COSTA RICA NATIONAL ACCOUNTS: MEASURING ANNUAL VALUE ADDED IN TERMS OF VOLUME

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ABSTRACT

Changes in current Gross Value Added (GVA) have two components: price and volume. In the national accounts these two elements are separated. The primary information used for the compilation of national accounts in Costa Rica is a combination of administrative data and surveys.

The double deflation method underpins Gross Value Added (GVA) in terms of volume by more than half. Current values of outputs and inputs for most activities of general government, financial corporations and free-trade zone corporations are estimated using census data for the complete population, and in these cases the double deflation method is therefore used. To deflate each input/output component by a specific price and accurately estimate GVA in terms of volume, index prices are recorded for input and output, respectively. The Price Index Development (PID) project provides price indices by product for imports and exports of goods by free-trade zone and non-free-trade zone businesses, inputs for agriculture and construction industries, producer prices for manufactured goods and main services (such as lodging, food and beverages, electricity and water, transportation, rental of vehicles and machinery, etc.) as well as product prices which are not available in the basket of consumer price indices.

It is not possible to obtain data for the entire Private Non-financial sector due to its size. This sector is therefore divided into two groups: "large companies", and "the rest of the private non-financial sector", which includes the remaining companies. The companies investigated in the Economic Study of Enterprises (whose acronym in Spanish is ESE, and which is described in detail in annexes) include all "large companies", as well as an annual random sample of companies from the "rest of the private non-financial sector" group. The double deflation method is used for those industries included in the sample, and the single extrapolation method based on volume indices is used in other cases.

Therefore, depending on the information available two methods –a double deflation and single extrapolation– are combined to estimate GVA in terms of volume in the Costa Rican national accounts. This paper discusses the advantages and disadvantages of the two methods.

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Content

ACRONYMS

BCCR	Central Bank of Costa Rica
CGS	Cost of Goods Sold
PID	Price Index Development project
EA	Economic Activity
MBS	Monthly Business Survey
NHS	National Household Survey
SUHE	Survey of Unincorporated Household Enterprises
ESE	Economic Study of Enterprises
QSAAP	Quarterly Survey of Agricultural Areas and Production
GDP	Gross Domestic Product
GPV	Gross Production Value
GVA	Gross Value Added
IC	Intermediate Consumption
INEC	National Statistics and Censuses Institute of Costa Rica
ISIC	International Standard Industrial Classification of All Economic Activities
MEIC	Ministry of Economy, Industry and Trade of Costa Rica.
I-O	Input-Output Matrix
OECD	Organization for Economic Co-operation and Development
PROCOMER	Foreign Trade Corporation of Costa Rica
PPS	Probability Proportional to Size method
REVEC	Registry of Economic Variables
SNA	System of National Accounts
SUT	Supply and Use Table

1. CONCEPTUAL FRAMEWORK

Current gross value added (GVA) is the difference between output and intermediate consumption (IC), and is an important component of the national accounts.

The changes in current values of GVA have two components: price and volume. GVA in terms of volume is measured by subtracting IC from output in terms of volume. There are different approaches that may be used to determine value added in terms of volume – double indicator methods and single indicator methods (See Figure 1) – which may be used at the level of individual businesses and industries.

Figure 1. Methods to estimate value added in terms of volume
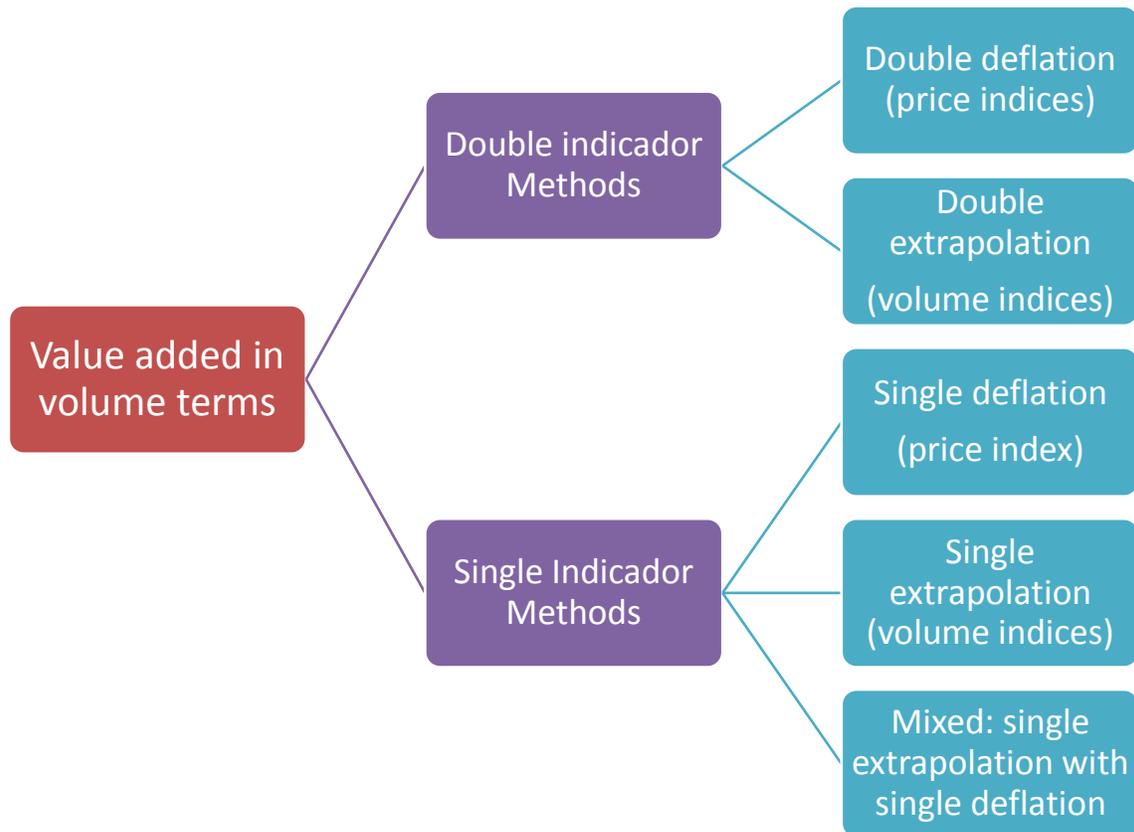
Source: prepared by the authors.

1.1.1. Double deflation

Double deflation is theoretically the best method to estimate GVA in terms of volume. Its use requires current values for outputs and inputs, which are deflated separately using their respective price indices. GVA is measured in terms of volume by subtracting IC from output; both expressed in terms of volume. Considerable amounts of data are required when this method is used, and there is no need to assume relationships among outputs and intermediate inputs. It also produces more unstable results, but changes in prices and volumes are captured more precisely, improving the accuracy of GDP (gross domestic product) estimates.

1.1.2. Double extrapolation

The double extrapolation method can be used instead of double deflation when price indices are not available. It extrapolates the complete range of goods and services for both outputs and inputs from starting values by using their corresponding output and input volume indices.

SINGLE INDICATOR METHODS

1.2.1 Single deflation

Due to insufficient availability of price indices, both production and inputs are deflated with the same price index, which may correspond to production prices, wages, inflation or a subcomponent of them. Its use assumes that output and input prices evolve similarly. Some simulations (Alexander, et al., 2010) show large differences ("biases") in results using single deflation when compared to those obtained using double deflation.

The GVA of a starting value is extrapolated using an appropriate volume indicator which may be based on output data or employment data. Its use assumes that input/output coefficients are fixed.

2. COSTA RICA: METHODS USED TO ESTIMATE ANNUAL GVA IN TERMS OF VOLUME

Costa Rica applies different methods to estimate GVA in terms of volume depending on the availability of different sources of information for industries. The methods used are usually either double deflation or single extrapolation; a mix of single indicators and double extrapolation methods is used in only a few cases.

FIGURE 2. Costa Rica: Methods used for GVA estimates in terms of volume, 2013-2015.

% of total GVA
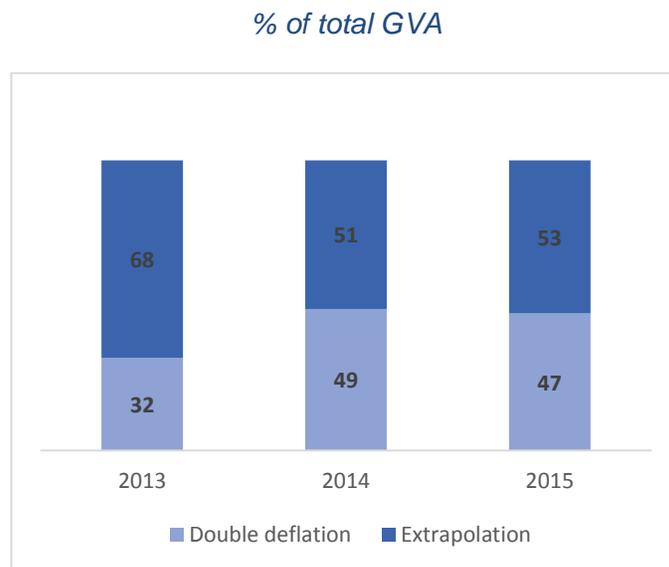
Source: prepared by the authors based on information from the SUTs

The double deflation method underpins GVA in terms of volume by more than half (Figure 1). From 2014 to 2015 the share of GVA estimated using double deflation declined given that household sector estimates used single extrapolation since the Survey of Unincorporated Household Enterprises (ENHOPRO) was being redesigned and was not conducted during this period.

Current values of outputs and inputs for the general government, financial corporations and free-trade zone corporations are built using census data that cover the overall population and in these cases double deflation is used.

In order to deflate each input/output component using a specific price, and accurately estimate GVA in terms of volume, index prices are recorded for input and output, respectively. The Price Index Development (PID) Project provides price indices by product for:

- Imports and exports of goods divided by businesses operating under free-zone and non-free-zone regimes.
- Inputs for agricultural and construction industries.
- Producer prices for manufactured goods and main services (such as lodging, food and beverages, electricity and water, transportation, rental of vehicles and machinery, etc.)
- Product prices not available in consumer price indices.

The components of the consumer price index are also used.

It is not possible to obtain data for the entire Private Non-financial sector[2] due to its size. This sector is therefore divided into two groups - "large companies", and "the rest of the private non-financial sector", which includes the remaining companies. The companies investigated in the Economic Study of Enterprises (ESE, which is described in detail in annexes) include all "large companies", as well as an annual random sample of companies from the "rest of the private non-financial sector" group. The double deflation method is used for those industries included in the sample, and the single extrapolation method that uses volume indices is used in other cases[3].

From 2014 the value added of non-profit institutions is estimated with double deflation, and a sample of this population has therefore been included in the ESE, which is randomly selected every year. The forms used to capture the data were designed specifically for these institutions.

As mentioned earlier, it is possible to use a combination of methods to estimate the GVA in terms of volume (See Figure 1). Some examples of mixed methods used in Costa Rica for government activities:

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[2] For this sector, the ESE has been used to estimate almost 50% of the value added with a double deflation method.

[3] Estimation of the output volume index indicating growth from t-1 to t is done based on Monthly business survey (MBS) and monthly and annual administrative records.

Example 1. EA87UF: Construction of roads and railways

P — C ≡ V A | Extrapolation |
| Deflation |
| VA+C |
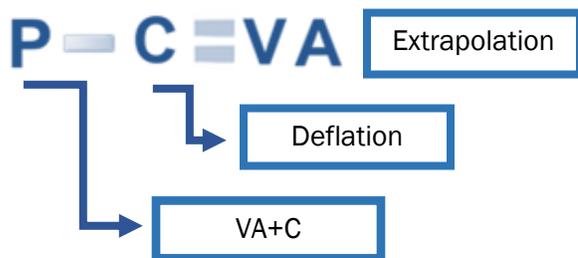
Where P = Production

C = Intermediate consumption

VA = Value added

Example 1. EA092: Transport by rail

P — C ≡ V A | P-C |
| Deflation |
| Extrapolation |
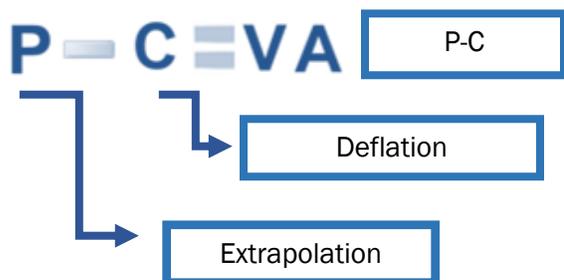
2.1 DOUBLE DEFLATION: ADVANTAGES AND DISADVANTAGES

The main challenge for Costa Rica in using double deflation is to improve the estimates of current values in order to avoid unstable results. The precision of the current values is determined by the data collection process, the use of scaling factors, and the assessment of output and input with different data sources.

Data Collection:

For example, in some cases, companies' accounting data are not available with the detail required for national accounts. Specifically, those companies whose financial statements are based on cost accounting techniques, in which cases the cost of goods sold (CGS) is determined in terms of a standard budget and volume and price variations from the standard, instead of details in terms of raw materials, inventories, labor, depreciation and indirect

costs. In order to confront this limitation, it is necessary to ask companies for additional details.

Scaling factors:

The second critical complication is the scaling factor which is used to expand the sample input/output data to input/output data for the entire country. Even though the output sampling error is low (hence the industry output is accurate), this assumes that the input coefficients of the surveyed company are equal for all the companies represented in the sample, but this is not the case in some industries, especially when businesses are very different, such as processing and preservation of fruits and vegetables (EA36) that includes orange juice, frozen pineapple or juice, toasted fruits and vegetables, banana puree and other products. If all companies included in the sample manufacture pineapple juice, EA36 coefficients will not take other critical agricultural inputs into account and pineapple consumption will be overestimated unless estimated values are compared and contrasted with other data.

Use of different data sources:

While the fruit and vegetable processing and preservation industry (EA36) is an extreme example, it serves to highlight the importance of contrasting and comparing total output and input with other data sources in the framework of the Supply and Use Table (SUT) to avoid over- or under-estimations.

Input Directory:

The "Input Directory" is applied since 2015 in activity EA036 to improve the quality of the IC. It was built based on the Registry of Economic Variables (REVEC) including all the companies of the activity. The seven main inputs and weights[4] were identified for each company whose historical cost details were available (data from the ESE), while inputs and coefficients of the most similar company were assigned to those companies without historical data.

The share of the weight of each input is multiplied by total costs of goods sold by companies, and the sum of all the values per product is the lower IC boundary for each input. The next step in this activity is to set an upper boundary and improve the calculation including other data sources such as the import matrix, free-zone local sales matrix, REVEC, data from the businesses chamber and reports of sales and purchases by seller and supplier from the Finance Ministry. Figure 3 illustrates this process.

In brief, the double deflation method requires the use of current values for outputs and IC to better reflect changes in prices and volumes, but at the same time it requires a comprehensive review of current estimates to avoid unstable results, which makes it a very expensive method, but one that also promotes a complete review of the entire value added compilation process.

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[4] With respect to costs of sales, which are obtained from the income statement.

Figure 3: Process to construct the Input Directory

(1)
Most recent data from ESE per company

Cost of Goods Sold	Weight
Raw Material 1	x%
Raw Material 2	y%
Raw Material 3	z%
Raw Material 4	a%
Raw Material 5	b%
Raw Material 6	c%
Raw Material 7	d%
Other Raw	e%
Labour	f%
Depreciation	g%
Indirect Cost	h%
Total	**100%**

Data from REVEC
Population of enterprises in AE36

Companies in ESE

Companies out of ESE

Research on the products manufatured

(1)
Allocation of a structure (the most similar company in ESE)

Cost of Goods Sold	Weight
Raw Material 1	x%
Raw Material 2	y%
Raw Material 3	z%
Raw Material 4	a%
Raw Material 5	b%
Raw Material 6	c%
Raw Material 7	d%
Other Raw Materials	e%
Labour	f%
Depreciation	g%
Indirect Cost	h%
Total	**100%**

(2)
Data for the period from the Minister of Finace

Cost of Goods Sold
Total ¢¢¢¢

(1) * (2) = (3)

(3)
Structure per company

Cost of Goods Sold	Amount
Raw Material 1	¢
Raw Material 2	¢
Raw Material 3	¢
Raw Material 4	¢
Raw Material 5	¢
Raw Material 6	¢
Raw Material 7	¢
Other Raw Materials	¢
Labour	¢
Depreciation	¢
Indirect Cost	¢
Total	**¢¢¢¢**

$$\sum Raw\ Material_i = \begin{array}{l} lower\ boundary \\ of\ a\ NPCR \end{array}$$

Source: prepared by the authors.

As compared to double deflation, extrapolation is a low-cost technique, which can be implemented quickly to provide timely data, which is desirable for policy makers; however, the quality of the results is lower in than those obtained when using the double deflation method. Due to their intrinsic nature or restrictions on information for some economic activities (e.g. construction and farming) it is necessary to use extrapolation, but actions must be taken to counteract the disadvantages of this method and improve the GVA estimates that it provides.

Construction

Single extrapolation is used in the construction industry at a very detailed product level. A Quarterly Survey of Progress of Construction Projects is applied which covers 1000 projects[5]. Each project is assigned to one of the existing 14 prototypes,[6] and there is a quarterly follow-up to determine the project progress. Extrapolation is applied in surveyed projects, according to prototype, stage of construction and progress level. The corresponding input-output coefficients are assigned based on on these variables. There is a breakdown of 6 construction stages and 700 inputs, where each input is assigned a different coefficient.

Specifically, survey results together with prototype data allow the calculation of the quantity of materials and labor per square meter necessary to achieve a given level of progress. The coefficient of progress for each construction stage is obtained by multiplying the percentage of physical advance by its respective factor of incidence, which represents the weight of each stage of construction within the total value of the project. Once the quantity of materials used per square meter is known for each project included in the survey, this total is multiplied by the square meters of each surveyed project to obtain the total of materials used by each each prototype. This result is multiplied by its respective scaling factor according to the prototype, to obtain an estimate of the total of materials used in the construction industry in a given period.

To calculate the value at previous year prices, the inputs obtained earlier are multiplied by the average price level of the previous year. This price level is derived from quarterly price indexes corresponding to baskets of construction prototypes. It is possible to estimate the GVA and IC in terms of volume. The production value is obtained as the sum of costs, and annual data is obtained through the sum of quarterly values.

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[5] This sample size covers 70% of total construction in process.
[6] Social interest prefabricated housing, social interest masonry housing, middle-class housing, upper-class housing, building (mixed use), shop, mall, cellar, industrial warehouse, residential development, wall, barrier, parking and pool.

Agriculture and livestock activities

An important effort has been made in data collection to permit measurement of farming activities with double extrapolation instead of single extrapolation. Use of data about the use of fertilizers, as well as from business chambers and government agricultural institutions is used to capture changes in the efficiency of use of planted areas – changes in the amount of inputs required for a given cultivated area compared to that of the previous year. Double extrapolation is used to measure activities related to products such as melon, watermelon and onions, while single extrapolation based on administrative records is used to analyze livestock-related activities.

"Rest of the private non-financial sector"

To avoid constantly extrapolating the same economic activities, Costa Rica switches between single extrapolation and double deflation from year to year to capture changes in production techniques. Use of data from the Input Directory can in some cases allow the use of double extrapolation. From 2013 to 2014 the activities in the EA036 category were extrapolated but in 2015 they were calculated using double deflation. The volume index in 2013 for the "rest of the private non-financial sector" indicated a growth close to 30%, a result that was influenced by the use of data for pineapple producers. Since single extrapolation keeps the same input coefficients used the prior year, this would imply that the production of potatoes, oranges, bananas and tomatoes grew at the same rate as pineapple, which is not true. It was therefore necessary to correct this data based on external information and the SUT framework. In 2015 estimations made using the double deflation method confirmed these changes.

3. FINAL REMARKS AND PLANS

Value added of non-profit institutions, public corporations, government, financial institutions, as well as free-trade zone and large non-financial corporations, is currently estimated using double deflation. In a few cases, estimates for the government are made using a mixed method.

The number of enterprises considered as large non-financial corporations has increased through time, and as a result a larger proportion of value added for the private non-financial sector is obtained by using double deflation, increasing the accuracy of GVA estimates.

The main challenge for Costa Rica in using double deflation is the need to improve estimates of current values to avoid unstable results. The precision of current values is determined by the data collection process, the use of scaling factors, and the need to contrast and compare the values for total output and input obtained with other data sources.

As compared to double deflation, extrapolation is a low-cost technique, which can be implemented quickly to provide timely data, which is desirable for policy makers; however, the quality of the results is lower than in those provided by using the double deflation method. Due to the intrinsic restrictions on information for some economic activities (e.g., construction and farming) it is necessary to use extrapolation, but actions must be taken to counteract the disadvantages of this method and improve the GVA estimates that it provides.

Regardless of the method used, it is important to contrast the data with other sources in the framework of the supply and use table to improve quality of the GVA.

It is proposed to build an "Input Directory" for the main raw materials based on administrative sources and historical data collected through the ESE to establish upper and lower boundaries of the use of those inputs and to improve results based either on double deflation or extrapolation. Automation of different sources of information is necessary, and it is also recommended to always include highly heterogeneous economic activities in the ESE.

4. ANNEX

4.1. ECONOMIC STUDY OF ENTERPRISES: SAMPLE DESIGN, DATA COLLECTION AND PROCEDURES

The objective of this survey is to collect data on non-financial private corporations. It began in January 2013 with the collection of information of firms for 2012, the new reference year of the national accounts. The 2013 survey included 1800 companies. The survey will be repeated every five years (it will be carried out again in 2018 for the reporting year 2017).

4.2 SAMPLE DESIGN

4.2.1 Study unit and population

The unit of study is the enterprise, and when there are two or more establishments, data is requested for each of them.

The ESE includes firms with more than five employees and an income percentile greater than 15%[7]. The rest of companies are excluded due primarily to two reasons:

- High instability of small companies due to openings and closings, changes in activities, and geographical movement.
- The high level of detail in the information requested, and a low probability that small companies have this information.

Additionally, data for industries is obtained from administrative records or specialized surveys, such as those carried out for farming, construction, public administration, supervised financial institutions, public water supply companies, electricity, unincorporated household enterprises. Companies operating under free-trade zone or inward processing regimes are excluded from the study.

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[7] Companies with less than five employees and with percentiles lower than 15% are included as producer households.

The REVEC includes variables such as economic activity, International Standard Industrial Classification of All Economic Activities (ISIC Rev.3), regime, details of establishments, and location variables. It is updated every year using the previous year as a reference. The following is a brief description of the types of sampling used in the years 2013-2016 (Table 2).

Table 2. Economic Study of Enterprises: type of sampling by year of execution, 2013-2016

Characteristics	2013	2014	2015	2016
Design variable	Income (tax income).	Income (tax income).	Income (tax income).	Income (ESE): information provided directly by company.
Sampling method	Minimum variance with two strata: random[8] and self-represented (census).	Minimum variance with two strata: random and self-represented.	Minimum variance with two strata: random and self-represented.	Stratified Sampling. Size of firm is defined according to guidelines of the Ministry of Economy, Industry and Commerce (MEIC) of Costa Rica and can vary by activity.
Sample (number of companies)	1802	696	706	1002

Source: prepared by the authors.

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[8] The selection method used in the random stratum is called probability proportional to size (PPS). With this method, each company has a different probability of being selected, according to its importance in the selection variable (in this case, income). Larger companies are thus more likely to be selected, which ensures greater coverage of revenue.

The sample size was calculated independently for each of the economic activities included in the study. In the case of the ESE for 2013, these calculations were carried out assuming different levels of precision: 5%, 10%, 15% and 20%, in order to evaluate the required sample sizes and the resources available for the execution of the study. It was decided to work with different levels of precision according to the importance of each activity, based on expert opinion.

The sample size for each activity is given by N = n_1 + n_2. To determine the proportion of businesses from each stratum, the following formula is used:

$$n_2 = \frac{(N - n_1)^2 S_2^2}{(e)^2 + ((N - n_1)S_2^2)}$$

Where:

- N = number of companies in the population
- n_1 = number of companies included in the self − represented stratum
- S_2^2 = variance of firms' income in the random stratum
- e = maximum permissible error

All self-represented companies were included in the sample and companies from the random stratum were selected according to the method of probability proportional to size (PPS).

When using the PPS method, the companies in the random stratum are arranged in ascending order of their incomes, and a new variable is calculated representing the cumulative values (total) of the incomes of all companies. A value k is then calculated, which is equal to the total income of the companies in the random stratum divided by the number of companies to be included in the sample (n_2). A random starting value RS between 1 and k is then selected, and the first company to be included in the sample is that with the smallest cumulative income value equal to or greater than RS, while the second and succeeding companies in the sample are those with the smallest cumulative income values equal to or greater than RS+k, RS+2k…RS+$(n_2 - 1)$k.

Given the cost involved, it is not possible to include all activities every year. For this reason as well as because of the way in which companies are selected (in the case of random strata) the groups of companies in the samples are not the same from one year to the next (see Annex 1 and Annex 2). This permits better estimations of Gross Production Value.

To obtain a population value based on a random sample it is necessary to calculate the sampling error.

The calculation of the variance was determined as follows:

$$v(\hat{Y}_{ppt}) = \frac{\sum_{i=1}^{n}(\frac{y_i}{z_i} - \hat{Y}_{ppt})^2}{n(n-1)}$$

Where

v= variance.

y_i= amount of the company's production i.

z_i= probability of selection (registered income of company as a percentage of total income).

$\hat{Y}_{ppt}$= estimate of total production.

n= sample size.

This formula was applied in each economic activity for companies in the random stratum.

4.2.8 Data capture and procedures

The Information Technology Department of the Central Bank of Costa Rica (BCCR) has developed a software to automate the collection of information from the questionnaires received by the ESE. The questionnaires are designed in the system to be used by those in charge of applying the survey.

The system incorporates information about the status of enterprises, helping the analysts to validate and manage the information obtained in the study. The stages of information processing in the system are as follows:

- In process: the company information is being incorporated into the system by the Ministry of Finance pollster.
- Data transmission: pollsters send information provided by the company to analysts at the BCCR (no changes in the information can be made).
- Checked/Rejected: analysts review the information entered, and can return inconsistent information to the pollster.
- Approved/Rejected: coordinators approve or reject the information previously checked by analysts.
- Completed: the company information is ready to be exported and encoded in Excel.

Figure 2. ESE: Status of enterprises
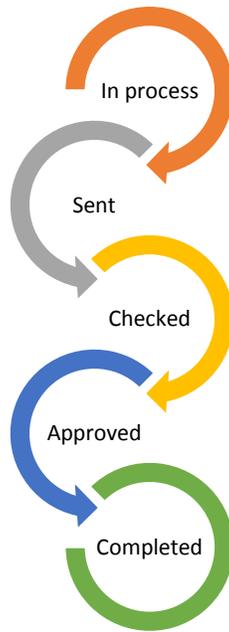
Source: prepared by the authors

The information is validated during and after the data gathering process. Pre-programmed automatic procedures exist to identify erroneous data entries and display an error message to permit necessary corrections. Validation is carried out for both companies and establishments.

After the company information is sent by the pollster, the analyst is responsible for accepting or rejecting the information.

4.2.11 Imputation and estimation

The scaling factors were calculated for each company as follows:

$$F_i = \frac{I_j}{(i_i * n_j)}$$

Where:

F_i = scaling factor

I_j = total income of the firms of the random stratum in the sample frame of the j-th economic activity.

i_i = registered revenue of the selected i-th company.

n_j = sample size selected in the j-th economic activity.

Firms in the self-represented stratum have a scaling factor of 1, while firms in the random stratum have a factor which varies depending on their probability of being selected, which is proportional to their size.

Scaling factors were multiplied by the observed values of production and total sales of each company to obtain an estimate of the total.

Table 3: Description of activities included in economic study of enterprises 2012

Economic Activity	Description of the activity included in ESE 2012
EA026	Support activities for agriculture, livestock and post-harvest activities
EA030	Extraction of stone, sand and clay
EA031	Salt extraction
EA032	Other mining and quarrying (not previously classified)
EA033	Preparation and preservation of poultry and poultry cold cuts
EA034	Preparation and preservation of meat and cold cuts of cattle and pigs, and other types of meats
EA035	Processing and preservation of fish, crustaceans and shellfish
EA036	Processing and preservation of fruits and vegetables
EA037	Production of oils and fats of vegetable and animal origin
EA038	Production of dairy products
EA039	Rice processing
EA040	Production of milling products, except rice, and starches and starch products
EA041	Production of bakery products and tortillas
EA042	Sugar processing
EA043	Production of cocoa, chocolate and confectionery products
EA044	Production of macaroni, noodles, and similar starchy products
EA045	Preparation of unroasted coffee
EA046	Production of coffee products
EA047	Production of foods, prepared meals, and other food products
EA048	Production of animal feed
EA049	Distillation, rectification and blending of alcoholic beverages and wines
EA050	Production of malt beverages, malt, non-alcoholic beverages, mineral waters, and other bottled waters

Table 3: Description of activities included in economic study of enterprises 2012

Economic Activity	Description of the activity included in ESE 2012
EA051	Production of tobacco products
EA052	Manufacture of textile products
EA053	Manufacture of clothing
EA054	Manufacture of leather and related products, except footwear
EA055	Manufacture of footwear
EA056	Timber production and manufacture of timber and cork products, except furniture; manufacture of straw articles and of plaiting materials
EA057	Manufacture of paper and paper products
EA058	Activities of printing, editing and reproduction of video recordings, except computing programs
EA059	Manufacture of refined petroleum products and coke
EA060	Manufacture of refined petroleum products and coke
EA061	Manufacture of basic chemical substances, fertilizers and nitrogen compounds
EA062	Manufacture of pesticides and other chemical products for agricultural use
EA063	Manufacture of paints, varnishes and similar coating products, printing inks and resins
EA064	Manufacture of soaps and detergents, preparations for cleansing and polishing, perfumes and toiletries
EA065	Manufacture of other chemical products (not previously classified) and manufactured fibers
EA066	Manufacture of pharmaceutical products, medicinal chemicals and botanical products
EA067	Manufacture of rubber products
EA068	Manufacture of plastic products
EA069	Manufacture of glass and glass products
EA070	Manufacture of refractory products, clay construction materials, and other porcelain and ceramic products
EA071	Manufacture of cement, lime, plaster, and articles of concrete, cement and plaster, and other non-metallic minerals, (not previously classified)

Table 3: Description of activities included in economic study of enterprises 2012

Economic Activity	Description of the activity included in ESE 2012
EA072	Manufacture of common metals
EA073	Manufacture of metal products, except machinery and equipment
EA074	Manufacture of electronic components and circuit boards, computers and peripheral equipment
EA075	Manufacture of electronic and optical products
EA076	Manufacture of electrical equipment and machinery (not previously classified)
EA077	Manufacture of motor vehicles, trailers and semi-trailers
EA078	Manufacture of other transport equipment
EA079	Manufacture of furniture
EA080	Manufacture of medical and dental instruments and supplies
EA081	Other manufacturing industries
EA082	Repair and installation of machinery and equipment
EA083	Supply of electricity, gas, steam and air conditioning
EA084	Supply of potable water and removal of residual waters
EA085	Waste management and decontamination
EA089	Specialized construction activities
EA090	Trade
EA091	Maintenance and repair of motor vehicles
EA093	Land passenger transport, except taxis
EA094	Passenger taxi transport
EA095	Sea, air, and road freight transport
EA096	Warehousing and storage
EA097	Transportation-related services activities
EA098	Freight handling and other transportation support activities
EA099	Postal and courier activities
EA100	Lodging activities

Table 3: Description of activities included in economic study of enterprises 2012

Economic Activity	Description of the activity included in ESE 2012
EA101	Catering, food and beverage services activities
EA102	Activities related to movie, video and television program production, sound recording; music editing, programming and transmission
EA103	Telecommunications activities
EA104	Information, programming and computing consulting activities, editing of computing and related programs
EA109	Real estate activities
EA110	Legal activities
EA111	Accounting, bookkeeping, fiscal advisory, and other accounting-related activities
EA112	Activities related to consulting in financial management, human resources, marketing, main offices, and related
EA113	Architecture and engineering-related activities; technical testing and analysis
EA114	Scientific research and development activities
EA115	Advertising and market research
EA116	Other professional, scientific and technical activities
EA117	Veterinary activities
EA118	Activities related to renting and leasing of tangible and intangible non-financial assets
EA119	Employment-related activities
EA120	Activities of travel agencies, tour operators, reservation services and related activities
EA121	Security and investigation-related activities
EA122	General building cleaning and landscaping activities
EA123	Administrative and office support activities, and other business support activities
EA127	Teaching
EA128	Activities related to human health care and social assistance
EA129	Artistic, entertainment and recreational activities

Table 3: Description of activities included in economic study of enterprises 2012

Economic Activity	Description of the activity included in ESE 2012
EA130	Activities of associations
EA131	Repair of computers, personal belongings and household goods
EA132	Activities related to washing, drying and cleaning fabric and leather garments
EA133	Hairdressing and other beauty treatment activities
EA134	Funerals and other related activities
EA135	Other services activities (not previously classified)
NPISH	Non-profit institutions serving households

Source: prepared by the authors

Table 4: Follow-up sample. Economic activities by year of execution

EA	2014	2015	2016	2017
EA026	X			
EA032	X			
EA034	X			
EA037	X			
EA038	X			
EA039	X			
EA040	X			
EA043	X			
EA044	X			
EA047	X			
EA049	X			
EA050	X			
EA056	X			
EA057	X			
EA060	X			
EA061	X			
EA062	X			
EA063	X			
EA064	X			
EA065	X			
EA070	X			
EA071	X			
EA073	X			
EA075	X			

Table 4: Follow-up sample. Economic activities by year of execution

EA	2014	2015	2016	2017
EA076	X			
EA078	X			
EA081	X			
EA082	X			
EA089	X			
EA100	X			
EA101	X			
EA103	X			
EA114	X			
EA118	X			
EA123	X			
EA127	X			
EA030		X		
EA083		X		
EA084		X		
EA085		X		
EA090		X		
EA093		X		
EA094		X		
EA095		X		
EA098		X		
EA102		X		
EA104		X		
EA112		X		
EA115		X		
EA116		X		

Table 4: Follow-up sample. Economic activities by year of execution

EA	2014	2015	2016	2017
EA121		X		
EA128		X		
EA129		X		
EA035			X	
EA033			X	
EA036			X	
EA041			X	
EA045			X	
EA046			X	
EA048			X	
EA051			X	
EA052			X	
EA053			X	
EA054			X	
EA055			X	
EA058			X	
EA066			X	
EA067			X	
EA068			X	
EA069			X	
EA072			X	
EA077			X	
EA079			X	
EA097			X	
EA099			X	
EA109			X	

Table 4: Follow-up sample. Economic activities by year of execution

EA	2014	2015	2016	2017
EA110			X	
EA111			X	
EA113			X	
EA120			X	
EA122			X	
EA131			X	
EA133			X	
EA031				X
EA042				X
EA059				X
EA074				X
EA080				X
EA091				X
EA096				X
EA117				X
EA119				X
EA130				X
EA132				X
EA134				X
EA135				X
NPISH				X

Source: prepared by the authors

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