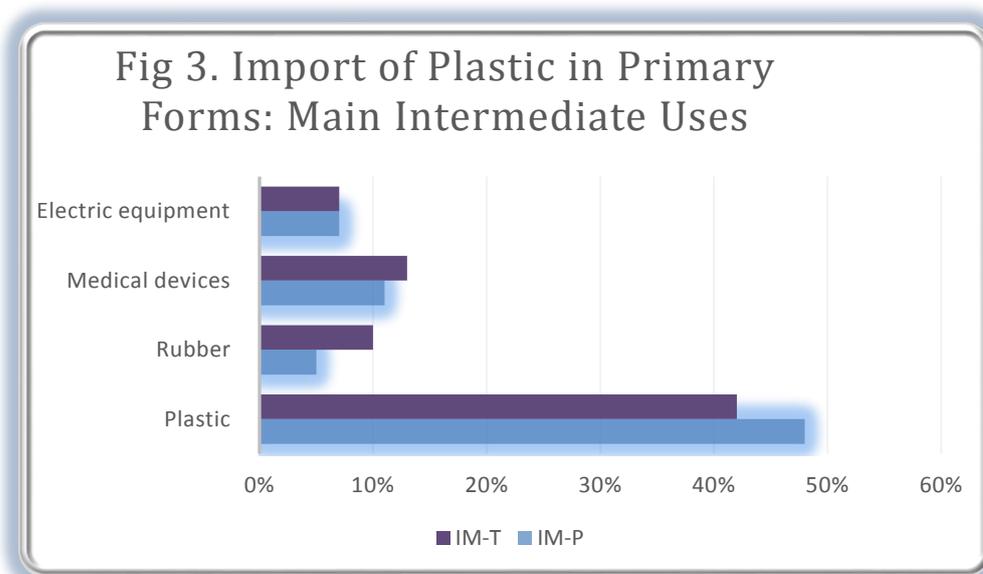
Both the import matrix with the proportionality assumption (IM-P) and the import matrix with the tracking imported inputs (IM-T) reveal similar results in terms of IC, PHC and PHC. On the contrary, the matrices reveal significant differences in the distributions of imported inputs among industries, which introduce a misleading guidance about use intensity of imports. Concerning import matrices classification, the one of Broad Economic Categories (BEC) shows lower values for IC and PHC but higher values for GFCF.

Table 1. Imports main uses according to different procedures

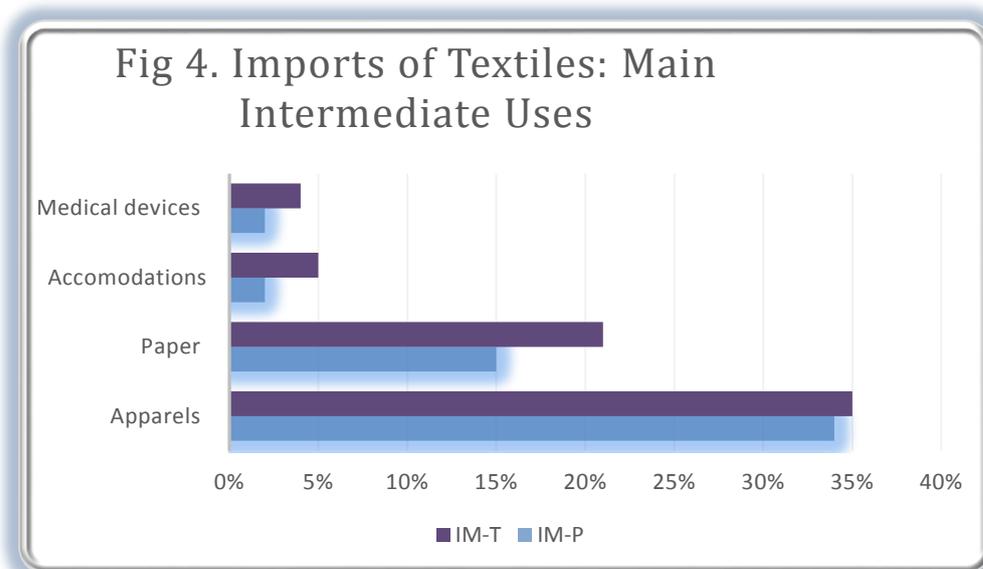
	<i>IM-P</i>	<i>IM -T</i>	<i>BEC</i>
IC	47%	48%	45%
PHC	26%	29%	23%
GFCF	12%	11%	19%
Fuels	14%	13%	13%

Source: Elaborated by the author with information from national accounts.

By using the share of the imported component with respect to the total intermediate consumption of the input –for all industries using the input–, the proportionality method underestimates the imported use in industries that have ratios (share of imported intermediate consumption with respect to total intermediate consumption) higher than average. On the contrary, the method overestimates the imported component of those industries with lower ratios. For some products ratios among industries are very similar because inputs are mainly imported. For example, over 95% of total intermediate use of plastic in primary forms and 78% of textiles products is imported. In these cases, the differences in results between both methods are smaller.



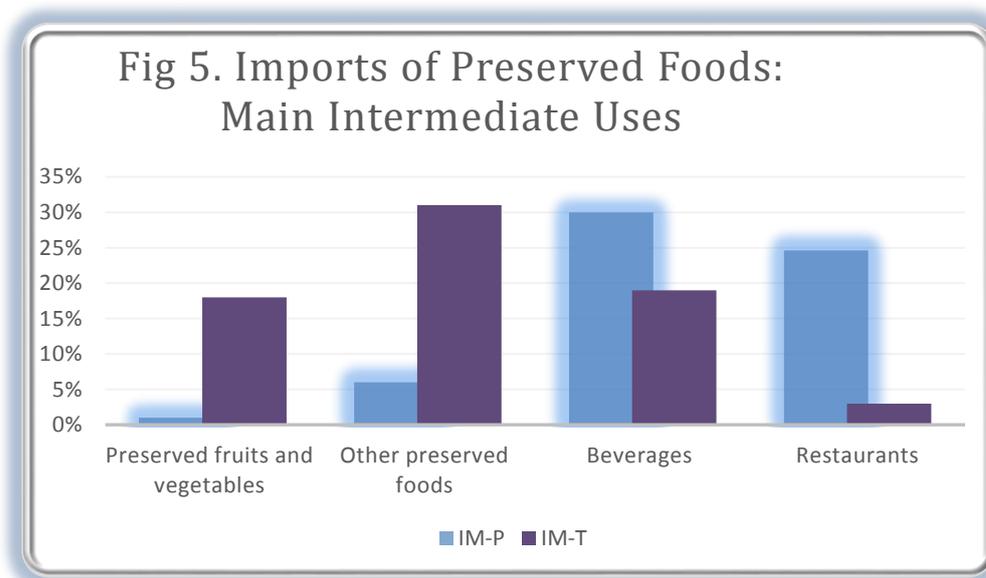
Source: Elaborated by the author with information from national accounts.



Source: Elaborated by the author with information from national accounts.

Others inputs like plastic products and preserved foods coexist with an important domestic production and results using both methods show notable differences. For preserved foods the imported component of IC is 61%, and imports according to IM-T are concentrated in a few industries, while the proportion method makes a wide use allocation of imported uses. Additionally, the IM-P assigns many imported inputs to beverages and restaurants because the share of intermediate consumption of these activities is 25% of total. This method

concentrates the imports in these activities; although, for example, the beverages industry is intensive in the use of domestic syrups and extracts, therefore it would overestimate the imported component. Moreover, the proportionality method assigns fewer imports for preserved foods underestimating the imported component. These activities are important from the exports point of view.



Source: Elaborated by the author with information from national accounts.

5. FINAL REMARKS

Although the proportionality method is used separating Free-Trade Zones and definitive regimen, some biases still persist caused by heterogeneities. Due to the importance of the import matrix for the symmetric input-output table and for the disaggregation for both domestic production and imports, proportionality assumptions should be used with caution in the compilation of import matrices in order to avoid misleading perceptions.

An important portion of some inputs like paper, glass, metal and plastic products are being imported directly by companies. Yet, in many cases companies' accounting records did not report these expenses explicitly, therefore creating an imbalance between imports and uses. In this context, import matrix tracking final uses is a valuable tool in order to balance the supply and use table, consequently getting more accurate and consistent results. Furthermore, it allows an improvement in the allocation of domestic and imported inputs.

For the total economy both matrices lead to similar results. However, there are important differences in the allocation of inputs among industries, especially for intermediate consumption that could be both imported and locally produced. Therefore, it is important to complement the proportional method with another source of data.

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