BCCR BANCO CENTRAL DE COSTA RICA

Costa Rica: Integrating foreign direct investment data and extended supply and use tables into national accounts

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Integrating foreign direct investment data and extended supply and use tables into national accounts.

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ABSTRACT

Daily economic transactions are increasingly influenced by globalization, and there is growing demand for a better understanding of the impact of globalization on economic accounts. Of course, this is important in all countries, but the need for better evidence in this regard is especially important in Costa Rica due to the highly open nature of its economy.

This paper highlights recent work carried out in Costa Rica to develop a set of Extended Supply-Use Tables (E-SUTs), under the auspices of the OECD Expert Group on Extended Supply and Use Tables. These tables include breakdowns by ownership structures which permit us to respond to many of these demands. Results show that the import content of exports is higher for goods in Free Trade Zones but lower for services. Export industries with a higher propensity to create upstream domestic value added include food, beverages, and services such as financial management, computing activities, and research and development.

This paper addresses key elements involved in the process of integrating FDI data into the Integrated Economic Account (IEA) and E-SUTs in detail, and therefore includes discussion of concepts, definitions, classifications, compilation tools, sample design, and estimation methods.

Contenido

Acronyms

BCCR   Central Bank of Costa Rica

Bop   Balance of Payments

CPC   Central Product Classification

CES   Corporate Economic Study

DSCG   Domestic Services content of Goods Exports

EACR   Standard Classification of Economic Activities for Costa Rica

E-SUT   Extended supply and use table

FCCs   Foreign Controlled Companies

FTZs   Free Trade Zones

ICE   Import Content of Exports

IEA   Integrated Economic Account

ISIC   International Standard Industrial Classification

GVCs   Global Value Chains

HS   Harmonized System

NAs   National Accounts

NPCR   Costa Rican Standard Product Classification

OECD   Organization for economic co-operation and development

RR   Regular Regime

TiVA   Trade in Value Added

VA   Value Added

1. Background

Daily economic transactions are increasingly influenced by globalization, and there is growing demand for a better understanding of the impact of globalization on economic accounts. Of course, this is important in all countries, but the need for better evidence in this regard is especially important in Costa Rica, due to the highly open nature of its economy. In 2015, for example, exports and imports represented 31% and 32% of GDP, respectively, while in 2016, Foreign Direct Investment (FDI) amounted to 5% of GDP and foreign controlled companies produced nearly 23% of all non-financial private sector value added. Appendix 6

One of the most significant challenges for such an open economy is to better understand the role of foreign owned affiliates in the production process, either as: i) creators of upstream supply chains within the domestic economy, ii) engines of spillovers and channels that can spread benefits more widely, or iii) drivers of international competitiveness in their role as upstream suppliers to other firms. However, the demand for additional insight is not only restricted to these issues; there is also a great deal of interest in understanding how, and to what extent, income generated by these affiliates through exports is eventually repatriated to parent companies.

Recent additions to the statistical landscape, such as Trade in Value-Added (TiVA) measures, have significantly advanced our current understanding of trade and production, but thus far these initiatives have had little to say about trade, production, and investment, and in their current form are not able to respond to demands for more information on the role played by FDI in the country's economy.

This paper highlights recent work carried out in Costa Rica to develop a set of E-SUTs under the auspices of the OECD Expert Group on Extended Supply and Use Tables. These tables include breakdowns by ownership structures, which permit us to respond to many of these demands (Saborio, G. 2015). Costa Rica has two customs regimes: Free Trade Zones (FTZs), whose occupants are predominantly FDI companies which receive more than half of the country´s FDI and generate more than half of its cross-border exports; and the Regular Regime (RR), in which FDI is located mainly in businesses in the lodging, health, retail, restaurant, and food products and beverages industries. Free zones have been growing in recent years, to reach and now account for 7% of GDP and 5% of employment in the country.

This paper addresses key elements of the process of integrating FDI data into the IEA and E-SUTs in detail, and therefore includes discussion of concepts, definitions, classifications, compilation tools, sample design, and estimation methods.

2. Integrating extended supply and use tables into macroeconomic statistics

2.1 Extended Supply and Use tables, extended input-output tables, and indicators

Firms in FTZs are very different from companies operating under the RR, since they are predominantly foreign controlled companies, produce mainly for exportation, and usually demand qualified labor. While most FTZs enterprises have almost no connection with domestic companies, some acquire their inputs from local firms that are their main suppliers.

This dynamic causes heterogeneity in terms of export-sales ratios, production functions, foreign content of exports and property income. To meet this challenge a separate set of E-SUTs with data for each economic activity that distinguishes between the two customs regimes has been compiled, following the accounting guidelines recommended in the SNA 2008 (Saborio, G. 2015).

The primary information used for the compilation of E-SUT is a combination of administrative data and survey results that are discussed in Appendix 1.

The Costa Rican supply and use tables are compiled product by product, for 183 products and 136 economic activities. Supply and use tables record how supplies of different kinds of goods and services originate from domestic industries, and how imports are allocated between intermediate and final uses (SNA 2008). Total supplies and uses of individual types of goods and services must balance. Beginning in 2012, the new reference year, results are disaggregated in fifty economic activities including services, distinguishing between companies operating in FTZs and those operating under the RR. (Appendix 2). Exports and imports by product are also presented in a way that permits distinguishing between customs regimens (Saborio, G. 2015).

Input-output tables can be implemented based on supply-use tables. For 2012, the input-output table disaggregates economic activities into different customs regimes. There is also an additional division of the symmetric input-output table into two tables: one containing only the use of

domestically produced products and another that contains only the use of imported products. (An import matrix is constructed to improve coherence for the use of imported products). For each of these symmetric matrices there is a breakdown of products coming from companies located in FTZs and operating under the RR, which is expressed in both columns and rows.

In addition, input-output tables can be used to obtain some TiVA indicators, such as the import content of exports (ICE) and the domestic services content of goods exports (DSCG).

2.1.1 Import content of exports.

Import content of exports (ICE) is defined as "the share of imported inputs in the overall exports of a country" (OECD, 2010) and is considered as a measure of international backward linkages in analyses of global value chains (GVCs). It shows an industry's relationship with its upstream foreign suppliers. Hummels et al. (1998, 2001) introduced the term "vertical specialization" in calculating the direct and indirect imported inputs that are included in a country's exports.

Participating in international divisions of labor and specialization helps countries to promote exports using imported intermediate goods (Yousefi et al., 2014). International fragmentation of production involves a vertical chain across many countries, with each country specializing in particular stages of a good's production sequence.

The total of imports directly and indirectly included in exports is calculated by using the inverse Leontief matrix to obtain direct and indirect requirements for each industry, the vector of exports for each industry, and the coefficients of the imports matrix (OECD, WTO, 2012), thus:

Import content of exports $= m * (1 - A)^{-1} * e$ where:

m: is a 1*n vector with components m j (the ratio of imports to output in industry j)

e: is a n*1 vector of exports by industry.

$(1 - A)^{-1}$: Inverse Leontief matrix.

Vertical integration is a common phenomenon in almost all countries (Yousefi et al., 2014); however, its impact varies between countries. The data summarized in Figure 1 show that Costa Rica has an ICE of 23%, which is similar to those of Greece, Spain, France and Lithuania (2014), and is the second highest in Latin America, surpassed only by Mexico.

Figure 1

Import content of exports (ICE), 2014
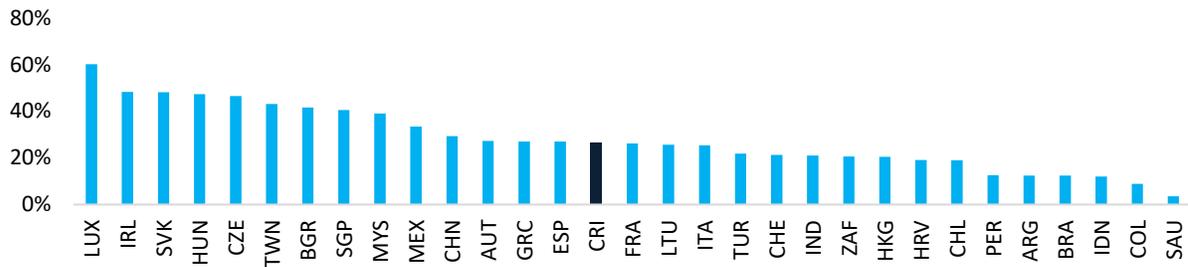
Source: OCDE

At a more detailed level, there are differences in ICE for both customs regimes, as shown in Table 1 and Figure 2. From Table 1 it is evident that the ICE is much higher for goods, but lower for services, in FTZs. In the case of goods, this is explained by the fact that these companies are vertically integrated with the rest of the world, and many of them are cost centers of direct investors, with their parent companies providing the main inputs. Services companies are also highly integrated with the rest of the world, but companies operating under the RR reports more imports than FTZs firms in accounting services, advertising and information technology.

Figure 2

Costa Rica: Import content of Exports, 2016
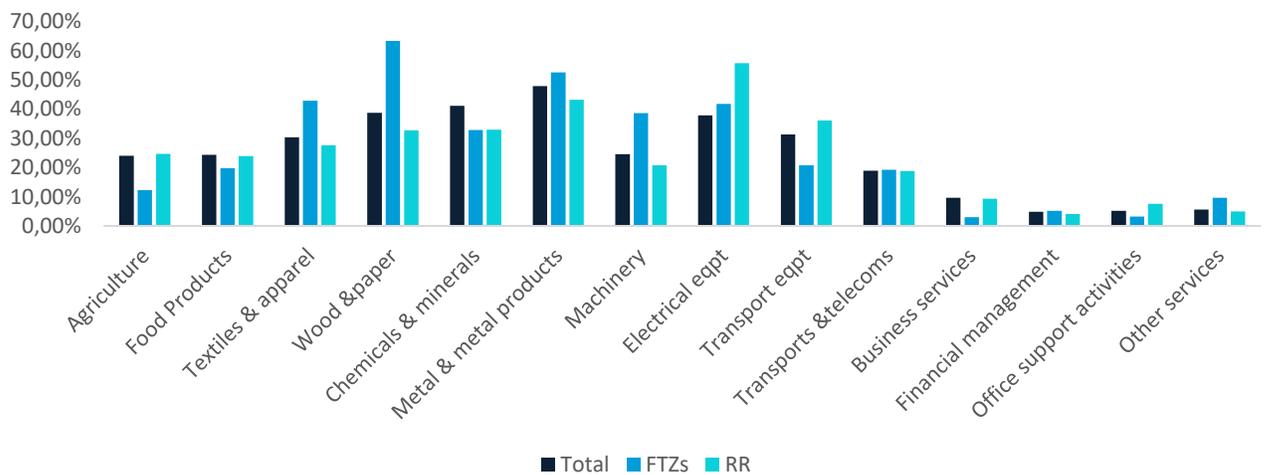
Source: Prepared with data from the BCCR.

Food product industries are characterized by an important presence of multinational companies operating under each of the customs regimes. Local producers are their main providers of raw

materials (fruits and vegetables); therefore, the ICE values in this industry are among the lowest in the national economy, although they are higher for companies operating under the RR than for those operating in FTZs. Appendix 3.

The ICE is higher in FTZs than RR in industries such as wood and paper, machinery, metal products, chemicals and minerals. These industries are the most intensive in terms of imports in the country, and some of them actively participate in GVCs, such as those that produce medical devices in the grouping machinery. (Bullón D., Tayutic M., Meng B. et al., 2014).

The growth of industries that are linked to GVCs, as in the case of medical devices, caused the imported component of goods exports to increase from 2014 to 2016 as shown in Table 1. On the contrary, services show a downward behavior.

Table 1

Costa Rica: Import content of goods and services export

	2012			2014			2016		
	Total	**Goods**	**Services**	**Total**	**Goods**	**Services**	**Total**	**Goods**	**Services**
FTZs	27,1%	38%	12%	23,2%	33%	9%	24,3%	37%	6%
RR	23,5%	29%	17%	23,4%	28%	18%	21,1%	27%	13%
Total	24,7%	32%	16%	23,3%	30%	14%	22,5%	32%	12%

Source: Prepared with data from the BCCR

Exports of services are frequently linked to GVCs especially in clusters such as financial services and office support activities (Gereffi and Bamber, 2013; Gereffi and Frederick, 2013). These are the most important services exported from Costa Rica, and have an ICE much lower than that of goods. This phenomenon has important implications for the goods and services account.

Figure 3 shows that as services exports grew, the deficit in the account of goods and services decreased until 2016, when the country showed its first surplus in the balance of goods and services in 8 years.

Figure 3

Goods and services account, current account, and services export growth (Costa Rica 2010-2016)
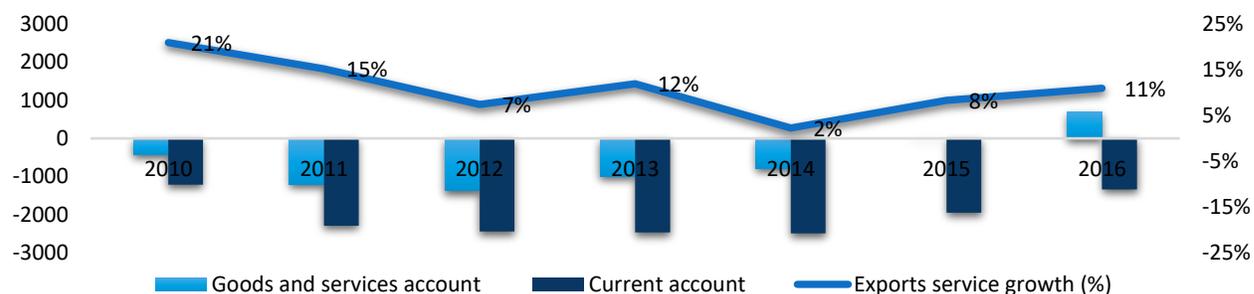
Source: Prepared with data from the BCCR.

In an environment of steadily increasing protectionism and commercial wars, the Costa Rican economy could be an example of how to obtain net benefits in the globalization process, notably by taking advantage of vertical specialization.

Current account

Even if the goods and services account shows a surplus, the current account will continue to show a deficit, due in part to FDI'S income repatriated to parent companies as shown in Figure 4. This makes it especially important to have FDI data related to foreign trade movements.

Figure 4

Current account and income on FDI
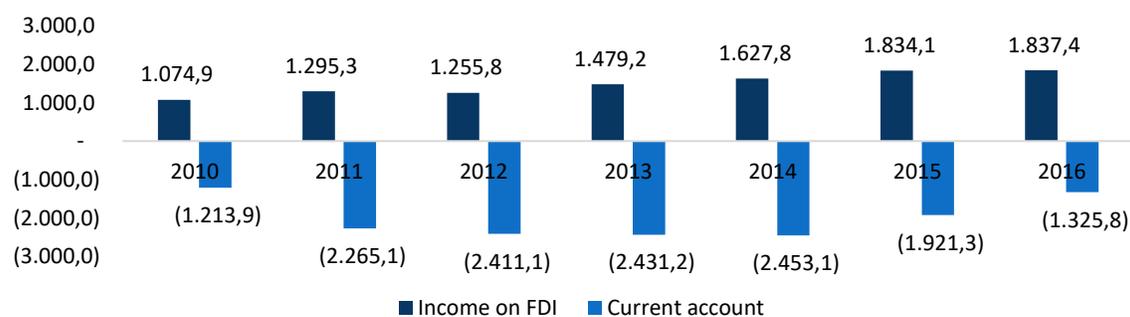
Source: Prepared with data from the BCCR.

2.1.2 Domestic services content of goods exports

The direct and indirect contribution of exports to value added considers the value added of the industries, the inverse Leontief matrix (direct and indirect requirements), and the vector of exports for each industry. The value added content of exports is calculated as (OCDE):

Value added of exports by industry: $v * (1 - A)^{-1} * e$ where:

v: is a ratio of value-added to output

e: is a vector of exports by industry

Using this approach, it is possible to obtain the direct and indirect contribution of exports to the added value of domestic services.

The top 15 countries in terms of services export content include economies such as France, the United Kingdom, and the United States. Costa Rica's goods and services export content is nearly 39%, similar to the world average[1], as shown in Table 2, while its domestic services content has not grown over the last few years.

Table 2

Costa Rica: Domestic services content of good and services exports

	2012			**2014**			**2016**		
	Total	**Goods**	**Services**	**Total**	**Goods**	**Services**	**Total**	**Goods**	**Services**
FTZs	32%	15%	91%	41%	15%	90%	44%	16%	89%
RR	42%	15%	78%	41%	15%	78%	45%	15%	78%
Total	39%	15%	80%	41%	15%	82%	45%	16%	82%

Source: Prepared with data from the BCCR.

Figure 5 illustrates the top exporting manufacturing activities record a contribution to the value added of domestic services higher in FTZs. The domestic services that contribute the most added value to exported goods are transport, lodging, programming and computing, and office support activities. Two economic activities have contributions from domestic services significantly above the goods mean (15%)– food products from companies operating in FTZs (almost 15 p.p.) and machinery. from companies operating under the RR (7 p.p.). Machinery includes the medical device

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[1] Organization for economic co-operation and development. OECD. Retrieved from https://stats.oecd.org/Index.aspx?DataSetCode=TIVA_2016_C1

industry, the largest manufacturing industry exporter in the country, that in the last year began contracting sterilization services from local suppliers.

Figure 5

Costa Rica: Domestic services content of goods exports, 2016
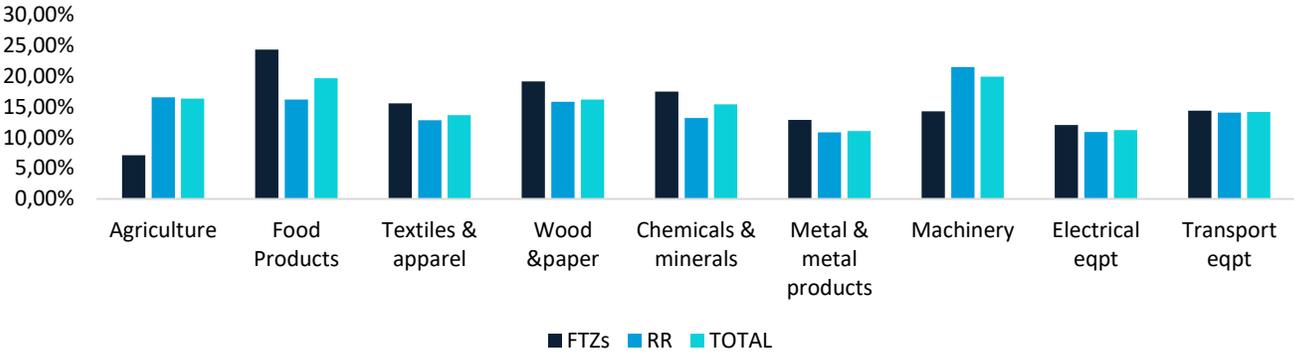
2.1.3 Indirect Contributions

Indirect contributions measure the ability of an industry to indirectly affect other industries, with the intermediate consumption of its products or services contributing to the value added of other national industries. This value is obtained using the matrix of technical coefficients and the inverse Leontief matrix (direct and indirect requirements).

For companies operating in FTZs, it is important to analyze information on supply chains (links with other industries) and the position of the industry according to its contribution to the value added of other domestic industries.

A breakdown between firms inside and outside FTZs produced unexpected results: In the economy as a whole, FTZs enterprises and those operating under the RR have the same coefficients, while the coefficient for the food industry in FTZs is higher than that for the industry operating under the RR.

It is important to promote exporting industries that have the capacity to impact other industries. More specifically, industries with a greater propensity to create upstream domestic value added are those engaged in the production of food and beverages and some services such as office support activities, research and development, financial management, and computing activities, as well as others engaged in the manufacture of goods, such as leather and related products, pharmaceutical products and clothing and textile products. On the other hand, some industries that are very

important in terms of direct value added, such as manufacturers of medical devices, show a low propensity to create upstream domestic supply chains. Appendix 5.

Figure 6

Indirect Contribution, 2012
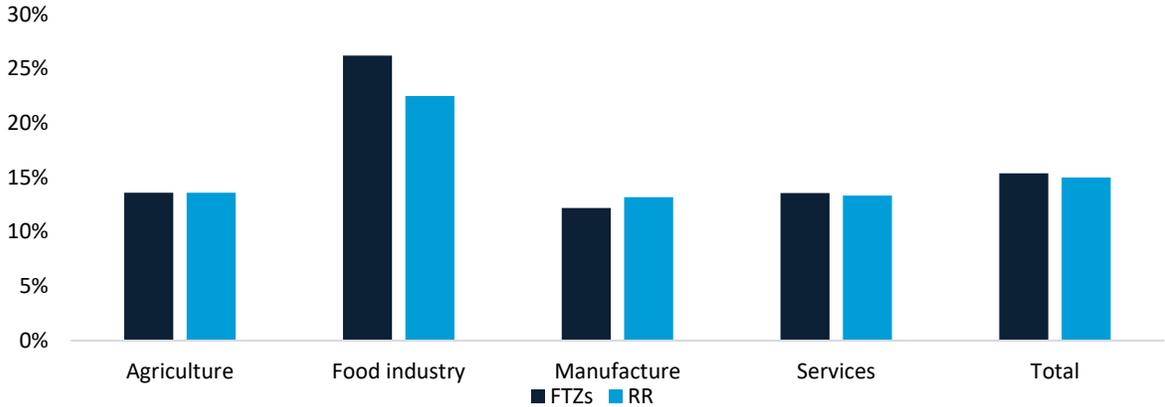
Source: prepared by the authors.

2.1.4 Productivity and Wages

Figure 7 shows that, as a whole, FTZs firms have higher productivity, even in agriculture.

Figure 7

Labor Productivity per-Worker (thousands of US Dollars)
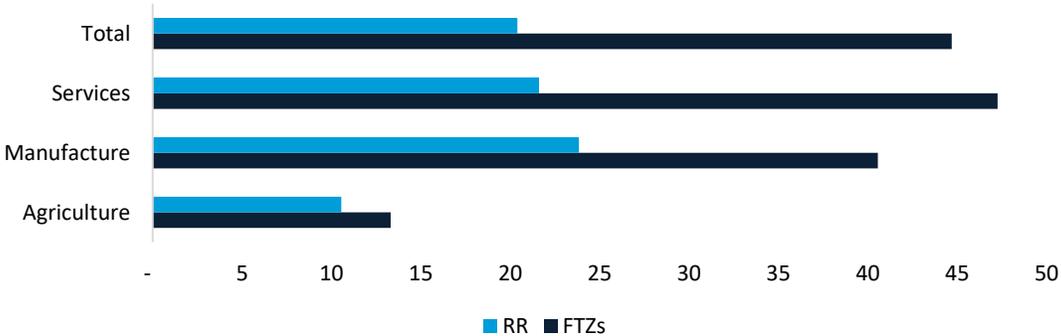
Source: prepared by the authors.

Figure 8 shows that most activities in FTZs have a higher share of their production in wages, except agriculture, food products, wood and paper, and other services. Financial and programming activities, pay up to 50% of their production value in wages.

Figure 8

Wages as a share of production, Costa Rica 2016
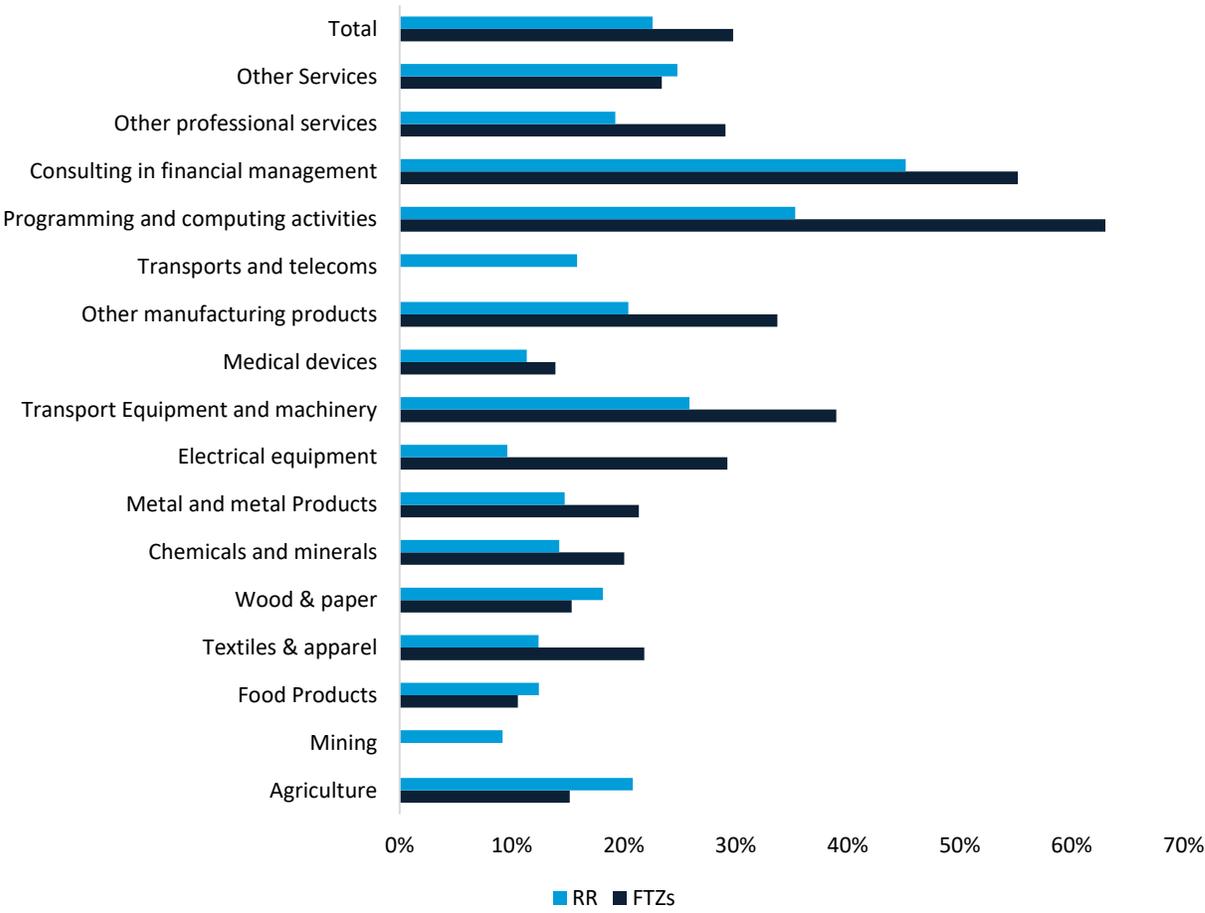
Note: *Excludes non-market and own use final production*

Source: *Prepared with data from the Central Bank of Costa Rica.*

Figure 9

Yearly average wage (thousands of US dollars).

Chart categories (top to bottom): Total, Other Services, Other professional services, Consulting in financial management, Programming and computing activities, Transports and telecoms, Other manufacturing products, Medical devices, Transport Equipment and machinery, Electrical equipment, Metal and metal Products, Chemicals and minerals, Wood & paper, Textiles & apparel, Food Products, Mining, Agriculture. Legend: RR, FTZs.

Source: Prepared with data from the BCCR.

Additional information is required to estimate the impact of foreign-controlled companies in the economy. By incorporating FDI into the NAs, as well as investment income by industry, it is possible to understand how, and to what extent, income generated by these affiliates through exports is eventually repatriated to parent companies. Paradoxically, globalization itself is increasing the presence of multinational companies, making it difficult to obtain FDI data for the entire population of these companies. The population of statistical units to be measured to estimate FDI statistics is obtained from the REVEC, the population of companies for which non-resident units own more than 10%, of which there are approximately 1,226 in Costa Rica.

The next section presents the research and development activities that are being developed in the NAs and the BoP to incorporate FDI into integrated economic accounts. This project could permit the creation of an E-SUT based on the ownership of capital and to estimate the income from investment and FDI by industry.

3. Incorporating FDI data into Integrated Economic Accounts

3.1 Concepts, definitions and classifications

International accounts are an integral conceptual part of the System of National Accounts 2008 (SNA 2008) that enable making comparisons with the BoP and other macroeconomic statistics.

FDI is a category of cross-border investment in which an investor who is a resident in an economy (a direct investor) decides to become an owner (totally or partially) of the equity of an organization (direct investment enterprise), seeking to control or have a significant degree of influence on the management of a company that resides in another economy. By convention, ownership of 10% or more of the share capital in a company gives an investor the ability to participate in and have an influence on the decisions of a company. (BPM6; p: 100-102).

Table 3

Direct investment relationships

Type of investment	Details
Direct investor (DI)	Entity or group of related entities with a significant degree of influence over another entity which is resident in another economy
Direct Investment Enterprises (DIE)	Institutional units subject to control or to a significant degree of influence by a Direct Investor (DI) from another economy

Source: Prepared by the authors based on BPM6.

A DI has control over the DIE when its capital share is over 50%, while it has active influence over the DIE when it has between 10% and 50% of the votes of the organization. (BPM6; p. 101)

According to the Balance of Payments Manual (BPM6), direct investment relationships can be immediate or indirect. Immediate direct investments occur when a DI owns 10% or more of the equity of a company. Indirect relationships take place when control and influence are exerted through a chain of direct investments, and capital shares amount to at least 10% in the entire chain of investments (BPM6; p. 101).

Both incorporated and non-incorporated entities may participate in FDI processes: subsidiaries, associates, related, and affiliated firms. Table 4.

Table 4

Types of entities associated with direct investment

Type	Criteria for direct investment relations (mrid)
Subsidiaries	Over 50% of the company's capital
Associates	Between 10% and less than 50% of the company's capital
Related (fellow)	Have the same immediate or indirect investor, but none of them are direct or indirect investors in the other
Affiliated	Affiliated firms are always in a direct investment relationship with each other

Source: Prepared by the authors based on BPM6.

In the context of relationships with other companies, under certain circumstances, an entity may act as a direct investor, a direct investment company, and as a related company simultaneously.

Direct investment includes reinvested earnings, direct investment flows in kind, mergers and acquisitions, and funds in transit, among other modalities.

In the SNA 2008, undistributed earnings are recorded as reinvested earnings in the distribution of primary income and as a reinvestment of earnings in the financial accounts – specifically, in the functional category of direct investment. Reinvestment of earnings increases the value of equity.

Direct investment data can be recorded using two approaches: according to the directional principle and to the asset/liability principle. Both approaches are relevant and useful for analytical purposes:

• Directional principle: Direct investment (DI) transactions are recorded according to the direction of the direct investment relationship. This approach facilitates understanding of the motivation of direct investment flows and considers the degree of control and influence involved in direct investment transactions (OECD, 2008).

• Asset/liability principle: This approach emphasizes determining whether the transaction is an asset or a liability. Recording is made in gross terms and is consistent with monetary, financial and other balance sheet figures, which is useful for comparative purposes (Torres, Rigoberto. 2018).

Table 5

Direct Investment: Asset/Liability principle and directional principle in Millions of US$

Principle: Assets/Liabilities (Net)	**-57**
Total Assets	**5**
Capital	5
Reinvested earnings	0
Debt	0
Direct investor in direct investment company	0
Direct investor in direct investment enterprise	0
Between related companies/intercompany	0
Total liabilities	**62**
Capital	60
Reinvested earnings	-8
Debt	10
Direct investor in direct investment company	0
Direct investor in direct investment enterprise	0
Between related companies/intercompany	10
Directional principle: Assets/Liabilities (Net)	**-57**
Total Direct investment abroad	**0**
Capital	0
Reinvested earnings	0
Debt	0
Active direct investor in direct investment company	0
Passive Investment company in Direct Investor	0
Direct investment in the reporting economy	**57**
Capital	55
Reinvested earnings	-8
Debt	10
Active	**0**
Direct investor in direct investment enterprise	0
Between related companies/intercompany	0
Passive	**10**
Direct investor in direct investment enterprise	0
Between related companies/intercompany	10

Source: Adapted by the authors based on book of International Accounts (2018).

Table 5 shows an example to better visualize the approaches mentioned above. Suppose that in 2017 a company resident in England (a direct investor) acquires 100% of shares of a company resident in Costa Rica (a Direct Investment Company). The amount of the transaction is US $60 million. Subsequently the Costa Rican subsidiary invests US $5 million in the company resident in England, which is equivalent to 4% of the capital of the British parent company. This case is an investment transaction in the opposite direction (known as a reverse investment). Similarly, during the period of interest, the company resident in Costa Rica receives a US $10 million loan from

another non-resident company whose direct investor is the same British company. At the end of 2017, the Costa Rican company recorded losses for US $8 million.

The compilation process for FDI is more complex than the example. The following table shows the data that firms must provide for the compilation and analysis of direct investment figures.

Table 6

Information requested from FDI companies

Assets and liabilities with non-residents			
	A. Direct investor in the direct investment company	B. Direct investment enterprises in direct investor (reverse investment)	C. Between fellow enterprises
1.Shares and other equity interests	X	X	X
2. Utilities or accumulated losses	X		
3. Accounts, loans and other long-term receivables	X	X	X
4. Accounts, loans and other assets receivable in the short term	X	X	X
5. Preferred shares that do not constitute equity participation	X	X	X

Note: X represents the items required.
Source: Prepared by the authors based on BPM6.

In order to homologate concepts, definitions, and classifications, the NAs and BoP teams made changes in the questionnaires to obtain harmonized statistics.

Globalization implies important challenges related to sample designs and estimation methods for the NAs in order to address heterogeneity in companies' features. Traditionally, sampling methods for the NAs use companies' income based on their sales or revenues as estimators, but the use of the E-SUT as mentioned before provides evidence that the ownership of capital is a key factor in economic indicators of the company. Globalization itself is increasing the presence of multinational companies, making it difficult to obtain data for the entire population of these companies; therefore, the idea is to introduce efficient and cost-effective sample designs. The next section presents efforts made by the central bank in terms of estimation methods that incorporate ownership characteristics into the NAs and BoP samples.

3.3 Data sources and estimation methods

In addition to NAs sources, we primarily use Balance of Payments survey (BoPs) data, as well as data from the National real-estate registry (Appendix 1).

The data sampling design and estimation methods are being revised by the NAs and BoP teams with support from the IMF through CAPTAC-DR, to make the adjustments necessary to obtain more accurate FDI data, and incorporate it into the integrated economic accounts in a coherent and integrated way between NAs and BoP in terms of definitions, concepts, sources and methods.

As shown in table 7, in Costa Rica there are approximately 1226 companies with cross-border investment of more than 10%, which fall into two groups of enterprises: 264 operate under the FTZ regime, and the remaining 962 correspond to private sector companies operating under the Regular Regime. Over half of all FDI is concentrated in FTZs.

Table 7

2016 Costa Rica FDI: Value, total firms and sample

Regime	FDI*	Total firms
Special regime: Free trade zones (FTZs)	1,217	264
Regular Regime (RR)	1,149	962
Total	2,366	1226

*In millions of dollars

Source: Prepared with data from the BCCR.

Free trade zones. Exhaustive annual information is available about FDI data by company. However, the BCCR needs quarterly information to calculate the BoP therefore it is necessary implement a survey and to define the companies that should be included in the sample.

Table 8

Random stratum and Self-represented stratum

Stratum	2016 Annual FDI (Dollars)		Total firms
	Total (Dollars)	Percentage	
Total Random stratum	52.165.791	4,6%	142
Self-represented stratum	1.073.660.195	95,4%	92
Total	**1.125.825.986**	**100,0%**	**234**

Source: Prepared by the authors..

As shown in Table 8, the self-represented stratum represents approximately 95% of FDI investment; if only this stratum was measured, it would not be possible to obtain data for the other 142 firms; a random sample was then selected for this group (Table 9). Therefore, all companies of the population are represented in the quarterly estimations, but only 5% of FDI is randomly estimated.

Table 9

2016 Costa Rica: FTZs Sample size proposed by strata

Stratum	ANNUAL FDI		e²	(NhSh)²	NhSh²	Nₕ	nₕ
	TOTAL (Dollars)	Sh²					
1	36,023,250	1,23442E+13	2,72127E+13	5,97458E+15	2,71572E+14	22	13
2	17,480,329	1,0501E+12		1,68016E+15	4,20041E+13	40	7
3	-1,337,798	49040045647		3,13856E+14	3,9232E+12	80	5(*)
Total	**52,165,781**	**4,08765E+15**		**7,97E+15**	**3,17E+14**	**142**	**25**
Auto	1,073,660,195	1,63915E+15				92	92
GRAND TOTAL	**1,125,825,976**					**234**	**117**

(*) The theoretical size is n=3, adjusted to n=5

S_h^2 = Variance of FDI in the stratum h

e^2: Maximum permissible error level

N_h: Number of companies in the population in stratum h

n_h: Number of companies in the sample in stratum h

Source: Osorio (2017).

The sampling frame that delimits the population of companies that report data on this variable make it possible to estimate the total population of the FDI and also controlling the estimation error as shows Table 10.

Table 10

2016 Costa Rica FDI: Estimation Based on the Selected Sample

Stratum	Fh	FDI (Dollars)	
		Population Value	Estimated value
1	1.67	36,023,250	34,986,757
2	5.74	17,480,329	7,443,773
3	15.96	-1,337,798	1,231,606
Total		52,165,781	43,291,264
Auto	1.00	1,073,660,195	1,073,660,195
Total		**1,125,825,976**	**1,117,322,331**

Source: Osorio (2017).

The expansion factors are calculated according to the stratum for each company as follows:

$$F_h = \frac{N_h}{n_h}$$

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Where: Fh = expansion factor

                Nh = number of enterprises in the h stratum.

                nh= calculated sample size in the h stratum.

The stratum of leading corporations includes the largest companies and has an expansion factor of 1.

The difference between the population data and the estimate obtained from the sample is lower for the companies that contribute the most to FDI, in both absolute and relative terms. That is, the sample was designed to estimate the data reported by the leading corporations more accurately, while still considering the information reported by smaller companies.

Table 11

Costa Rica: Theoretical limits of the strata

Stratum	Limits		Fh	Nh
	Upper	Lower		
1	7,5000,000	2,000,001	1.69	13
2	2,000,000	500	5.74	7
3	Less than	500	16.00	5

Source: Prepared by the authors.

The theoretical limits of the stratum are defined using the absolute value of the FDI declared by the companies during the year 2016. If the data reported are not within the theoretical limits of this stratum at the time of the survey, businesses should be post-stratified into their appropriate stratum, and the expansion factor of the stratum should be adjusted.

Regular regime. After carrying out several trials, it was proposed to use the same design that is applied to FTZ companies for companies operating under the RR. To do this, it is necessary to obtain data[2] of assets and liabilities related to foreign direct investment for all firms with more than 10% participation of capital. This is currently being done, and the sample design will be updated in such a way that the annual and quarterly samples will be coherent once this task is concluded.

The data in Table 13 show that there are important correlations between FDI and transactions of assets and liabilities with parent and related companies, so the use of these variables is considered acceptable in defining the sample of RR companies. In addition, analysis will be conducted in order

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[2] An FDI census is being carried out for this particular year

to consider the possibility of eliminating annual BoPs, conducting only quarterly surveys, and obtaining the FDI annual data from NAs through the CES[3].

Table 12

COSTA Rica: Linear Correlation Coefficient between FTZs FDI and Variables in the CES

Year	Assets with		Contributions and other capital	Social capital	Declared dividends	Liabilities with		Profit (+) losses (-) for the period after tax	Accumulated profits and losses
	Sisters	Parent company				Sisters	Parent company		
	0.75	0.14	0.08	0.55	-0.25	**0.68**	0.06	0.59	0.67
	0.80	0.27	0.45	0.02	-0.38	**0.83**	0.05	-0.10	-0.08
	0.92	0.25	-0.74	0.28	-0.78	**0.79**	0.03	0.73	0.91
	0.71	0.00	0.11	0.20	-0.27	**0.73**	0.30	0.71	0.78

Source: Osorio (2017*).*

Table 12 and 13 illustrate the results of tests carried out to estimate the sample size using CES data on liabilities and income for the companies that make up this subpopulation. It was found that there is no linear correlation between these variables, therefore a sample designed using total liabilities or net income is not adequate for estimating FDI.

Table 13

FDI: sample size based on firms Liabilities, 2015

Stratum	N	TOTAL LIABILITIES		e^2	$(NS)^2$	NS^2	n_h
		TOTAL	S^2				
1	197	7,00003E+11	5,63036E+18	3,18173E+21	2,18509E+23	1,10918E+21	45
2	248	98467547378	5,51103E+16		3,38951E+21	1,36674E+19	6
3	210	7340908702	9,56304E+14		4,2173E+19	2,00824E+17	1
Total	83	4,922883E+12			2,2194E+23	1,12305E+21	83
Auto	655	8,05812E+11					52
			TOTAL SAMPLE RR				**135**

Source: Prepared by the authors.

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[3] This sample is part of the NAs sample, whose questionnaire is harmonized with data on balance-of-payments for foreign direct investment that is integrated into the company's institutional account

3.4 FDI and Integrated economic accounts

Harmonization of concepts, definitions, sources and methods makes it possible to explicitly show the transactions that make up FDI in the IEA. Each transaction involved in FDI is split according to FDI definitions, as shown in Table 14 for the case of "Other accounts receivable/payable". This change will be introduced in the 2017´s IEA.

This improves the quality of the primary distribution of the income account and the financial account of private companies, and allows a better understanding of FDI as a financial source.

Table 14

Integrated economic accounts with the new Disaggregation of accounts incorporated as FDI

F89	Other accounts receivable/payable
F892	*Foreign currency*
	RESIDENTS
	Direct investor (parent Company)
	Direct investment company (daughter companies)
	Related companies (fellow companies)
	Unrelated clients
	NON RESIDENTS
	Direct investor (parent Company)
	Direct investment company (daughter companies)
	Related companies (fellow companies)
	Unrelated clients

Source: Prepared by the authors.

4. Concluding remarks and challenges ahead

Globalization raises a challenge for macroeconomic statistics by its influence in production, income, consumption, saving and accumulation. Given this, it is necessary doing changes in NAs in order to highlight data related to the interconnectivity of the domestic markets with the external ones. The E-SUT is an effort in this sense along with others for to include in national accounts samples some characteristic related to globalization, such as ownership of the capital.

The better understanding of globalization allows making diagnoses of the globalization´s effects that serve to formulate political policies an example could be promoting those economic activities with more potential in terms of spillover, domestic chains, national income and high and medium skill employment, furthering inclusive growth.

The content of the imports in exports is much higher for FCCs and so the contribution of domestic services to exports of goods. The foregoing provides evidence that E-SUT boots draw conclusions, which are important for economic, educative and social development strategies. Additionally, wages and productivity tend to be higher in FTZs.

A takeaway is to promote domestic linkages in the top exporters industries and at the same time leveraging the spillovers. Industries with more propensity to create upstream domestic value added are those engaged in the production of food and beverages and some services such as research and development, financial management and programming and computing activities while others with an important share in direct value added for the country such as medical devices and plastic products have a low propensity to create domestic value added in other industries.

Food products has a high relatively domestic service content of exports and upstream domestic chains, but their average wage is lower than the one corresponding to the overall economy. This industry allows less qualified workers to insert themselves in the process of globalization. This result is especially important given the fact that 38% of the manufacture employment corresponds to the food industry.

The breakdown in FTZs and RR makes it easier to conciliate and balance out supply and use by type of products and improving the quality of the supply and use table and the coherence within the national accounting central framework.

There are challenges ahead. In the short term it is expected to have a breakdown in the ESUT based on ownership; this goal could be possible based on the FDI integration between NAs and BoP.

Practically all free zones companies are of foreign control therefore a breakdown of RR related with the property of the capital make it easier having an ESUT with a breakdown based on ownership.

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Appendix

Appendix 1. Data sources

Data Sources	
Business registry (REVEC)	Records characteristics of enterprises such as location, sales, establishments and type of ownership (equity corresponding to non-residents).
Trade Enterprises Characteristics (TEC)	It links data of trade and REVEC using the importer´s and exporter´s identification. Matching the company profile and HS categories, at the most detailed level allows identifying the users of specific imported products and determines if the product is used for intermediate consumption, final consumption or gross capital formation. Over 90% of import´s value is matched with importer's profile. In addition, it is possible to identify the exporter´s economic activity (Chacón et al, G. 2017).
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. 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 and so reveals intercompany transactions, making it possible to identify free-zones firms' purchases in the domestic market and so it allows estimate flows of intermediate consumption between the different categories of firms (i.e. FTZs vs RR) (Chacón et al, G. 2017).

Corporate Economic Study (CES)	The objective of this survey is to collect data from non-financial private companies for NA. CES is applied on an annual basis to a group of firms always included called "large corporations" and to a random sample of companies that belong to the "rest of the private non-financial firms". The content of the survey, covers: identification of each firm, description of their activities and products, turnover per products, other revenues (non-financial and financial), detailed costs, surplus/deficit, income taxes and detailed taxes on production, employment, detailed balance sheet and a FDI module. The unit of selection is the company and the analysis unit is the establishment, the first one is used for the institutional account, and the second one for the economic activity.
Free trade zone regime (FTZs) reports	FTZs is granted to enterprises seeking to promote Foreign Direct Investment, trade exchange and employment for the country. As part of the obligations of the FTZs beneficiary, they must submit details of financial transactions with related companies to the Costa Rica Export Promotion Agency (PROCOMER) to which the BCCR has access.
Balance of payments survey (Bops).	It is a quarterly to obtain the BoP and contains a module to estimate FDI that collects information about assets and liabilities with non-residents, making it possible to know whether the transaction is with related companies, direct investor, direct investment company or others non-residents.
National real-estate registry	Is the main source of information about real-estate investment and based on passport numbers contain data on non-resident natural persons that make real-estate investments in the country.
Information about General Superintendencies	To obtain data for financial sector.

Source: Prepared by the authors.

Appendix 2. Costa Rica Extended Supply and Use Table (E-SUT) Framework

USE TABLE

Industries	Output by industries						TOTAL ECONOMY	Export FOB			FINAL CONSUMPTION EXPENDITURE				GROSS CAPITAL FORMATION			
	Industry 1		Industry n		Total			GOODS	SERVICES	TOTAL	HOUSEHOLDS	NPISHS	GENERAL GOVERNMENT	TOTAL	GROSS FIXED CAPITAL FORMATION	CHANGES IN INVENTORIES	ACQUISITION MINUS DISPOSALS OF VALUABLES	TOTAL
Products	FTZs	RR	FTZs	RR	FTZs	RR												
Product 1																		
Product n																		
Total																		

SUPPLY TABLE

Industries	Output by industries						TOTAL	IMPORTS			CIF/FOB ADJUSTMENTS ON IMPORTS	TAXES ON PRODUCTS	SUBSIDIES ON PRODUCTS	TRADE AND TRANSPORT MARGINS
Products	Industry 1		Industry 2		Total			GOODS	SERVICES	TOTAL				
	FTZs	RR	FTZs	RR	FTZs	RR								
Product 1														
Product n														
Total														

VALUE ADDED

TOTAL GROSS VALUE ADDED/GDP					
Compensation of employees					
Taxes minus subsidies on production and imports					
Mixed income, gross					
Operating surplus, gross					
Consumption of fixed capital-mixed					
Consumption of fixed capital-other					
LABOUR INPUTS					

Source: Prepared by the authors.

Appendix 3. Costa Rica: Import Content of Exports by Economic Activity (FTZs and RR)

EA	Economic Activity Description	Import content of Exports - Costa Rica 2012		
		Total	FTZs	RR
EA003	Cultivation of other cereals, legumes and oil seeds (not previously classified)	0.17	0.17	0.18
EA010	Cultivation of other vegetables, roots and tubers (not previously classified)	0.24	0.25	0.24
EA020	Cultivation of other non-perennial and perennial plants	0.22	0.31	0.22
EA035	Processing and preservation of fish, crustaceans and shellfish	0.32	0.33	0.26
EA036	Processing and preservation of fruits and vegetables	0.25	0.27	0.21
EA037	Production of oils and fats of vegetable and animal origin	0.32	0.11	0.38
EA041	Production of bakery products and tortillas	0.25	0.28	0.25
EA043	Production of cocoa, chocolate and confectionery products	0.25	0.23	0.27
EA047	Production of foods, prepared meals, and other food products	0.22	0.18	0.27
EA048	Production of animal feed	0.40	0.35	0.40
EA050	Production of malt beverages, malt, non-alcoholic beverages, mineral waters, and other bottled waters	0.34	0.37	0.34
EA052	Manufacture of textile products	0.38	0.50	0.32
EA053	Manufacture of clothing	0.29	0.34	0.25
EA054	Manufacture of leather and related products, except footwear	0.23	0.29	0.23
EA056	Timber production and manufacture of timber and cork products, except furniture; manufacture of straw articles and of plaiting materials	0.17	0.28	0.17
EA057	Manufacture of paper and paper products	0.47	0.70	0.47
EA058	Printing, editing and reproduction of recordings, except for computer programs	0.22	0.30	0.22
EA060	Manufacture of basic chemical substances, fertilizers and nitrogen compounds	0.55	0.66	0.55
EA065	Manufacture of other chemical products (not previously classified) and manufactured fibers	0.44	0.52	0.41
EA066	Manufacture of pharmaceutical products, medicinal chemicals and botanical products	0.27	0.14	0.29
EA067	Manufacture of rubber products	0.40	0.40	0.40
EA068	Manufacture of plastic products	0.50	0.47	0.51
EA069	Manufacture of glass and glass products	0.32	0.09	0.32

EA071	Manufacture of cement, lime, plaster, and articles of concrete, cement and plaster, and other non-metallic minerals, (not previously classified)	0.22	0.22	0.22
EA072	Manufacture of common metals	0.53	0.60	0.48
EA073	Manufacture of metal products, except machinery and equipment	0.35	0.47	0.32
EA074	Manufacture of electronic components and circuit boards, computers and peripheral equipment	0.16	0.16	0.31
EA075	Manufacture of electronic and optical products	0.32	0.34	0.22
EA076	Manufacture of electrical equipment and machinery (not previously classified)	0.47	0.28	0.59
EA077	Manufacture of motor vehicles, trailers and semi-trailers	0.31	0.23	0.39
EA079	Manufacture of furniture	0.25	0.37	0.25
EA080	Manufacture of medical and dental instruments and supplies	0.43	0.44	0.29
EA081	Other manufacturing industries	0.25	0.39	0.21
EA082	Repair and installation of machinery and equipment	0.22	0.08	0.23
EA096	Warehousing and storage	0.08	0.04	0.09
EA098	Freight handling and other transportation support activities	0.14	0.22	0.13
EA104	Informatics services	0.09	0.11	0.04
EA112	Activities related to consulting in financial management, human resources, marketing, main offices, and related	0.05	0.05	0.04
EA114	Scientific research and development activities	0.08	0.08	0.08
EA115	Advertising and market research	0.10	0.03	0.10
EA116	Other professional, scientific and technical activities	0.07	0.01	0.09
EA118	Activities related to renting and leasing of tangible and intangible non-financial assets	0.09	0.12	0.09
EA123	Administrative and office support activities, and other business support activities	0.05	0.03	0.08
EA131	Repair of computers, personal belongings and household goods	0.14	0.13	0.14

Source: Prepared by the authors based on input-output matrix 2012 and 2016 exports.

Appendix 4. Costa Rica: Domestic Services content of goods

EA	Economic Activity Description	Domestic services content of goods (%)		
		Total	RE	RR
EA003	Cultivation of other cereals, legumes and oil seeds (not previously classified)	0.14	0.14	0.14
EA010	Cultivation of other vegetables, roots and tubers (not previously classified)	0.12	0.11	0.12
EA020	Cultivation of other non-perennial and perennial plants	0.13	0.10	0.13
EA035	Processing and preservation of fish, crustaceans and shellfish	0.21	0.21	0.21
EA036	Processing and preservation of fruits and vegetables	0.20	0.19	0.20
EA037	Production of oils and fats of vegetable and animal origin	0.13	0.09	0.14
EA041	Production of bakery products and tortillas	0.23	0.22	0.23
EA043	Production of cocoa, chocolate and confectionery products	0.19	0.24	0.16
EA047	Production of foods, prepared meals, and other food products	0.33	0.42	0.20
EA048	Production of animal feed	0.15	0.14	0.15
EA050	Production of malt beverages, malt, non-alcoholic beverages, mineral waters, and other bottled waters	0.21	0.25	0.21
EA052	Manufacture of textile products	0.14	0.16	0.13
EA053	Manufacture of clothing	0.14	0.15	0.12
EA054	Manufacture of leather and related products, except footwear	0.13	0.17	0.12
EA056	Timber production and manufacture of timber and cork products, except furniture; manufacture of straw articles and of plaiting materials	0.14	0.20	0.14
EA057	Manufacture of paper and paper products	0.17	0.21	0.16
EA058	Printing, editing and reproduction of recordings, except for computer programs	0.18	0.09	0.18
EA060	Manufacture of basic chemical substances, fertilizers and nitrogen compounds	0.10	0.07	0.10

EA065	Manufacture of other chemical products (not previously classified) and manufactured fibers	0.15	0.12	0.16
EA066	Manufacture of pharmaceutical products, medicinal chemicals and botanical products	0.21	0.23	0.20
EA067	Manufacture of rubber products	0.17	0.17	0.16
EA068	Manufacture of plastic products	0.11	0.13	0.10
EA069	Manufacture of glass and glass products	0.22	0.18	0.22
EA071	Manufacture of cement, lime, plaster, and articles of concrete, cement and plaster, and other non-metallic minerals, (not previously classified)	0.21	0.26	0.21
EA072	Manufacture of common metals	0.10	0.10	0.10
EA073	Manufacture of metal products, except machinery and equipment	0.13	0.15	0.13
EA074	Manufacture of electronic components and circuit boards, computers and peripheral equipment	0.09	0.09	0.29
EA075	Manufacture of electronic and optical products	0.13	0.12	0.19
EA076	Manufacture of electrical equipment and machinery (not previously classified)	0.11	0.13	0.09
EA077	Manufacture of motor vehicles, trailers and semi-trailers	0.14	0.16	0.13
EA079	Manufacture of furniture	0.15	0.13	0.15
EA080	Manufacture of medical and dental instruments and supplies	0.12	0.12	0.24
EA081	Other manufacturing industries	0.20	0.14	0.21

Source: Prepared by the authors based on input-output matrix 2012.

Appendix 5. Costa Rica: Indirect contributions

EA	Economic Activity Description	Coefficients: Indirect input requirements (2012)	
		FTZs	RR
EA003	Cultivation of other cereals, legumes and oil seeds (not previously classified)	0,13	0,13
EA010	Cultivation of other vegetables, roots and tubers (not previously classified)	0,18	0,14
EA020	Cultivation of other non-perennial and perennial plants	0,12	0,15
EA021	Plant propagation	0,12	0,14
EA025	Breeding of other animals	0,23	0,20
EA028	Marine and freshwater fishing	0,13	0,12
EA035	Processing and preservation of fish, crustaceans and shellfish	0,30	0,38
EA036	Processing and preservation of fruits and vegetables	0,24	0,22
EA037	Production of oils and fats of vegetable and animal origin	0,15	0,19
EA041	Production of bakery products and tortillas	0,29	0,28
EA043	Production of cocoa, chocolate and confectionery products	0,37	0,20
EA047	Production of foods, prepared meals, and other food products	0,24	0,18
EA048	Production of animal feed	0,25	0,22
EA049	Distillation, rectification and blending of alcoholic beverages and wines	0,16	0,16
EA050	Production of malt beverages, malt, non-alcoholic beverages, mineral waters, and other bottled waters	0,39	0,22
EA052	Manufacture of textile products	0,14	0,13
EA053	Manufacture of clothing	0,13	0,10

EA054	Manufacture of leather and related products, except footwear	0,17	0,24
EA056	Timber production and manufacture of timber and cork products, except furniture; manufacture of straw articles and of plaiting materials	0,20	0,17
EA057	Manufacture of paper and paper products	0,12	0,12
EA058	Activities of printing, editing and reproduction of video recordings, except computing programs	0,07	0,12
EA060	Manufacture of basic chemical substances, fertilizers and nitrogen compounds	0,04	0,07
EA065	Manufacture of other chemical products (not previously classified) and manufactured fibers	0,09	0,15
EA066	Manufacture of pharmaceutical products, medicinal chemicals and botanical products	0,16	0,16
EA067	Manufacture of rubber products	0,16	0,13
EA068	Manufacture of plastic products	0,09	0,08
EA069	Manufacture of glass and glass products	0,09	0,19
EA071	Manufacture of cement, lime, plaster, and articles of concrete, cement and plaster, and other non metallic minerals, (not previously classified)	0,26	0,17
EA072	Manufacture of common metals	0,09	0,09
EA073	Manufacture of metal products, except machinery and equipment	0,10	0,10
EA074	Manufacture of electronic components and circuit boards, computers and peripheral equipment	0,06	0,16
EA075	Manufacture of electronic and optical products	0,10	0,10
EA076	Manufacture of electrical equipment and machinery (not previously classified)	0,09	0,07
EA077	Manufacture of motor vehicles, trailers and semi-trailers	0,12	0,10
EA079	Manufacture of furniture	0,12	0,14
EA080	Manufacture of medical and dental instruments and supplies	0,08	0,16
EA081	Other manufacturing industries	0,15	0,14

EA082	Repair and installation of machinery and equipment	0,07	0,15
EA095	Sea, air, and road freight transport	0,02	0,16
EA096	Warehousing and storage	0,13	0,21
EA097	Transportation-related services activities	0,11	0,14
EA098	Freight handling and other transportation support activities	0,26	0,29
EA102	Activities related to movie, video and television program production, sound recording; music editing, programming and transmission	0,20	0,21
EA104	Information, programming and computing consulting activities, editing of computing and related programs	0,14	0,06
EA109	Real estate activities	0,26	0,09
EA112	Activities related to consulting in financial management, human resources, marketing, main offices, and related	0,15	0,09
EA113	Architecture and engineering-related activities; technical testing and analysis	0,14	0,13
EA114	Scientific research and development activities	0,16	0,13
EA115	Advertising and market research	0,08	0,17
EA116	Other professional, scientific and technical activities	0,02	0,11
EA118	Activities related to renting and leasing of tangible and intangible non-financial assets	0,33	0,07
EA122	General building cleaning and landscaping activities	0,07	0,05
EA123	Administrative and office support activities, and other business support activities	0,09	0,09
EA131	Repair of computers, personal belongings and household goods	0,14	0,13

Source: Prepared by the authors based on input-output matrix 2012.

Appendix 6. Value added for **foreign controlled non-financial enterprises** by industry 2015

Industry	% Value Added FCC by industry
Other Services	15,90%
Food Products	26,80%
Financial management	41,90%
Research and development	16,70%
Medical devices	94,60%
Electrical equipment	55,00%
Other professional services	57,60%
Others	21,00%
Total	**23,50%**

Source: Prepared by the authors.