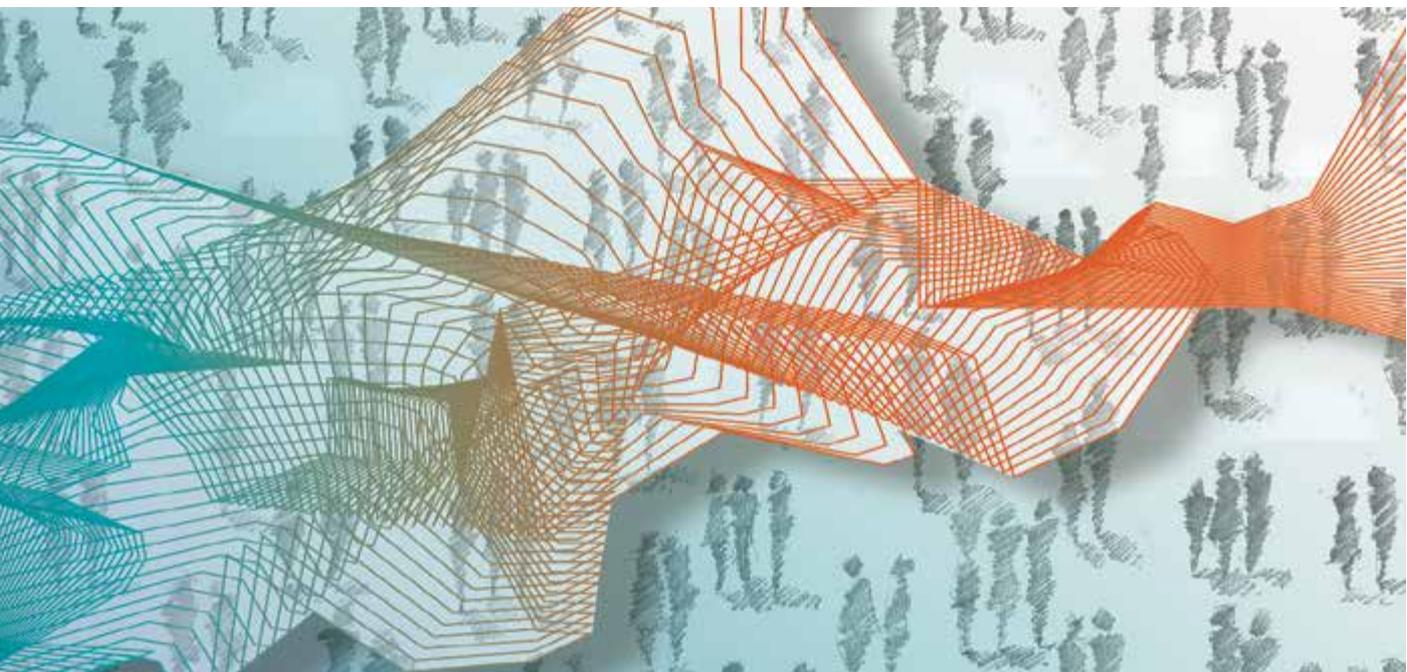




National Accounts Institute



# National accounts

Quarterly national accounts of Belgium

Methodological inventory  
(March 2018 version)



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## Chapter 1 Overview of the system of quarterly national accounts

This chapter gives a general overview of the compilation system of quarterly national accounts for Belgium. It can be read separately from the following chapters.

### 1.1 Organisation and institutional aspects

In Belgium, the national accounts are compiled by the National Accounts Institute (NAI). Established by a law of 21 December 1994, the NAI groups together three institutions, namely the National Bank of Belgium (NBB), the Federal Planning Bureau (FPB) and Statics Belgium (NSI). Together, these three institutions have been given the responsibility of compiling estimates of the main Belgian macroeconomic statistics: national accounts, regional accounts, input-output tables, external trade statistics, economic projections, etc.

Within the NAI, the NBB has the task of compiling the national accounts. The annual and quarterly national accounts and the regional accounts are estimated within the same unit, called National & Regional Accounts and Short Term Statistics

The Belgian national accounts were published on a quarterly basis for the first time in 1998. Since then, the quarterly accounts for Belgium have been adapted to conform to changes in European recommendations in terms of method (ESA 1995 and then ESA 2010) and time span (85 days, 60 days, 45 days, 30 days flash).

### 1.2 Publication schedule and revision policy

The release of Belgium's quarterly national accounts statistics is spread over three stages:

- a flash estimate of economic growth, published 30 days after the end of the quarter;
- a rapid estimate of the main aggregates, issued 60 days after the end of the quarter;
- a detailed estimate of the quarterly accounts, published 120 days after the end of the quarter, at the same time as the following quarter's flash estimate.

These three stages are thus grouped together in two terms:

- 30 days after the end of the quarter: flash estimate and revised and more complete data on the previous quarter (120-days estimate);
- 60 days after the end of the quarter: main aggregates.

In this process, the revision policy makes a distinction, on the one hand, between the last quarters of a year for which no annual estimate is yet available and, on the other hand, the previous quarters, linked to an annual estimate that has already been published:

- the quarters falling outside a year for which an annual estimate has already been published<sup>1 2</sup> can be revised at each quarterly publication at 120 days after the end of the quarter, with no significance threshold, so that users

<sup>1</sup> Whether this estimate comes from the quarterly accounts themselves (publication of the annual estimate derived from the quarterly accounts, in April) or whether it is a completely separate annual estimate (publication of detailed accounts, in October).

<sup>2</sup> These quarters are:

- in the January publication of year t: the 1st, 2nd and 3rd quarters of year t-1;
- in the April publication of year t: the 1st, 2nd, 3rd and 4th quarters of year t-1;
- in the July publication of year t: the 1st quarter of year t;
- in the October publication: the 1st and 2nd quarters of year t.

- have at their disposal economic information that is as full and precise as possible;
- the quarters belonging to a year for which an annual estimate has already been published may only be revised twice a year:
  - with the introduction of the most recently published government accounts in April;
  - when the detailed annual accounts are published in October<sup>1</sup>.

The revision policy is described more in detail in the following document: [methodcn\\_en\\_201709.pdf](#)

### 1.3 General estimation method

Most of the information used for compiling annual national accounts is not available on a quarterly basis. As in the majority of European countries, Belgium's quarterly national accounts depend on an indirect method (temporal disaggregation). The quarterly results are obtained by interpolating the data from annual national accounts on the basis of indicators that are available every three months.

The interpolation method used is based on the Fernández (Chow and Lin) econometric model, which ensures perfect consistency by construction with the annual series and provides for the current year optimum extrapolations as a function of the relationships observed in the past.

Since it is based on the most reliable quarterly data, the gross domestic product (GDP) by production approach is favoured. The other two approaches (expenditure and income) are adjusted via a balance item (changes in inventories under expenditure and operating surplus from the income approach).

While preference is given to the production approach, the estimate of changes in inventories obtained by balance is nevertheless compared with other sources of information, namely the results of business surveys on managers' assessment of stocks.

### 1.4 Volume estimates

Volume growth of Belgian GDP and its components is measured on the basis of the structure of the previous year's prices according to the chain index method.

Quarterly, these chain indices are based on the annual overlap method, which consists of comparing the current quarter's value with the average value in quarters of the previous year.

The volume measure of Belgian quarterly national aggregates is obtained by following two estimation techniques, which depend on the type of quarterly information available:

- If the quarterly information is expressed in volume terms (industrial production indices, amount of electricity produced, etc.), the estimate by volume is obtained directly through the Fernández (Chow and Lin) econometric model being applied to annual aggregates by volume (value added of a small number of activities in industry, etc.).
- If the quarterly indicator is available in value terms (VAT statistics, general government budget information, etc.), the volume estimate is obtained indirectly, by deflating the quarterly aggregate in value terms stemming from application of the Fernández (Chow and Lin) model on the annual aggregate in value terms by a quarterly price index, itself obtained by applying the Fernández (Chow and Lin) method to the annual deflator (value added of most activities in industry, value added in market services, household consumption, investment by enterprises, public consumption, etc.).

### 1.5 Adjustment for seasonal variations and calendar effects

The quarterly statistical series often fluctuate in the very short term with climate conditions, social and other habits. These fluctuations are referred to as seasonal variations. The quarterly series can also be affected by the number of working days and other calendar effects. While the seasonal nature and the calendar effects form an integral

<sup>1</sup> If this were not the case, a discrepancy would creep into the annual and quarterly accounts.

part of quarterly data, they hinder the interpretation of infra-annual developments and the compilation of quarterly balances. It is thus preferable for the figures to be adjusted for these effects.

The method chosen is based on the combination of the Tramo<sup>1</sup> and Seats<sup>2</sup> algorithms, officially recommended by Eurostat as seasonal adjustment instruments. The adjustment for seasonal variations and for calendar effects is made by the JDemetra+ software.

Seasonal adjustment is made at the most detailed level (indirect approach), even for the chain linked volume series which are afterwards aggregated through the transformation in previously year prices<sup>3</sup>.

## 1.6 Flash estimate

A "flash" estimate is a first estimate of an economic aggregate according to the concepts of the national accounts, calculated and published as soon as possible after the end of the quarter, on the basis of incomplete information. The advantage of the GDP flash estimate over the other advanced economic indicators is that it is the only one to offer an overall, coherent picture of the economy as a whole. The incompleteness of the basic data justifies the use of ad hoc statistical methods in order to reduce the margin of error associated with these initial estimates.

To achieve maximum reliability, the general principle adopted for the "flash" estimate (t + 30 days) of the Belgian national accounts is simple: wherever possible, the methods and sources used are the same as for the following estimates (t + 60 days and t + 120 days).

The "flash" estimate of the Belgian quarterly GDP is therefore based on the same econometric method as the estimate of the quarterly accounts proper, namely the Fernández (Chow and Lin) method. As in the traditional quarterly accounts, GDP is first estimated from the output approach before being compared with GDP from the expenditure approach. The estimates are made at the same disaggregation level as in the complete quarterly accounts.

However, the "flash" estimate differs in one essential respect from the full quarterly accounts, namely in the available statistical information. The estimate after 30 days has to be based on the data available no later than 3 weeks after the end of the quarter, namely:

- for industrial output: the provisional monthly indices for the first two months of the quarter;
- for the VAT statistics: the final statistics on the monthly returns for the first month in the quarter, and the provisional statistics for the monthly returns for the second month.

The flash quarterly indicators are built on the basis of this two months information and on a statistical extrapolation of the third month. This extrapolation is based on an ARIMA model.

1 Tramo is the acronym for "Time Series Regression with Arima Noise, Missing Observations and Outliers".

2 Seats is the acronym for "Signal Extraction in Arima Time Series".

3 Note that chain linked volume series are not additive and have to be transformed firstly to series in previously year prices before they can be added together.

## Chapter 2 Publication schedule and revision policy

### 2.1 Dissemination policy

There is an ever-pressing need for rapid, reliable and complete information on the economy, whether in a Belgian<sup>1</sup> or wider European<sup>2</sup> context.

According to the current European schedule, a first global estimate of economic growth is expected 30 days (preliminary GDP flash estimate) and 45 days (GDP flash estimate) after the end of the quarter. The detailed breakdown of this growth in terms of value added, expenditure, income and employment must then be transmitted within 2 months.

In this context, the policy governing the dissemination of the quarterly national accounts fulfils three objectives:

- to meet users' needs as far as possible, by offering the best possible balance between speed, detail and accuracy;
- to bring Belgian national accounts into line with best European practice;
- to rationalize the supply of publications, in view of the increasing number of statistics to publish.

Statistics for Belgium's quarterly national accounts are disseminated in three stages:

- a flash estimate of economic growth, published 30 days after the end of the quarter;
- a rapid estimate of the main aggregates (GDP, value added, expenditure, income, wages, employment), issued 60 days after the end of the quarter;
- a detailed estimate of the accounts, which combines general government accounts with a new version of the main aggregates, published 120 days after the end of the quarter, at the same time as the following quarter's flash estimate.

These three stages are thus grouped together in two terms:

- 30 days after the end of the quarter: flash estimate and revised and more complete information on the previous quarter (120-days estimate);
- 60 days after the end of the quarter: main aggregates.

Table 1 gives an overview of the schedule. After a recapitulation of the European Commission's requirements, for each of the quarterly statistics of the national accounts, it shows the timetable applied in Belgium with the time-lags currently in force, for the four distribution channels (sending to Eurostat, press release, data base on the website<sup>3</sup> and actual publication).

Table 2 sums up the three stages, in terms of time-lags, variables and basic data used.

<sup>1</sup> Notably to make the best adjustment of the forecasts for the whole of the current year.

<sup>2</sup> Under the joint pressure of the European Commission and the European Central Bank.

<sup>3</sup> DotStat database.

**TABLE 1** PUBLICATION SCHEDULE FOR BELGIAN NATIONAL ACCOUNTS: NUMBER OF DAYS DELAY BETWEEN THE END OF THE REFERENCE PERIOD AND THE DATE OF PUBLICATION FOR EACH TYPE OF STATISTICS.

	<i>Regulatory deadline set by the European authorities</i>	Deadline applied in Belgium for		
		transmission to Eurostat	press release and tables (Dotstat) on the NBB's website	publication (tables and comments)
<u>Quarterly accounts</u>				
– GDP flash	30	30	30	30
– Main aggregates: 1st version	2 months	60	60	-
– Government accounts	85	85	100 or 120	100 or 120
– Sectoral accounts	85	85	100 or 120	100 or 120
– Main aggregates: 2nd version	-	120	120	120
<u>Annual accounts</u>				
– Main aggregates: 1st version	2 months	60	60	-
– Government accounts: 1st version	85	85	120	120
– Sectoral accounts: 1st version	85	85	-	-
– Main aggregates: 2nd version	-	120	120	120
– Government accounts: 2nd version	9 months	9 months	290	290
– Detailed tables	9 months	9 months	290	290
– Sectoral accounts: 2nd version	9 months	9 months	290	290

Source: NAI

TABLE 2 DESCRIPTION OF THE DIFFERENT STAGES OF DISSEMINATION OF QUARTERLY NATIONAL ACCOUNTS IN TERMS OF VARIABLES AND BASIC DATA

<i>Term</i>	<i>Variables disseminated</i>	<i>Distribution channel</i>	<i>Basic data used</i>	
30 days	GDP growth rate in volume	Press release Dotstat Publication (120 days)	Industrial production	month 1: version m+70 days month 2: version m+40 days month 3: -
			VAT	month 1: version m+75 days month 2: version m+45 days month 3: - quarterly declarations: -
60 days	Main national aggregates:  GDP, in value and volume terms, broken down according to the value added of 11 branches of activity, according to expenditure (public and private consumption, investment, changes in inventories, exports and imports) and income (compensation of employees, gross operating surplus and joint income of the self-employed)  Labour market statistics: wages and employment broken down according to 11 branches of activity	Press release Dotstat	Industrial production	month 1: version m+70 days month 2: version m+70 days month 3: version m+40 days
			VAT	month 1: version m+75 days month 2: version m+75 days month 3: version m+45 days quarterly declarations: version t+45 days
			Balance of payments	month 1: version m+105 days month 2: version m+75 days month 3: version m+45 days
120 days	Main national aggregates (see above)  Flash estimate for the following quarter	Press release Dotstat Publication	Industrial production	month 1: version m+130 days month 2: version m+70 days month 3: version m+70 days
			VAT	month 1: version m+75 days month 2: version m+75 days month 3: version m+75 days quarterly declarations: version t+45 days
			Balance of payments	month 1: version m+165 days month 2: version m+135 days month 3: version m+105 days
			NSSO	quarterly data : version t+75 days ("T+4")

Source: NAI

Striking the right balance between speed, detail and accuracy lies at the heart of the process of estimating economic statistics. From this perspective, the three stages proposed each give preference to one or the other dimension, which gives them their added value:

- by offering an estimate of economic growth after only 30 days, the flash estimate meets the speed requirement, with the inevitable concessions in terms of accuracy (the basic data available being limited to just the first two months of the quarter) and detail;
- drawn from basic data covering the whole quarter, the estimate of the main aggregates put out after 60 days gives a more accurate breakdown of economic growth;
- based on updated fundamental data and containing a wider range of statistics, the publication that comes out 120 days after the end of the quarter favours accuracy and detail.

The publication after 120 days brings together a set of statistical data that are perfectly consistent. Calculations concerning the main aggregates making up GDP (value added, expenditure and income), made 113 days after the end of the quarter, incorporate final data on general government<sup>1</sup> (consumption and investment, taxes and production subsidies).

The results after 60 days and/or 120 days are used to estimate the quarterly accounts by institutional sectors<sup>2</sup> (financial and non-financial corporations, households, non-profit institutions, rest of the world). A methodological inventory for quarterly sector accounts can be found on [NBB website](#)

Likewise, the published statistics correspond in all aspects to the figures sent to the European authorities at 85 and 120 days, thus facilitating collaboration between domestic and foreign users.

At the end of the month of April (120 days after the end of the fourth quarter), full and detailed accounts are published. These accounts are accompanied by a yearly publication, presenting the same variables for the whole of the past year.

Publication dates are announced one year in advance on the NBB's website. There is no special transmission foreseen for any national or international authority.

## 2.2 Revision policy

Since consistency with the annual accounts is an inherent feature of the quarterly accounts, the *methodological and conceptual revisions* are made on the same dates as in the annual accounts.

As far as *routine revisions* are concerned, there is a need to make a distinction, on the one hand, between the last quarters of a year for which no annual estimate is yet available and, on the other hand, the previous quarters, linked to an annual estimate that has already been published:

- the quarters falling outside a year for which an annual estimate has already been published<sup>3 4</sup> can be revised at each quarterly publication at 120 days after the end of the quarter, with no significance threshold, so that users have at their disposal economic information that is as full and precise as possible;
- the quarters belonging to a year for which an annual estimate has already been published may only be revised twice a year:
  - with the introduction of the most recently published government accounts in April;
  - when the detailed annual accounts are published in October<sup>5</sup>.

The revision policy is described more in detailed in the following document, available on [NBB website](#)

1 Available approximately 82 days after the end of the quarter.

2 Which must be sent to Eurostat after 85 days.

3 Whether this estimate comes from the quarterly accounts themselves (publication of the annual estimate derived from the quarterly accounts, in April) or whether it is a completely separate annual estimate (publication of detailed accounts, in October).

4 These quarters are:

- in the January publication of year t: the 1st, 2nd and 3rd quarters of year t-1;
- in the April publication of year t: the 1st, 2nd, 3rd and 4th quarters of year t-1;
- in the July publication of year t: the 1st quarter of year t;

5 If this is the case, the publication of the detailed annual and quarterly accounts.

## 2.3 Content of publications

### 2.3.1 Monthly flash estimate

The flash estimate of economic growth calculated 30 days after the end of the reference quarter is distributed via two channels:

- a press release;
- a paper publication sent to subscribers and available upon request, also put on the website in pdf form.

The press release gives GDP growth by volume, adjusted for calendar effects and seasonal variations, compared with both the previous quarter and with the same quarter of the year before, in table and chart form. The same communiqué also includes full and detailed information (120 days) on the previous quarter (cfr. Section 2.3.3). The press release is put up on the NBB's website at 3 pm on the 30 days deadline. An example is given in Annex 1.

The paper publication is the hard-copy publication that sets out the detailed accounts for the previous quarter (cfr. Section 2.3.3). As for the flash estimate, its content is identical to that given in the press release.

### 2.3.2 Main aggregates - 60 days

The results of the estimates of the main aggregates are disseminated via two channels:

- a press release;
- statistical tables published on the NBB's website.

The press release gives GDP growth by volume, adjusted for calendar effects and seasonal variations, compared with both the previous quarter and with the same quarter of the year before, in table and chart form. It also includes a table featuring growth rates of the main components of value added and expenditure, at quarterly intervals. These tables and charts are accompanied by a text describing the main economic developments observed during the quarter. The press release is put up on the NBB's website at 3 pm on the 60 days deadline. An example is featured in Annex 2.

Released on the NBB's website, in the Dotstat database, at the same time as the press release, the tables set out in level series (in millions of euro), in the form of gross data, adjusted for calendar effects and seasonal variations:

- GDP broken down into 11 branches of activity (nomenclature A10 with a distinction made for general government), by volume and by value;
- GDP broken down according to the main categories of expenditure (household and NPISH consumption, public consumption, investment in housing, investments by enterprises, public investment, changes in inventories, exports and imports of goods and services), by volume and by value;
- GDP broken down according to the main categories of income (compensation of employees, gross operating surplus and gross mixed income), by value;
- final consumption of households by durability (durable goods and others) according to the domestic concept, by volume and by value;
- imports and exports of goods and services by geographical zone (Euro area, Intra EU extra Euro area, Extra-EU), by volume and by value;
- compensation of employees broken down into 11 branches of activity, by value;
- total paid employment and self-employment, domestic and national;
- domestic employment broken down into 11 branches of activity.

### 2.3.3 Detailed accounts - 120 days

The results of the estimates of the detailed accounts are disseminated via three channels:

- a press release;
- statistical tables published on the NBB's website;
- a paper publication sent to subscribers and available upon request, also put on the website in pdf form.

The press release is the same as that devoted to the following quarter's flash estimate (cfr. Section 2.3.1). Apart from the growth estimate for quarter t-1, it presents a new and more complete estimate of volume growth of GDP in quarter t-2, adjusted for calendar effects and seasonal variations, compared with both the previous quarter and with the same quarter of the year before, in table and chart form. It also comprises a table featuring growth rates of the main components of value added and expenditure of this quarter t-2, at quarterly intervals. These tables and charts are accompanied by a text describing the main economic developments observed during quarter t-2. As a reminder, an example of this press release is attached in Annex 1.

Released on the NBB's website, in the Dotstat database, at the same time as the press release, the tables set out in level series (in millions of euro), in the form of gross data, adjusted for calendar effects and seasonal variations:

- GDP broken down into 11 branches of activity (nomenclature A10 with a distinction made for general government), by volume and by value;
- GDP broken down according to the main categories of expenditure (household and NPI consumption, public consumption, investment in housing, investments by enterprises, public investment, changes in inventories, exports and imports of goods and services), by volume and by value;
- GDP broken down according to the main categories of income (compensation of employees, gross operating surplus and gross mixed income), by value;
- final consumption of households by durability (durable goods and others) according to the domestic concept, by volume and by value;
- imports and exports of goods and services by geographical zone (Euro area, Intra EU extra Euro area, Extra-EU), by volume and by value;
- compensation of employees broken down into 11 branches of activity, by value;
- total paid employment and self-employment, domestic and national;
- domestic employment broken down into 11 branches of activity;
- main general government sector revenue and expenditure.

Apart from the flash estimate of quarter t-1 (cfr. Section 2.3.1), the hard-copy publication presents the same tables as those in the Dotstat database, but only adjusted for calendar effects and seasonal variations (except in the case of public sector revenue and expenditure), accompanied by a commentary on the main developments observed.

## 2.4 Metadata

The Belgian national accounts abide by the IMF's distribution rules (Special Data Dissemination Standard – SDDS). In this context, summary information on the sources and methods used for estimating them is available on the NBB's website.

More detailed information can also be found in the form of methodological notes, in individual publications or on the website.

## Chapter 3 General method of estimation

### 3.1 General structure

To varying degrees, all countries use an indirect method for estimating quarterly national accounts. In Belgium, this method is given a preference, since the main sources of annual data are not available on time for the annual methodology to be converted to quarterly level. The quarterly results are therefore obtained by interpolating annual data on the basis of quarterly indicators.

The interpolation method used is based on the Fernández (Chow and Lin) econometric model, which is built in a way that the quarterly series are perfectly consistent with the annual series and provide optimal extrapolations for the current year based on related series observed in the past.

### 3.2 Balancing, calibration and other reconciliation procedures

#### 3.2.1 Balancing the GDP approaches

Since it is based on the most reliable quarterly data, the gross domestic product (GDP) by production approach is favoured. The other two approaches (expenditure and revenue) are adjusted via a balance item (changes in inventories under expenditure and operating surplus on the revenue approach).

While preference is given to the production approach, the estimate of changes in inventories obtained by balance is nevertheless compared with other sources of information, namely the results of business surveys on managers' assessment of stocks.

#### 3.2.2 Benchmarking and calibration with annual data

The basic indirect method theoretically consists of two stages. Initially, the evolution of an economic indicator is adjusted to the annual series using ordinary least squares (benchmarking). Any remaining differences between the benchmarked indicator and the annual series are then broken down mechanically (calibration).

Merging these two stages under the method put forward by Fernández<sup>1</sup> (Chow and Lin<sup>2</sup>) makes it possible to improve on this procedure by reducing the estimate error variance. This method, based on generalised least squares, is justified by the fact that the remainders show a significant autocorrelation.

The conversion of an annual series into quarterly figures from indicators in the framework of a general linear model can be defined more explicitly in the following way.

The objective is to estimate the quarterly series, whose annual total  $Y$  is known, from a quarterly indicator  $x$ , assuming the model:

$$y = x * \beta + \epsilon$$

$$\text{with } E(\epsilon | x) = 0 \text{ and } V(\epsilon | x) = \sigma^2 V$$

If  $M$  is the sum matrix of the quarters of a same year, the annual constraint can be written as:

$$Y = M * y = M * x * \beta + M * \epsilon$$

$M$ ,  $Y$ ,  $x$  and  $V$  being known.

<sup>1</sup> Fernández R.b., A methodological note on the estimation of time series, *The Review of Economics and Statistics*, 63(3), 1981, pp. 471-476

<sup>2</sup> Chow G. and Lin A.L., Best linear unbiased interpolation, distribution and extrapolation of time series by related series, *Review of Economics and Statistics*, vol. 43, N°4, November 1971, pp. 372-375. For a detailed technical description, see the article by Bournay and Laroque, *Réflexions sur la méthode d'élaboration des comptes trimestriels*, *Annales de l'INSEE*, N°36, 1979, pp. 3-29.

An estimator  $y_e$  of  $y$ , linear on  $Y$ , unbiased and with minimum variance can be derived from this problem of prediction in a general linear model:

$$y_e = x * \beta_e + L * (Y - M * x * \beta_e)$$

where the unbiased estimator  $\beta_e$  of  $\beta$  is that of the generalised least squares on the annual model and where  $L$  is a smoothing matrix depending on  $V$ .

More specifically, if  $C = M * V * M'$ , then:

$$L = V * M' * \text{inv}(C)$$

The method provides a direct extrapolation of the quarterly series. Matrix  $M$  simply has to be extended by zero values, if there are no annual constraints.

By a purely classical development, it also gives an estimate of the variance of forecast errors:

$$\text{Var} (y - y_e)_e = \sigma_e^2 * ((I - L * M) * V + (x - L * M * x) * \text{inv}(x' * M' * \text{inv}(C) * M * X) * (x' - x' * M' * L'))$$

where  $I$  is the identity matrix and  $\sigma_e^2$  is the estimator of  $\sigma^2$  of the generalised least squares on the annual model.

The choice of variance-covariance matrix of quarterly randoms  $V$  is important in this method of estimation. Fernández's approach assumes that these randoms follow a stationary integrated process of order 1, whereas Chow and Lin's approach assumes that the randoms follow a stationary autoregressive process of order 1:

$$\varepsilon (t) = \rho \varepsilon (t-1) + \mu (t)$$

with  $\rho = 1$  in the case of Fernández,

with  $|\rho| < 1$  in the case of Chow and Lin,

and with the usual assumptions on  $\mu$ .

Such a hypothesis may be motivated by numerous considerations: annual data and quarterly indicators do not cover the same population (different survey rates, different fields covered, for instance for classification purposes, etc.), the concepts measured are not strictly equivalent, etc. It can be reasonable inferred that the distortions caused by these approximations evolve in a sufficiently regular manner.

In the case of Chow and Lin, using the maximum likelihood method,  $\rho$  can be estimated, and from that, the other unknowns in the equation.

It should be noted in particular that, in the hypothesis where the quarterly randoms are independent from each other ( $\rho = 0$ ), the method boils down to applying ordinary regression on the annual data and spreading out the annual deviations over the quarters by dividing them by 4.

The accuracy of quarterly series calculated indirectly depends much more on the quality of the indicators than on the choice of method. Fernández's method nevertheless has several advantages: it is based on reasonable hypotheses, is consistent and gives an estimate of forecast errors.

### 3.3 Adjustment for calendar effects and seasonal variations

The quarterly statistical series often fluctuate in the very short term with climate conditions, social and other habits. These fluctuations are referred to as seasonal variations. The quarterly series can also be affected significantly by the number of working days and other calendar effects.

While the seasonal nature and the calendar effects form an integral part of quarterly data, they hinder the interpretation of infra-annual developments and the compilation of quarterly balances. It is thus preferable for the figures to be adjusted for these effects.

### 3.3.1 Calendar effects

#### - *The length of the quarter*

The measurement of economic activity is directly influenced by the length of the period under consideration. From one year to the next, the respective length of each quarter is generally constant and, therefore, naturally taken into account in the seasonal adjustment. The case of a leap year is nevertheless rather exceptional: the first quarter has 91 days instead of 90 days.

#### - *The number of working days*

Economic activity is not spread evenly throughout the week. Many branches of activity see their production typically reduced or, on the contrary, increased on a Saturday and/or a Sunday. As the distribution of days of the week within a quarter is not the same from one year to the next – in which case its influence would be equivalent to a seasonal variation –, it is important to take into account the number of working days in each quarter.

It should be noted that this effect is not independent of the length of the period under consideration and that, with a few exceptions – which are not found in the quarterly accounts –, the impact of the number of working days and the length of the period therefore have to be considered simultaneously.

#### - *The "Easter" effect*

Holiday periods alter the development of economic activity. In the case of fixed holidays, such as Christmas, 21 July or the summer holidays, their effects are taken into account in the seasonal adjustment. In contrast, Easter is a 'moving holiday' whose positive or negative impact on economic activity is usually felt in the second quarter but sometimes also in the first quarter either in part or in full<sup>1</sup>, and therefore requires special treatment.

### 3.3.2 Adjustment for calendar effects

Adjustments for calendar effects are made using the Tramo<sup>2</sup> software, developed in 1994 by Maravall (Banco de España) and Gómez (Spanish Ministry of the Economy). The program models time series through regressions with the possible presence of calendar effects, missing values, outliers and ARIMA errors. The ARIMA model can be automatically identified. Likewise, the above-mentioned deterministic effects can be established or tested and taken into account if their presence is statistically significant.

As short-term forecasting program, Tramo is mainly used in the more general framework of seasonal adjustment of time series, combined with the Seats<sup>3</sup> program; in this context, Tramo's role lies in the prior adjustment of data in order to make it easier to break down the series. Eurostat officially recommends using Tramo-Seats together as a tool for seasonal adjustment.

The proposed method of adjusting for calendar effects is based on a direct econometric regression between the quarterly indicator used in the national accounts, on the one hand, and the calendar variables whose impact needs to be measured, on the other.

#### - *The length of the quarter*

For the length of the quarter, Tramo constructs a variable as follows: for each quarter, the average number of days in a year, i.e. 365.25, divided by 4, is subtracted from the number of calendar days. For example, for the first quarter of 2000, there are  $[91 - (365.25/4)]$  days, that is -0.3125.

<sup>1</sup> For the "Easter" effect, Tramo offers impact durations of 1 to 8 days before Easter.

<sup>2</sup> Tramo is the acronym for Time Series Regression with Arima Noise, Missing Observations and Outliers.

<sup>3</sup> Seats is the acronym for Signal Extraction in Arima Time Series.

- *The number of working days*

At this stage, no specific information on the Belgian calendar is used.

As far as working days are concerned, Tramo offers two possibilities: using just one or six regressors.

In the first case, this regressor is calculated as the deviation from the normal number of weekdays (5) in relation to the number of weekend days (2). More precisely, the variable takes the following value:

$$[\text{no. Mon} + \text{no. Tues} + \text{no. Wed} + \text{no. Thurs} + \text{no. Fri}] - [5/2 \times (\text{no. Sat} + \text{no. Sun})]$$

In the second case, the six regressors are calculated as the difference between the number of each weekday and the number of Sundays:

$$\text{Regr.1} = \text{no. Mon} - \text{no. Sun} \quad \text{Regr.2} = \text{no. Tues} - \text{no. Sun} \quad \dots \quad \text{Regr.6} = \text{no. Sat} - \text{no. Sun}$$

This is the solution that has been adopted in the Belgian quarterly accounts.

- *The Easter effect*

For the Easter effect, Tramo proposes by default a length of impact of 6 days before Easter. This is the hypothesis used for the Belgian quarterly accounts.

### 3.3.3 Adjustment for seasonal variations

Seats is a software program for decomposing univariate time series into unobservable components. It is based on ARIMA modelling. The components – namely trend, cycle, seasonal and irregular factors – are estimated by using signal extraction techniques applied to ARIMA models. This model-based approach enables optimum forecasting of the components and the calculation of standard errors.

## 3.4 Volume estimates

### 3.4.1 General principle

The value changes in economic aggregates over time can be decomposed, on the one hand, into an element which conveys the movement in prices of the products they are composed of and, on the other hand, an element that takes account of volume changes of these products. The volume measure is important for national accounts to determine growth of GDP and its components.

To measure volume growth of GDP and its components, the effect of price changes needs to be removed from the change in value by keeping prices "constant". To this end, a base year is selected to calculate changes in volume terms. The price structure and the weights of this base year are used to calculate detailed series and aggregates "at constant base year prices".

The rapid change in relative prices distorts the measurement of growth the further away from the base year the calculations move. This is why, in the national accounts, the base year is updated annually. This annual update of the price structure results in a "chain volume measure" of growth.

By making use of chain indices, volume growth between two consecutive periods (t and t+1) is calculated by reference to the prices and weights of year t. For example, volume growth of investment from year 1 to year 2 is obtained by comparing investment in year 2 expressed in year 1's prices with investment in year 1. Growth between years 2 and 3 is obtained by comparing year 3's investment expressed in year 2's prices with investment in year 2, etc. The changes between consecutive periods are linked together (cumulated) to give a chained index. When the chained index of an aggregate is applied to the level amount of a reference year, it gives a measure

of the volume change in "chained euros". The choice of reference year has no effect on the growth profile of the series.

Compared with a fixed-base-year method, using chained indices improves the accuracy of the measure of economic growth and increases the international comparability of the results. Users must nevertheless take account of the fact that, owing to technical/statistical characteristics, the application of chained indices leads to a loss of additivity in regard to the volume levels (except for the figures relating to the reference year and the year immediately following it).

In the quarterly accounts, calculation of chained indices is transposed according to the annual overlap method, which consists of comparing the current quarter's value with the average value in quarters of the previous year. The index is calculated as the current quarter's value expressed in average prices for the previous year. The annual overlap method thus has an advantage over other methods of transposition used in quarterly accounts in that the annual average of the quarterly indices corresponds to the annual chained index.

#### 3.4.2 Chaining and calibration

The volume measure of Belgium's quarterly national aggregates is obtained according to two systems of estimation, which depend on the type of quarterly information available:

- If the quarterly data is expressed by volume (industrial production indices, amount of electricity produced, etc.), the volume estimate is obtained directly by applying the Fernández (Chow and Lin) econometric model to the annual aggregates by volume (value added of a small number of activities in industry, etc.).
- If the quarterly figures are available by value (VAT statistics, general government budget data, etc.), the volume estimate is obtained indirectly, by deflating the quarterly aggregate in value terms derived from applying the Fernández (Chow and Lin) method to the annual aggregate in value by a quarterly price index, itself obtained by applying the Fernández (Chow and Lin) technique to the annual deflator (value added of most activities in industry, value added in market services, household consumption, investment by enterprises, public consumption, etc.).

The price and volume indices that serve as quarterly indices are obtained according to the annual overlap method (cfr. Section 3.4.1). Under the non-additivity rule, the Fernández (Chow and Lin) econometric regressions for prices and volumes are applied at the most detailed level. Aggregation is done afterwards through the transformation in previously year prices<sup>1</sup>.

<sup>1</sup> Note that chain linked volume series are not additive and have to be transformed firstly to series in previously year prices before they can be added together.

## Chapter 4 Estimation of GDP from the output approach

### 4.1 Estimation of value added by branch of activity

Value added is estimated for 41 branches of activity, grouped together in 11 branches for publication.

The choice of quarterly indicators is adapted according to the data sources and the quality of the adjustment on the annual series. To estimate value added, the indicators selected are generally the following:

- industrial production indices, for value added of a small number of activities in industry;
- VAT statistics, for value added of most activities in industry, construction and most market services;
- information from the (quarterly) sector accounts, for financial services;
- budget data for general government.

The estimation procedures vary according to the indicators and the annual data used. Two systems can be singled out for obtaining volume estimates.

#### *Method I: direct estimation of value added by volume*

When the indicator is a volume index, the solution lies in directly estimating value added in volume terms.

This is the case for a small number of branches in industry and one service branch.

#### *Method II: estimation of the aggregate by value, price and volume*

When the indicator is a value index (VAT statistics), the following system is used:

- econometric estimation of the aggregate by value on the basis of the VAT indicator;
- econometric estimation of the quarterly deflator on the basis of quarterly price indices;
- econometric estimation of the aggregate by volume on the basis of aggregates by value and by price estimated at the previous stages.

This method mainly concerns agriculture, most branches of industry, construction and most market services.

In reverse, this technique is also used to obtain value estimates when the estimation is made directly in volume terms (method I): the value estimate is worked out from the volume estimate and the price estimate.

Table 3 gives a detailed picture of the quarterly data used for the different branches of activity.

TABLE 3 SOURCE AND METHOD OF ESTIMATING VALUE ADDED IN THE DIFFERENT BRANCHES OF ACTIVITY (NACE CODE)

<i>Activities - Products</i>	<i>Method of estimation</i>	<i>System of estimation</i>	<i>Quarterly data</i>
1. Agriculture, forestry and fishing	Fernández	II	VAT turnover
2. Mining and quarrying	Fernández	II	VAT turnover
Manufacturing of:			
3. Food products, beverages, tobacco	Fernández	II	VAT turnover
4. Textiles, clothing, leather and footwear	Fernández	II	VAT turnover
5. Wood, paper products and printing	Fernández	II	VAT turnover
6. Coke and refined petroleum products	Fernández	II	VAT turnover
7. Basic chemical products	Fernández	II	VAT turnover
8. Basic pharmaceutical products	Fernández	I	Industrial production index
9. Rubber, plastic products and other non-metallic mineral products	Fernández	II	VAT turnover
10. Basic metals	Fernández	II	VAT turnover
11. Computer, electronic and optical products	Fernández	II	VAT turnover
12. Electrical equipment	Fernández	II	VAT turnover
13. Machinery and equipment	Fernández	III	VAT turnover
14. Transport equipment	Fernández	II	VAT turnover
15. Other manufacturing and furniture	Fernández	II	Prodcom
16. Repair	Fernández	II	VAT turnover
17. Distribution of electricity, gas, steam and air conditioning supply	Fernández	I	Electricity production
18. Water supply, sewage and waste management	Fernández	II	VAT turnover
19. Construction	Fernández	II	VAT turnover
20. Wholesale & retail trade	Fernández	II	VAT turnover
21. Transportation and storage	Fernández		VAT turnover
22. Hotels and restaurants	Fernández	II	VAT turnover
23. Publishing, audiovisual and broadcasting activities	Fernández	II	VAT turnover
24. Telecommunications		II	VAT turnover
25. ITservices	Fernández	II	VAT turnover
26. Financial intermediation			(Quarterly) sector accounts <sup>1</sup>
27. Insurance services			(Quarterly) sector accounts
28. Other financial services			
29. Real estate activities			
30. Imputed rents			
31. Legal, accounting, consultancy, architecture and engineering activities	Fernández	II	VAT turnover
32. Research and development			
33. Advertising, other professional activities, veterinary activities	Fernández	II	VAT turnover
34. Administrative and support services activities	Fernández	II	VAT turnover
35. Public administration	Fernández	II	Value added government
36. Education	Fernández	II	Value added government
37. Human health activities	Fernández	II	Wages
38. Social work activities	Fernández	II	Wages
39. Arts, entertainment and recreation	Fernández	II	VAT turnover
40. Other services activities	Fernández	II	VAT turnover
41. Domestic services	Fernández	I	Labour volume

Source: NAI

<sup>1</sup> To estimate value added for financial sector, information stemming from the sector accounts is used. This information cannot be used directly in the estimation process, due to the large variability that this data contains.

## 4.2 Taxes and subsidies on products

The quarterly figure for taxes and subsidies comes from the quarterly accounts of general government, which are in turn based on budget data.

## 4.3 Gross domestic product

Relatively reliable data are available for all the components of GDP by production. GDP can also be obtained through simple addition.

Even though preference is given to estimating GDP in this way, it is nevertheless compared with the result of the GDP by expenditure approach (cfr. Chapter 5).

## Chapter 5 Estimation of GDP from the expenditure approach

### 5.1 The different components of the expenditure approach

The various components of the expenditure approach (household consumption, NPISH consumption, public consumption, investment in housing, investment by enterprises, public investment, exports and imports of goods and services) are estimated separately.

The choice of quarterly indicators is adapted according to the source of information and the quality of the adjustment on annual series. The indicators used are generally the following:

- VAT statistics, for household consumption and investment by enterprises;
- statistics on the dwellings started by households and the building permits for investment in housing;
- budget data for public consumption and investment;
- balance of payments and foreign trade statistics for exports and imports of goods and services.

Such as in the production approach (cfr. Section 4.1), estimation procedures differ depending on the indicators and the annual data used.

The same two systems can be singled out to obtain the volume estimates, however in the expenditure approach, only method II is used.

[Table 4](#) sets out the different sources and methods.

**TABLE 4** Sources and methods for estimating the various GDP expenditure components

<i>Type of expenditure</i>	<i>Method of estimation</i>	<i>Quarterly information</i>
Household consumption		
a. Durable goods	Fernández	VAT turnover of specialised retail branches + registration of vehicles
b. Others	Fernández	VAT turnover in retail trade + VAT turnover in the horeca sector + VAT turnover of other personal services
NPI consumption		
Public consumption	Fernández	Budget data
GFCF of enterprises	Fernández	Investment according to VAT records
GFCF in housing	Fernández	Composite indicator based on statistics of dwellings started by household and number of building permits
GFCF of general government	Fernández	Budget data
Changes in inventories	Balance, checked with the help of ad hoc data	Business surveys
Exports and imports	Fernandez	Balance of payments statistics

Source: NAI

### 5.2 Estimation of changes in inventories and gross domestic product

Changes in stock levels have a considerable influence on industrial production and economic growth. But, in the quarterly national accounts, the item "changes in inventories" is not estimated directly on the basis of exogenous variables, but is initially taken as the difference between the aggregates obtained under the output approach and those under the expenditure approach. This is common practice in European countries. In order to improve the estimate of this crucial economic variable, on which the final estimate of GDP depends, it is nevertheless recommendable to check the balance obtained against other data sources, like for instance question 18 of the business surveys conducted among enterprises<sup>1</sup>.

<sup>1</sup> The wording of the question is as follows: "In your opinion, are your current stocks of this product higher than normal, normal or below normal?"

## Chapter 6 Estimation of GDP from the income approach

### 6.1 Compensation of employees

The quarterly statistics from the National Social Security Office (NSSO), the principal social security body for employees working in Belgium, are the best source of data for estimating the wages, in view of their wide coverage (85 % of all employees). The information obtained from the NSSO consists of social security contributions due to it and the income used as a basis for calculating them.

These NSSO statistics serve as an indicator to convert annual estimates for compensation of employee to a quarterly basis, using the same method as the aggregates by value added and expenditure. The estimates are made according to a breakdown into 11 branches of activity (nomenclature A10 with a distinction made for general government and education).

### 6.2 Taxes and subsidies on products

Taxes and subsidies on products are also obtained using the Fernández (Chow and Lin) method. The quarterly indicator is built from budget data used to compile the quarterly government account.

### 6.3 Gross operating surplus and gross mixed income

The quarterly estimate of the gross operating surplus and gross mixed income is derived from the balance. It corresponds to the difference between the estimate of GDP determined from the value added and expenditure approaches and the sum of the other two components of the income approach (compensation of employees and taxes less subsidies on products).

## Chapter 7 Population and employment

Unlike the indirect statistical approach adopted for the other national accounts variables, the quarterly population and employment estimates are the result of a direct approach: all the data are available on a quarterly basis. It is therefore at this frequency that all the calculations are made. The annual estimate is derived from the quarterly estimate.

### 7.1 Population

In Belgium, all population movements (births, deaths, new registrations, departures, etc.) are recorded administratively by the local authorities. They are gathered together every month in a centralised database called the National Register, which lists all people officially resident in Belgium.

The population figures transmitted to Eurostat (and not published by the NAI) in the quarterly national accounts correspond to the quarterly average of the total number of residents.

### 7.2 Employment

#### 7.2.1 Employees

Information gathered by the social security bodies enables a direct compilation, at the company level, of the number of persons working.

The figures on paid employment are therefore obtained by aggregating individual company data concerning the number of employees, derived mainly from the databases of the two principal social security bodies (National Social Security Office – NSSO – and the National Social Security Office for Provincial and Local Authorities – NSSOPLA<sup>1</sup>), according to characteristics – branch of activity and institutional sector – listed in the index of units of production for the national accounts, so as to ensure consistency in the results.

An adjustment is made so as to count workers affiliated to both the NSSO and the NSSOPLA only once. This adjustment is based on information from the Crossroads Bank for Social Security<sup>2</sup> regarding the number of persons registered with the two social security agencies: for each branch of activity, the proportion of workers registered with both agencies is extrapolated to the actual population of the NSSO and NSSOPLA records and deducted from the total.

An additional adjustment is made to avoid double counting between paid employment and self-employed activity: on the basis of information from the Crossroads Bank for Social Security, workers whose activity as an employee is secondary to their principal self-employed activity are left out.

However, the information obtained from the NSSO and the NSSOPLA does not correspond exactly to national accounts concepts.

Three more categories have to be added to the number of employees obtained in this way:

- workers not liable for contributions or covered by other social security bodies – seafarers, domestic staff, workers employed under a local employment agency (LEA) contract, etc. –, for which an estimate is made on the basis of individual statistical data;
- working students, who are recorded in a distinct NSSO variable and a separate NSSOPLA file;
- undeclared work, estimated in a consistent manner with adjustments to the calculation of value added and the wages in the national accounts.

<sup>1</sup> Since 1st January 2015, the NSSOPLA became the Special Social Security Schemes Office (SSSSO) and it merged with the NSSO on 1st January 2017.

<sup>2</sup> The Crossroads Bank for Social Security cross matches the data from the different social security bodies on the basis of National Register entries.

## 7.2.2 Self-employed

As for employees, the quarterly estimate of the number of self-employed is based on administrative data from the social security body for the self-employed, INASTI. The information is exhaustive.

Some adjustments are made to these data in order to bring them into line with the ESA 2010 definitions.

A first group of adjustments is intended to avoid double counting with employees (principally within the group pursuing a secondary activity on a self-employed basis) and to exclude self-employed persons who are not actually working (particularly self-employed persons active after retirement age). In practice, these adjustments are determined on the basis of the data from the Crossroads Bank for Social Security.

A second adjustment applies to child minders registered with the NSSO and the NSSOPLA and that are added to the adjusted INASTI totals. In the national accounts they are regarded as self-employed and therefore not as employees.

## 7.3 Volume of work (number of hours worked)

### 7.3.1 Employees

Under the method for estimating employment, the number of employees is obtained from a compilation of all individuals identified by the various social security bodies (NSSO, NSSOPLA, etc.). The situation is different for calculating the number of hours worked: only the NSSO files provide information – albeit incomplete – on this subject. The estimation of the number of hours worked therefore relies on the use of a conversion coefficient making it possible to convert from the figure for employment measured in number of persons to a figure for the volume of work measured in number of hours.

For employees registered with the NSSO, who account for more than 85 % of all paid employment, application of the conversion coefficient gives a result that is no different from the figure that would be obtained from a direct compilation of the number of hours. The use of a conversion coefficient is necessary for persons registered with other social security bodies (less than 15 % of paid employment), for whom an indirect method of estimation may be considered.

The method therefore relies on calculating, from statistics for individual enterprises from the NSSO, multiplying coefficients, which, when applied at the most detailed level (140 branches of activity broken down by institutional sector) to the figures for the number of employees, give the number of hours worked.

These conversion coefficients are obtained from estimating the number of hours declared to the NSSO and dividing them by the number of persons registered in the same database.

Within the different branches of activity and institutional sectors, calculation of the coefficients varies according to the status of the workers (manual worker or employee) and the working arrangements (full-time or part-time), which influence the information available.

To estimate the number of paid hours worked by part-timers, the number of hours officially declared to the NSSO is summed up.

The problem is more complex for full-time workers. For manual workers, it is possible to arrive at an estimate of the number of hours via two other variables: that of the "*maatman*" (a reference which corresponds to the number of contractual hours that a full-timer has to work in the week and can then be converted into the number of hours per day) and that for the number of days worked by a full-timer. The number of legal holidays must still be taken out of this variable. They are estimated at 10 days a year, in all branches of activity, distributed between quarters according to the date on which they fall. For each full-time worker, the number of hours declared is therefore estimated as being equal to the number of hours per day of the "*maatman*" multiplied by the number of days worked less the number of legal holidays.

A further stage is necessary for employees. It is aimed to cancel out the effect of annual holidays on the number of days worked. The number of annual days leave is attributed to the different branches in accordance with the joint committees to which they belong and broken down by quarter according to the findings of an ad hoc survey.

The total number of hours is obtained by adding up the number of hours paid to part-time workers and full-time manual workers and employees. Derived from the NSSO database, these calculations are made by enterprise and then aggregated by branch of activity and institutional sector. At this level of detail (a cross match of 140 branches of activity and institutional sectors), the total number of hours is divided by the number of employees to obtain the conversion coefficients.

At the most detailed level by branch of activity, the conversion coefficients calculated on the basis of NSSO data are applied to the number of employees recorded in the Belgian national accounts. By aggregating these results, the total number of hours worked by employees in Belgium is obtained.

### 7.3.2 Self-employed

No information from administrative sources is available on the volume of work done by the self-employed. An indirect method has been developed, based on the findings of the labour force survey, in order to derive the annual estimates<sup>1</sup>. A method still needs to be developed in order to derive reliable quarterly estimates.

<sup>1</sup> This method is fully described in the [GNI methodological inventory for Belgium](#), section 4.11.1.2.

## Chapter 8 Flash estimate

A "flash" estimate is a first estimate of an economic aggregate according to the concepts of the national accounts, calculated and published as soon as possible after the end of the quarter, on the basis of incomplete information. It concerns two variables in the Belgian national accounts: GDP and employment.

### 8.1 Flash GDP estimate

In Belgium, a flash GDP estimate is published 30 days after the end of the quarter.

The advantage of the GDP flash estimate over the other advance economic indicators is that it is the only one to offer an overall, coherent picture of the economy as a whole. The incompleteness of the basic data justifies the use of ad hoc statistical methods in order to reduce the margin of error associated with these initial estimates.

To achieve maximum reliability, the general principle adopted for the "flash" estimate ( $t + 30$  days) of the Belgian national accounts is simple: wherever possible, the methods and sources used are the same as for the following estimates ( $t + 60$  days and  $t + 120$  days).

The "flash" estimate of the main Belgian quarterly aggregates is therefore based on the same econometric method as the estimate of the quarterly accounts proper, namely the Fernández (Chow and Lin) method. As in the traditional quarterly accounts, GDP is first estimated from the output approach before being compared with GDP from the expenditure approach. The estimates are made at the same disaggregation level as in the complete quarterly accounts.

However, the "flash" estimate differs in one essential respect from the full quarterly accounts, namely in the available statistical information.

The estimate after 30 days has to be based on the data available no later than 3 weeks after the end of the quarter, namely:

- for industrial output: the provisional monthly indices for the first two months of the quarter;
- for the VAT statistics: the final statistics on the monthly returns for the first month in the quarter, and the provisional statistics for the monthly returns for the second month.

The flash quarterly indicators are constructed on the basis of this two months information and on a statistical extrapolation of the third month. This extrapolation is based on an ARIMA modelling.

### 8.2 Flash employment estimate

The NAI is planning to release a flash estimate for employment, 30 days after the end of the quarter as for GDP.

In Belgium, the only solution designed to meet the need for a rapid estimate of employment (30 days after the end of the quarter) is based on econometric modelling. No information from administrative sources or from surveys is actually available in time.

The estimation process will thus rely on an econometric method to extrapolate the evolution of paid employment with other available information (value added, bankruptcies, paid employment for the previous quarter).

Concerning the number of self-employed persons, as it is quite stable, the assumption will be made that the growth of the number of self-employed is similar to the quarter-on-quarter growth observed for the previous quarter.

An autoregressive distributed lag (ADL) model will be used to estimate the evolution of paid employment. The explanatory variables used in this model are the following:

- Number of bankruptcies of companies (monthly data, 12 month moving average);
- Value added of manufacturing industry in volume;
- Total domestic paid employment, quarterly averages.

These variables undergo a log-transformation and are expressed in variation compared to the corresponding period of the previous year.

The selected lags are:

- 1 quarter for the number of bankruptcies;
- 3 quarters for the value added of manufacturing industry;
- 1 quarter for paid employment.

The output of the model is a quarter-on-quarter calendar and seasonally adjusted growth rate for the considered quarter from which a year-on-year growth rate for the number of employees is derived.



National Accounts Institute



Eurosystem

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## **PRESS RELEASE**

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Links: [Publication](#) [NBB.Stat](#) [General information](#)

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### **Economic activity grows by 0.4 % in the second quarter of 2017**

In this press release, the National Accounts Institute (NAI) publishes the result of the flash estimate of economic growth for the second quarter of 2017.

At the same time, the NAI is publishing a revised version of the accounts for the first quarter of 2017 based on a wider series of basic data.

#### 1. Flash estimate of economic growth in the second quarter of 2017

According to the flash estimate of seasonally and calendar adjusted gross domestic product (GDP), economic activity rose by 0.4% in the second quarter of 2017 compared with the previous quarter. On an annual basis, economic growth worked out at 1.4 %.

#### 2. Accounts for the first quarter of 2017

In the first quarter of 2017, seasonally and calendar adjusted GDP by volume rose by 0.6 % compared with the previous quarter. Year-on-year growth of GDP was 1.6 % in the first quarter of 2017.

Economic activity was up on the previous quarter's figures by 0.2 % in industry, 2.6 % in construction and by 0.5 % in the services sector.

There was an increase in both household consumption expenditure (+0.5 %) and private investment (+0.2 %). The public sector boosted its investment by 0.7 % on the one hand, but reduced government consumption expenditure by 0.3 % on the other hand. Business investment was down by 1.2 % as a result of an acquisition by a pharmaceuticals company of R&D services in the fourth quarter of 2016.

This same purchase of R&D services caused the total imports to be reduced by 0.1 % in the first quarter of 2017. Exports of goods and services, on the other hand, were up by 0.7 %, so that net exports made a positive contribution to economic growth (+0.8 of a percentage point).

During the first quarter of 2017, domestic employment increased slightly, by 0.3 %, compared with the previous quarter. It was 1.4 % higher than in the corresponding quarter of last year.

The volume of labour among wage-earners showed an increase of 0.2 % on a quarterly basis and 1.3 % on an annual basis.

## QUARTERLY AGGREGATES

### GDP, QUARTERLY GROWTH IN VOLUME

*(data adjusted for seasonal and calendar effects)*

	Percentage change compared to	
	corresponding quarter of the previous year	previous quarter
2015 I	1.4	0.4
II	1.6	0.6
III	1.3	0.1
IV	1.6	0.5
2016 I	1.3	0.1
II	1.2	0.5
III	1.2	0.1
IV	1.1	0.4
<b>2017 I</b>	<b>1.6</b>	<b>0.6</b>
<b>II</b>	<b>1.4</b>	<b>0.4</b>

### MAIN COMPONENTS

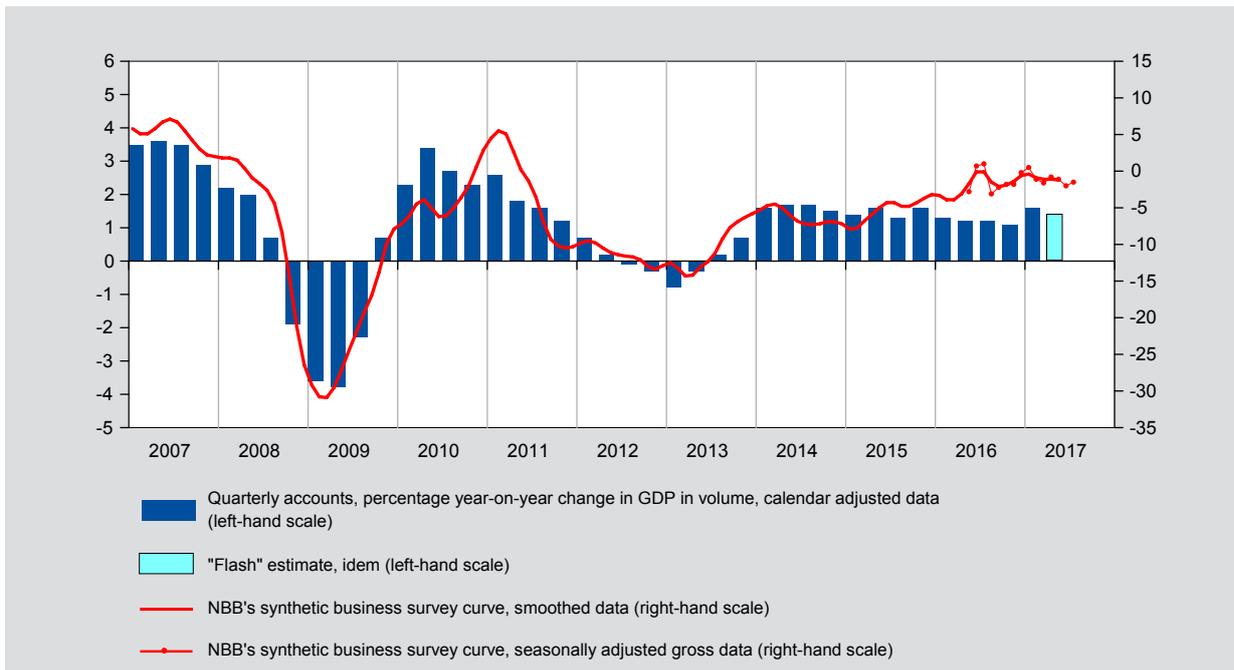
*(percentage change in volume compared to the preceding period, data adjusted for seasonal and calendar effects)*

	2015				2016			2017
	II	III	IV	I	II	III	IV	I
<b>1. Value added</b>								
Industry	1.0	0.8	1.2	0.5	-0.3	0.0	0.0	<b>0.2</b>
Construction	1.8	0.6	1.0	1.5	0.7	-0.1	-0.1	<b>2.6</b>
Services	0.4	-0.1	0.3	-0.1	0.6	0.1	0.5	<b>0.5</b>
<b>2. Expenditure</b>								
Private consumption expenditure (1)	0.6	-0.3	0.1	0.4	0.6	0.4	0.2	<b>0.5</b>
Final consumption expenditure of general government	-0.1	-0.3	0.0	0.2	-0.3	0.0	0.4	<b>-0.3</b>
Total gross fixed capital formation	-10.2	2.1	1.8	1.1	1.2	-1.5	4.0	<b>-0.7</b>
Business	-13.9	2.7	1.8	1.3	1.1	-2.2	5.6	<b>-1.2</b>
Housing	-2.1	-0.1	3.4	0.6	2.2	0.3	0.5	<b>0.2</b>
Public administration	-1.0	2.8	-1.3	0.9	-0.6	-0.7	1.6	<b>0.7</b>
Domestic demand (excluding inventories)	-2.2	0.3	0.5	0.5	0.5	-0.1	1.1	<b>-0.1</b>
Change in inventories (2)	0.8	0.0	-0.1	-0.4	0.2	0.2	0.3	<b>-0.2</b>
Exports of goods and services	1.1	0.3	2.0	0.5	3.1	1.7	1.4	<b>0.7</b>
Imports of goods and services	-1.3	0.5	1.7	0.5	3.4	1.8	2.6	<b>-0.1</b>
Net exports of goods and services (2)	2.0	-0.2	0.2	-0.1	-0.2	0.0	-1.0	<b>0.8</b>
<b>3. Labour market</b>								
Total number of workers	0.3	0.3	0.2	0.3	0.5	0.5	0.1	<b>0.3</b>
Number of hours worked by employees	-0.1	0.0	0.6	0.5	0.2	0.2	0.8	<b>0.2</b>

(1) Including non-profit institutions serving households.

(2) Contribution to the change in GDP.

## GDP and the economic cycle





**National Accounts Institute**



Eurosystem

2017-08-31

## **PRESS RELEASE**

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### **Economic activity up by 0.4 % in the second quarter of 2017**

In the second quarter of 2017, seasonally and calendar adjusted gross domestic product (GDP) in volume terms grew by 0.4 % compared with the previous quarter. In comparison to the second quarter of the previous year, economic activity expanded by 1.5 %.

The pattern was not identical across the different branches of activity: compared with the previous quarter, value added stabilised in industry, declined slightly in construction (-0.1 %) and rose by 0.6 % in the services sector.

GDP growth has been shored up by domestic expenditure: this increased (+0.8 %) as a result of the rise in business investment in fixed assets (+3.5 %) and in household consumption expenditure (+0.5 %). Public investment was also up (+1.2 %). However, government consumption expenditure and household investment declined by respectively 0.1 % and 0.5 %.

Net exports of goods and services made a slightly negative contribution to the change in GDP (-0.2 percentage point), as exports rose at a slower pace (+1.1 %) than imports (+1.3 %).

In the second quarter of 2017, domestic employment rose by 0.2 % compared with the previous quarter. Compared with the corresponding period of 2016, it was up by 1.1 %.

## QUARTERLY AGGREGATES

### GDP, QUARTERLY GROWTH IN VOLUME

*(data adjusted for seasonal and calendar effects)*

	Percentage change compared to	
	corresponding quarter of the previous year	previous quarter
2015 I	1.4	0.4
II	1.6	0.6
III	1.3	0.1
IV	1.6	0.5
2016 I	1.3	0.1
II	1.2	0.5
III	1.2	0.1
IV	1.1	0.4
2017 I	1.6	0.6
II	<b>1.5</b>	<b>0.4</b>

### MAIN COMPONENTS

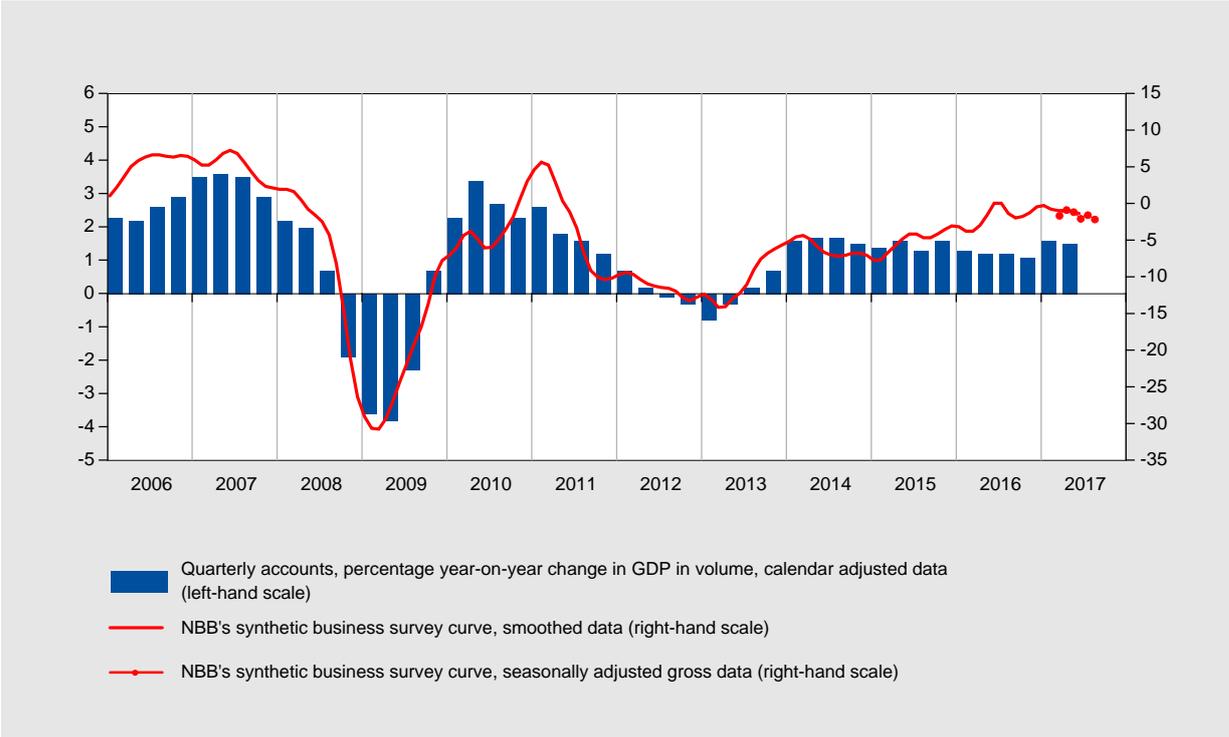
*(percentage change in volume compared to the preceding period, data adjusted for seasonal and calendar effects)*

	2015		2016				2017	
	III	IV	I	II	III	IV	I	II
<b>1. Value added</b>								
Industry	0.8	1.2	0.5	-0.3	0.0	0.0	0.2	<b>0.0</b>
Construction	0.6	1.0	1.5	0.7	-0.1	-0.1	2.6	<b>-0.1</b>
Services	-0.1	0.3	-0.1	0.6	0.1	0.5	0.5	<b>0.6</b>
<b>2. Expenditure</b>								
Private consumption expenditure (1)	-0.3	0.1	0.4	0.6	0.4	0.2	0.5	<b>0.5</b>
Final consumption expenditure of general government	-0.3	0.0	0.2	-0.3	0.0	0.4	-0.3	<b>-0.1</b>
Total gross fixed capital formation	2.1	1.8	1.1	1.2	-1.5	4.0	-0.7	<b>2.4</b>
Business	2.7	1.8	1.3	1.1	-2.2	5.6	-1.2	<b>3.5</b>
Housing	-0.1	3.4	0.6	2.2	0.3	0.5	0.2	<b>-0.5</b>
Public administration	2.8	-1.3	0.9	-0.6	-0.7	1.6	0.7	<b>1.2</b>
Domestic demand (excluding inventories)	0.3	0.5	0.5	0.5	-0.1	1.1	-0.1	<b>0.8</b>
Change in inventories (2)	0.0	-0.1	-0.4	0.2	0.2	0.3	-0.2	<b>-0.2</b>
Exports of goods and services	0.3	2.0	0.5	3.1	1.7	1.4	0.7	<b>1.1</b>
Imports of goods and services	0.5	1.7	0.5	3.4	1.8	2.6	-0.1	<b>1.3</b>
Net exports of goods and services (2)	-0.2	0.2	-0.1	-0.2	0.0	-1.0	0.8	<b>-0.2</b>
<b>3. Labour market</b>								
Total number of workers	0.3	0.2	0.3	0.5	0.5	0.1	0.3	<b>0.2</b>

(1) Including non-profit institutions serving households.

(2) Contribution to the change in GDP.

**GDP and the economic cycle**



Source: NAI

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