

COSTA RICA NATIONAL ACCOUNTS  
METHODOLOGY FOR CALCULATING QUARTERLY GROSS  
DOMESTIC PRODUCT

March 2017

## PRESENTATION

The Central Bank of Costa Rica presents the methodological document for the Calculation of Quarterly Gross Domestic Product, with 2012 as the reference year, which includes the recommendations of the International Monetary Fund (IMF) on quarterly accounts, in addition to the methodological guidelines suggested in the System of National Accounts 2008 (SCN08), and the Sixth Edition of the Manual of Balance of Payments and International Investment Position (MBP6).

The quarterly national accounts system seeks to provide indicators of the short-term evolution of macroeconomic changes in the economy, so that they may be used as an instrument for decision-making by economic actors. It is also useful for analysis and forecasting of the country's economic cycle.

This document is organized as follows: the first part presents the conceptual framework, and relevant methodological aspects of the calculation of both supply and expenditure. It also includes some considerations of data dissemination and revision, as well as seasonal adjustments.

## 1. CONCEPTUAL FRAMEWORK

The quarterly accounts (QAs) are a quarterly time series system integrated in a coherent accounting framework that provides a synthesis of economic information on a country's situation in terms of its economic activity. The same methodological guidelines are followed in their preparation as those used for preparing the annual accounts (SNA 2008), as well as the recommendations of the International Monetary Fund contained in the Handbook of Quarterly National Accounts - Concepts, Data Sources and Compilation.

The basic statistics used to prepare the QAs have less coverage and quality than those used for the annual calculation of national accounts. However, their strength lies in being an important analytical instrument, since they are synthetic indicators of the general behavior of the economy in the short term, in addition to allowing identification of changes in the context of the economy. They are also basic inputs that can be used to carry out research and analysis of economic cycles.

Given their nature, QAs should be timely, accurate and show some degree of disaggregation. However, they should strike a balance between timeliness and precision; that is, the shorter the reporting period and the QA reference period, the more they will have to be revised later. Taking this into account, QAs in Costa Rica are prepared 90 days after the end of the quarter of interest.

Calculation of QAs is based on monthly or quarterly frequency indicators that reflect the evolution of the variable to be measured (either the supply or the expenditure component)<sup>1</sup>. Best practices suggest that the indicator used should be consistent<sup>2</sup> with those used in the calculation of annual national accounts. Since this condition is not fully met, best practices also suggest that, prior to the selection of the indicator to be used, factors such as coverage, the relationship of the indicator to reference data and timeliness should be evaluated.

Since QAs are based on monthly or quarterly frequency indicators, and to maintain consistency with the annual accounts, their measurement must be adjusted through benchmarking<sup>3</sup> using the Denton Method<sup>4</sup>, which guarantees quantitative consistency of quarterly and annual results in the context of time series.

The new QAs are presented since 1991. The figures up to 2011, with the reference year 2012, correspond to a chained time series with of the 1991 base year series<sup>5</sup>, so that they include methodological and classificatory changes that generate differences in variation levels and rates with respect to the 1991 official base series that was in effect in that period.

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<sup>1</sup> The percentage is over 60% to economic activity and 85% to the expenditure.

<sup>2</sup> Consistency is understood to mean that the sum of the quarterly estimates of a period is equal to the corresponding annual accounts.

<sup>3</sup> Benchmarking is a process that seeks to adjust highly frequent estimates to less frequent estimates; for instance, quarterly time series adjusted to annual series, while keeping the characteristics of both series. This procedure combines the timeliness of short-term indicators with the quality and greater accuracy of annual accounts.

<sup>4</sup> The IMF's Quarterly National Accounts Manual recommends the use of the Denton proportional method, which keeps the series adjusted in the most proportional way possible with respect to the indicator; this method is based on linear quadratic optimization.

<sup>5</sup> [Calculating national accounts using chained indexes](#)

In terms of supply, the QAs respect the accounting identity of GDP based on the calculation of production and intermediate consumption; that is, they estimate the added values of each economic activity as the difference between the gross production value and intermediate consumption. In addition, they distinguish between production of goods and services generated by companies operating under the special regime.

From the perspective of expenditure components, QAs are based on the calculation of components of the final demand in the GDP: final consumption expenditure, government consumption expenditure, gross fixed capital formation, changes in inventories, exports (FOB) and imports (CIF). The last two components include adjustments to the gross foreign trade figures of the General Customs Office for third-party processing services, and maintenance and repairs. The first case corresponds to manufacturing services of companies on physical inputs (processing, assembly, packaging, etc.), in which the economic ownership of goods does not change, even though they cross the country's borders; the second case corresponds to aircraft repair services and the like, which are not accounted for in the general merchandise account but rather in the services account<sup>6</sup>.

Just as in the case of annual accounts, QAs are calculated on a moving base – that is, the goods and services produced in the economy are valued at the prices of the previous year<sup>7</sup>. In the specific case of QAs, the "annual overlap" technique is used in which the weight is given by the annual average weight in order to avoid effects of relative price volatility in the short term.

Finally, the chained volume method has the characteristic that the components are not additive<sup>8</sup>, that is, the sum of chained values of economic activities is not equal to the GDP; likewise, the sum of expenditure components does not add to the GDP. In this way, the series can be analyzed by calculating the contribution of the components to the variation rate of the aggregate.

From the perspective of expenditure components, specifically changes in inventories, it is not recommended to chain this variable as it can have both negative and positive values, and the interpretation of the percentage variation lacks economic significance. For purposes of analysis, it is recommended to evaluate the contribution of this variable to gross domestic product growth.

## **2. METHODOLOGY**

The new national accounts classify the country's production in 136 economic activities according to the International Standard Industrial Classification (ISIC Rev4). For the purposes of the QAs, they are presented by sections<sup>9</sup>.

As indicated in previous paragraphs, QAs estimate aggregated values of each economic activity as the difference between gross production value and intermediate consumption. The hypothesis underlying this method is that ratios of intermediate consumption and gross value added over gross production value remain constant in the short term in terms of volume. Thus, the basic procedure is as follows:

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<sup>6</sup> This is in keeping with the methodological recommendations of the VI Edition of the Manual of Balance of Payments and International Investment Position (MBP6) of the International Monetary Fund, and with that established in the 2008 System of National Accounts (SNA 2008).

<sup>7</sup>The advantage of this method is that it makes it possible to keep the country's price structure updated. Using fixed-base weighting has the problem that as time goes on, the price structure becomes outdated, mostly during periods of high volatility.

<sup>8</sup>Additivity requires fixed price weights.

<sup>9</sup> See details of section and economic activities in Appendix 1.

- a) Synthetic indicators of volume, production prices and intermediate consumption prices are calculated for each economic activity.
- b) Volume indices are aggregated based on the annual weights of year t-1, except for the first year in which the weights of that year are used and are chained using the annual overlap method.
- c) Basic value indicators (gross production and intermediate consumption) are constructed for each activity.
- d) Annual production and intermediate consumption values are calculated by quarters, as well as chained annual volume indexes.
- e) The quarterly monetary chain is calculated taking 2012 as the reference year.
- f) The implicit deflator is obtained as a quotient.

Some details of the calculation of each of the economic activities included in the QAs exercise are presented below.

i. **Agriculture, Livestock and Forestry (Section A)**. This activity were split into four groups: exportable products, agricultural products, livestock products and others.

Monthly information is available for amounts harvested, production sold in the local and foreign markets, amount extracted from cattle and pigs, among other types of data, which were added together quarterly. Data on amounts harvested is obtained from the Coffee Institute (ICAFE), the National Production Council (CNP), the Industrial Sugar Cane League (LAICA), the National Rice Corporation (CONARROZ), the Comprehensive agricultural marketing program (PIMA). Also, poultry production surveys from The Economics Surveys Area unit

Information on exports provided by the General Customs Office is also taken into account.

ii. **Mining and quarrying (Section B)**. The baseline information for preparing the quarterly indicators is derived from the monthly production surveys conducted by the Banco Central's Economic Survey Area, in addition to the National Cooperative of Salt Producers (CONAPROSAL).

Monthly information on amounts and prices of gross production value is available for stone and salt extraction, and the operation of other mines.

iii. **Manufacturing (Section C)**. A distinction is made between production of companies operating under the regular and the special regimes.

a. **Definitive Regime**. This activity is made up of 74 products, which were grouped into six groups: food products (including beverages and tobacco); textiles, garments and the leather industry; paper and paper products, printing and publishing; chemicals and chemicals derived from petroleum; manufacture of metal products, machinery and equipment; other manufacturing industries (vehicles, vehicle parts and accessories, wooden furniture, medical and dental instruments, and other manufacturing products).

The main source of information is the monthly production surveys conducted by the Banco Central's Economic Survey Area, in addition to information on coffee, milk, rice, livestock production (cattle and pigs), and poultry raised for meat, which are considered to be indicators of agricultural activity.

b. **Special Regime.** Most of the production of this group of companies is oriented towards the external market. In order to maintain consistency within the manufacturing industry, the same grouping is carried out in the Special Regime as in the Definitive Regime, with the difference that a group has been created for products related to medical equipment and instruments, given the dynamism they have shown in recent years.

The gross value of production of these companies is estimated using the values at which they are exported. The information is provided by the General Customs Office.

Since it was possible to identify the companies that provide processing services, the quarterly information on the value of these services (calculated for their inclusion in the balance of payments) was used directly.

iv. **Electricity, water supply, waste management and remediation activities (Section D, E).** Information on electricity is provided by the Costa Rican Electricity Institute (ICE); it distinguishes electric energy sales (megawatts hours), by consumption sector: residential, general, small industries, large industries, high-voltage industries and public lighting. In addition, it provides the prices associated with each type of sale.

In the case of water, the Costa Rican Water and Sewage Institute provides the sales and amounts collected through water fees for aqueducts, sewers and hydrants.

v. **Construction (Section F).** A distinction is made between construction for private use, and for public use.

a. **Private use.** The results of the Quarterly Survey on Progress of Construction Projects for Private Use (ETAPCP) are used. This survey measures the actual physical progress of works under construction (from inception to completion) and has been carried out continuously since the fourth quarter of 2010.

b. **Public use.** No volume information is available, so the annual estimate level of the monetary chain it has been turn into a quarterly indicator using the Denton method.

vi. **Wholesale and retail trade (Section G).** The calculation is based on results of the monthly production surveys conducted by the Banco Central's Economic Survey Area. The information is disaggregated into six trade groups: food products, chemicals and pharmaceuticals, construction materials, vehicles and tires, electrical appliances and other products (textiles, leather, furniture, mineral products and manufactured goods). A parallel sales index is calculated with information on sales from the Ministry of Finance.

vii. **Transport and storage (Section H).** This group distinguishes between passenger transport, freight transport, warehousing and courier services. Foreign trade goods records are the indicator for cargo transport and storage of goods. The annual estimate level of the monetary chain it has been turn into a quarterly indicator using the Denton method to services with no indicators.

viii. **Accommodation and food service activities (Section I).** In the case of accommodation-related activities, information derived from a hotel monthly survey carried out by the Economic Survey Area is available for the number of occupied rooms.

The production indicator for food service activities is constructed based on sales information reported to the Ministry of Finance.

**ix. Information and communication (Section J).** Among this group of companies, a distinction is made between the production of companies operating under the definitive and special regimes.

Particularly in communications, the main sources of information are the Costa Rican Electricity Institute (ICE) and some private sector companies like Telecommunications Superintendency (SUTEL), Radiográfica de Costa Rica (RACSA). The index considers internet and telephone consumption, mobile and fixed, among others.

In the case of information, programming and IT consulting services, a distinction is made between production generated by companies operating under the regular and special regimes. There is no volume indicator for production under the regular regime, and that for the special regime is estimated based on monthly income of the companies in this group. The primary source of information is PROCOMER, the Foreign Trade Promotion Agency of Costa Rica.

**X. Financial and insurance activities (Section K).** The source of information for the quarterly calculation are the monthly financial statements and information on gross premiums provided by the General Superintendency of Financial Entities (SUGEF) and the General Superintendency of Insurance (SUGESE), respectively.

This activity is disaggregated into three groups: financial intermediation services indirectly measured (the indicator is constructed based on the FISIM production of state and private banks, cooperatives, financial entities and mutual savings and credit institutions); financial services with explicit cost (monthly calculation of the production of financial services with explicit cost of state and private banks, cooperatives, financial entities and mutual savings and credit institutions), and financial insurance (the indicator is constructed based on information of gross premiums of all the insurance companies in the country).

It should be noted that in terms of volume, the FISIM are calculated following the guidelines established in the System of National Accounts 2008 (SNA 2008).

**xi. Real estate activities (Section L).** No volume information is available, so the annual estimate level of the monetary chain it has been turned into a quarterly indicator using the Denton method.

**xii. Professional, scientific and technical activities (Sections M and N).** For these types of services a distinction is made between production generated by companies operating under the definitive regime (77%) and those operating under the special regime (23%). There is no indicator for production of the regular regime, and that of the special regime is estimated from the monthly income of the companies in this group. The primary source is PROCOMER, the Foreign Trade Promotion Agency of Costa Rica.

**xiii. Public administration and compulsory social security (Section O).** This group constructs an indicator based on information from the quarterly financial statements of the Central Government and the biannual employment statistics of the Ministry of Finance.

**xiv. Education, human health and social work activities (Sections P and Q).** A distinction is made between non-market and market production. In the first case, information from quarterly financial statements of the Central Government, as well as employment statistics from the Ministry of Finance, is used as an indicator. In the second case, No volume information is available, so the annual estimate level of the monetary chain it has been turned into a quarterly indicator using the Denton method

**xv. Other activities (Sections R, S, T and U).** There is no volume indicator for these activities, so the annual estimate level of the monetary chain it has been turned into a quarterly indicator using the Denton method.

**xvi. Taxes on products and imports (net of subsidies).** Calculations use as an indicator the monthly cash flows of the Central Government and the annual financial statements of the Ministry of Finance. In addition, a volume indicator is constructed using the volume index of manufacturing, commercial, hotels and restaurants, and communications activities.

The procedure used to turn of annual to quarterly the components of expenditure is detailed below:

**a) Expenditure in Final Consumption of Households.** Taking as the reference year the final consumption expenditure vector for 2012, it was determined that 38 products (out of 183) account for about 80% of total expenditure. These products were disaggregated according to durability: durable goods, non-durable goods, semi-durable goods, and services.

In addition, for each of the selected products, the origin (national or imported) was evaluated to identify those whose main component was imported, so that the indicator is constructed based on the import records provided by the General Customs Office.

In those cases when the product has a predominantly national origin, the evolution of the indicator of production of the economic activity that produces it (assuming that the supply/demand ratio of the product is maintained) is considered as an indicator.

**b) Government final consumption expenditure.** A distinction is made between individual and collective consumption. The former uses the quarterly results to education and human health activities as an indicator and the latter, the public administration.

**c) Gross fixed capital formation.** This is divided into: machinery and equipment, housing and other new construction, cultivated assets and intellectual property,.

The machinery and equipment indicator is constructed based on foreign trade records of the General Customs Office, while that for housing and new constructions is calculated with information from the Quarterly Survey on Progress of Construction Projects for Private Use (ETAPCP).

There is no volume indicator for cultivated assets and intellectual property, so the annual estimate level of the monetary chain it has been turned into a quarterly indicator using the Denton method.

**d) Imports and exports of goods.** Figures are received on a monthly basis from the General Customs Office, and are disaggregated by trade regime (normal and special). Given the impact of the oil bill within the balance of payments, imports of the definitive regime are divided into: fuels and other imports.

As mentioned in previous paragraphs, the companies that carry out processing services are identified, so monthly adjustments are made and consistency is guaranteed with the figures that are finally incorporated into the balance of payments.

**e) Imports and exports of services.** Quarterly services figures of the balance of payments are the indicator. The possibility of disaggregating tourism- and travel-related services is being assessed.



The services Consumer Price Index (CPI) is the deflator of services exports, while imports use the United States CPI adjusted for exchange rate variation.

**e) Change in inventories.** These are obtained as a residual.

### **3. DATA DISSEMINATION**

The new quarterly figures, available in the section of economic indicators of the Web site, will be published 90 days after the end of the quarter being analyzed, with the following details:

- ✓ GDP by economic activity (according to the International Standard Industrial Classification Rev 4), in nominal terms (original and seasonally adjusted series).
- ✓ GDP by economic activity, in terms of volume at previous year's prices chained with the reference year 2012 (original series, seasonally adjusted, trend cycle and annualized variation of the trend cycle).
- ✓ GDP and expenditure components, in nominal terms (original series and seasonally adjusted).
- ✓ GDP and expenditure components, in terms of volume at previous year's prices chained with the reference year 2012 (original series, seasonally adjusted, trend cycle and annualized variation of the trend cycle).

### **4. DATA REVISION**

Considering the trade-off between timeliness and accuracy, the QAs compile preliminary data that are subject to revision when new basic information becomes available. In general terms, two sources of revision are identified:

- ✓ Those derived from changes in basic short-term information.
- ✓ Those associated with the revision of annual figures; as mentioned in previous paragraphs, QAs should be harmonized with the annual accounts. This will involve revisions of the quarterly figures of previous years, given the harmonization procedure that is followed in the QAs.

### **5. SEASONAL ADJUSTMENT**

The seasonal adjustment is made using the TRAMO/SEATS package. Each time the annual series is revised, the models defined for the extraction of indicators are re-evaluated.

The seasonal adjustment can be carried out in two ways: directly and indirectly. In the first case, the adjustment is made to each of the components and aggregates independently, while in the second case, the aggregates are obtained from a weighted sum of the components. Costa Rica uses the first method.

The International Monetary Fund manual<sup>10</sup> indicates that neither approach is optimal, however, the direct method produces a smoother adjustment and generates series that are subject to less revisions.

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<sup>10</sup> Handbook of Quarterly National Accounts - Concepts, Data Sources and Compilation. Page 142, paragraph 8.50

**ANEXO 1**

<b>SECTION</b>	<b>ECONOMIC ACTIVITY</b>
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D,E	Electricity, water supply, waste management and remediation activities
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities (L)
M,N	Professional, scientific technical, administrative and support service activities
O	Public administration and compulsory social security
P,Q	Education, human health and social work activities
R,S,T,U	Other service activities <sup>11</sup>

<sup>11</sup> It includes arts, entertainment and recreation (R), other services activities (S), activities of households as employers; undifferentiated goods – and services - producing activities of households for own use (T) and, activities of extraterritorial organizations and bodies.