Quarterly national accounts of Belgium

Methodological inventory

Description of sources and methods used

December 2007

Pierre Crevits
Isabelle Brumagne
Yves de Lombaerde

TABLE OF CONTENTS

CHAPTER 1   OVERVIEW OF THE SYSTEM OF QUARTERLY NATIONAL ACCOUNTS FOR BELGIUM

This chapter gives a general overview of the 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 (BfP) and the National Statistical Institute (NSI). Together, these three institutions have been given the responsibility of compiling estimates of the main Belgian macroeconomic statistics: national accounts, regional accounts, inflow-outflow tables, external trade statistics, economic projections, etc.

Within the NAI, it is the NBB that 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 time span (105 days, 70 days, 60 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 70 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);
- 70 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[1][2] can be revised at each quarterly publication (70 days and 120 days), 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 once a year, when the detailed annual accounts are published (September)[3].

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 (benchmarking). 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 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;
- the results of econometric modelling established on the basis of historic stocks and past and present demand.

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.

---

[1]   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 September).

[2]   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.

[3]   If this were not the case, a discrepancy would creep into the annual and quarterly accounts.

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, number of architects' building plans, etc.), the estimate by volume is obtained directly through the Chow and Lin econometric model being applied to annual aggregates by volume (value added in industry, investment in housing, 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 Chow and Lin model on the annual aggregate in value terms by a quarterly price index, itself obtained by applying the Chow and Lin method to the annual deflator (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 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.

The method chosen is based on the combination of the Tramo[4] and Seats[5] algorithms, officially recommended by Eurostat as seasonal adjustment instruments. The adjustment for seasonal variations is made by the Seats software on the basis of series that have first been generally adjusted for calendar affects with the help of the Tramo software, without resorting to a specific national calendar.

Since the volume series are not additive, they are subjected to a direct approach (seasonal adjustment made at each level of aggregation), unlike the value series (adjustment made at the most detailed level, with aggregates obtained by addition).

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 + 70 days and t + 120 days).

---

[4]   Tramo is the acronym for "**T**ime Series **R**egression with **A**rima Noise, **M**issing Observations and **O**utliers".
[5]   Seats is the acronym for "**S**ignal **E**xtraction in **A**rima **T**ime **S**eries".

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 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 model.

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[6] or wider European[7] context.

According to the current European schedule, a first global estimate of economic growth is expected 45 days after the end of the quarter. The detailed breakdown of this growth in terms of value added, expenditure, income and employment must then be published within 70 days.

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;
- rationaliser 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, GNI, net lending, value added, expenditure, income, wages , employment), issued 70 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);
- 70 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[8] and actual publication).

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

---

6   Notably to make the best adjustment of the forecasts for the whole of the current year.
7   Under the joint pressure of the European Commission and the European Central Bank.
8   Belgostat.

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

	Regulatory deadline set by the European authorities	Deadline applied in Belgium for		
		transmission to Eurostat	release of press communiqué and tables (Belgostat) on the NBB's website	publication (tables and comments)
Quarterly accounts				
- GDP flash	*45*	30	30[9]	30
- Main aggregates: 1st version	*70*	70	70[10]	-
- Government accounts	*90*	90	120	120
- Sectoral accounts	*95*	95	-	-
- Main aggregates: 2nd version	*-*	120	120	120
Annual accounts				
- Main aggregates: 1st version	*70*	70	-	-
- Government accounts: 1st version	*90*	90	120	120
- Sectoral accounts: 1st version	*95*	95	-	-
- Main aggregates: 2nd version	*-*	120	120	120
- Compte des AP: 2nd version	*240*	180	180	300
- Detailed tables	*270*	270	270	300
- Sectoral accounts: 2nd version	*270*	270	270	300

---

[9] 60 for the fourth quarter of the year.

[10] Distribution scrapped for the fourth quarter of the year.

Table 2: Description of the different stages of dissemination of quarterly national accounts in terms of variables and basic data

Term	Variables disseminated	Distribution channel	Basic data used	
30 days	GDP growth rate in volume	Press release Belgostat Publication (120 days)	Industrial production	month 1: version m+70 days month 2: version m+40 days month 3: -
			VAT	month 1: version m+80 days month 2: version m+50 days month 3: - quarterly declarations: -

70 days	Main national aggregates:
	    GDP, in value and volume terms, broken down according to the value added of 7 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)
	    GNI, disposable income and net lending
	    Labour market statistics: wages and employment broken down according to 7 branches of activity
		Press release
		Belgostat
			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+80 days month 2: version m+80 days month 3: version m+50 days quarterly declarations: version t+50 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) General government revenue and expenditure After test phase: institutional sectors' accounts Flash estimate for the following quarter	Press release Belgostat Publication (electronic and paper media)	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+80 days month 2: version m+80 days month 3: version m+80 days quarterly declarations: version t+50 days
			Balance of payments	month 1: version m+135 days month 2: version m+105 days month 3: version m+75 days

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[11], 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 70 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 105 days after the end of the quarter, incorporate data on general government[12] (consumption and investment, taxes and production subsidies). The results are used to estimate the accounts of the different institutional sectors[13] (enterprises, households, non-profit institutions). Gross National Income is also calculated consistently, thanks to an approach combining investment income (dividends and interest) received from and paid to other countries.

Likewise, the published statistics correspond in all aspects to the figures sent to the European authorities at 90, 95 and 120 days, thus facilitating collaboration between domestic and foreign users.

An exception has been made in the Belgian timetable for the estimates of the fourth quarter of each year. Since this Q4 estimate also determines the annual growth rate, an extra delay of one month is used, taking to 60 days the deadline for the flash estimate, put out at the end of February. The second publication (70 days) is therefore skipped. 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.

---

[11] Belgium is thus ahead of the other European countries, at the same level as the United States.
[12] Available approximately 90 days after the end of the quarter.
[13] Which, to recap, must be sent to Eurostat after 95 jours.

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[14] [15] may be revised along with each quarterly publication, with no significance threshold, so that users have at their disposal economic information that is as full and precise as possible;
-    the quarters falling in a year for which an annual estimate has already been published may only be revised once a year, when the detailed annual accounts are published (September)[16].

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 nearest Wednesday to 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.

---

[14] 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 September).
[15] 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.
[16] If this were not the case, a discrepancy would creep into the annual and quarterly accounts.

2.3.2   Main aggregates - 70 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 nearest Wednesday to the 70 days deadline. An example is featured in Annex 2.

Released on the NBB's website, in the Belgostat database, at the same time as the press communiqué, 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 7 branches of activity (nomenclature A6 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;
- the transition from GDP to the nation's net lending (primary income payable to / receivable from the rest of the world, consumption of fixed capital, current transfers, capital transfers, net lending / net borrowing), by value;
- compensation of employees broken down into 7 branches of activity, by value;
- total paid employment and self-employment, domestic and national;
- domestic employment broken down into 7 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 Belgostat database, at the same time as the press communiqué, 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 7 branches of activity (nomenclature A6 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;
- le passage du GDP to the nation's net lending (primary income payable to / receivable from the rest of the world, consumption of fixed capital, current transfers, capital transfers, net lending / net borrowing), by value;
- compensation of employees broken down into 7 branches of activity, by value;
- total paid employment and self-employment, domestic and national;
- domestic employment broken down into 7 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 Belgostat 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 preference, since the main sources of annual data are not available in good enough 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 Chow and Lin econometric model, which is constructed so that the 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 from 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;
- the results of econometric modelling established in the basis of historic stocks and past and current demand (cfr. Section 5.2).

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 Chow and Lin[17] 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:

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

with $E(\epsilon \mid x) = 0$ and $V(\epsilon \mid x) = \sigma^2 V$

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.

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:

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

where the unbiased estimator βe of β 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:

$$L = V * M' * inv(C)$$

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:

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

where I is the identity matrix and σ^2_e is the estimator of σ^2 of the generalised least squares on the annual model.

---

[17] 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.

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

$$\varepsilon\,(t) = \rho\,\varepsilon\,(t\text{-}1)\, \underset{\sim}{+}\, \mu\,(t)$$

with $|\,\rho\,| < 1$ and with the usual assumptions on μ.

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.

Using the maximum likelihood method, ρ 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. Chow and Lin'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, which, by a simple mechanical effect, is likely to explain about 1.1 p.c. additional growth compared with the same quarter of the previous year – with all other things being equal.

- *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. As an example, just one unworked day more or less than a normal working day can be enough to account for almost 1.3 p.c. of growth in one quarter compared to another.

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[18], and therefore requires special treatment.

3.3.2 Adjustment for calendar effects

Adjustments for calendar effects are made using the Tramo[19] 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[20] 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.

---

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

[19] Tramo is the acronym for **T**ime Series **R**egression with **A**rima Noise, **M**issing Observations and **O**utliers.

[20] Seats is the acronym for **S**ignal **E**xtraction in **A**rima **T**ime **S**eries.

- *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.

- *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:

[no. Mon + no. Tues + no. Wed + no. Thurs + no. Fri)] - [5/2 x (no. Sat + 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:

Regr.1 = no. Mon – no. Sun   Regr.2 = no. Tues – no. Sun   ...   Regr.6 = no. Sat – 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, that 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, number of architects' building plans, etc.), the volume estimate is obtained directly by applying the Chow and Lin econometric model to the annual aggregates by volume (value added in industry, investment in housing, 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 Chow and Lin method to the annual aggregate in value by a quarterly price index, itself obtained by applying the Chow and Lin technique to the annual deflator (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 Chow and Lin econometric regressions for prices and volumes are applied at all levels of aggregation.

3.4.3   Chaining and adjustment for calendar effects

Non-additivity poses a problem when it comes to adjusting data for calendar effects. An econometric regression must be applied at all levels of aggregation.   There is an annual reference for this regression in gross terms (annual figure), but not after adjustment for calendar effects, because these figures are derived from quarterly accounts.

An additional stage is therefore necessary. It involves calculating an annual correction coefficient to adjust for calendar effects at all levels of aggregation. This coefficient is applied to the annual gross figure to serve as an annual reference for the calibration regression (Chow and Lin).

CHAPTER 4   ESTIMATION OF GROSS DOMESTIC PRODUCT FROM THE OUTPUT APPROACH

4.1   Estimation of value added by branch of activity

Value added is estimated for 33 branches of activity, grouped together in 7 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 industry;
-   VAT statistics, for value added of construction and most market services;
-   interest rates, 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 mainly the case for most branches of industry, agriculture and some service branches.

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 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)

Branches - Products	Method of estimation	System of estimation	Quarterly data
1. Agriculture, hunting, forestry and fishing	Chow and Lin	I	Constant + trend[21]
2. Mining and quarrying	Total		2a + 2b
2a of energy-producing materials	Chow and Lin	II	VAT turnover[22]
2b except of energy-producing materials	Chow and Lin	I	Industrial production index
Manufacturing of:	Chow and Lin		Total 3 to 15
3. Food products, beverages, tobacco	Chow and Lin	I	Industrial production index
4. Textiles, clothing, leather and footwear	Chow and Lin	I	Industrial production index
5. Wood and wood products (including furniture)	Total		5a + 5b
5a Furniture making	Chow and Lin	II	VAT turnover
5b Wood and other wood products	Chow and Lin	II	VAT turnover
6. Pulp, paper, publishing & printing	Total		6a + 6b
6a Paper, board	Chow and Lin	I	Industrial production index
6b Publishing, printing	Chow and Lin	II	VAT turnover
7. Coke, refined pteroleum products and nuclear fuel	Chow and Lin	I	Industrial production index
8. Chemicals	Chow and Lin	I	Industrial production index
9. Rubber and plastic materials	Chow and Lin	I	Industrial production index
10. Other non-metallic mineral products	Chow and Lin	I	Industrial production index
11. Basic metals	Chow and Lin	I	Industrial production index
12. Fabricated metal products	Chow and Lin	I	Industrial production index
13. Machinery and equipment	Chow and Lin	I	Industrial production index
14. Transport equipment	Chow and Lin	I	Industrial production index
15. Recycling	Chow and Lin	II	VAT turnover
16. Other manufacturing	Balance		Total manuf. - total 3 to 15
17. Electricity, gas and water	Total		17a+17b+17c
17a Electricity generation & supply	Chow and Lin	I	Industrial production index
17b Gas supply	Chow and Lin	II	VAT turnover
17c Water supply	Chow and Lin	II	VAT turnover
18. Construction	Chow and Lin	II	VAT turnover – VAT purchases
19. Wholesale & retail trade; repairs	Chow and Lin	II	VAT turnover
20. Hotels and restaurants	Chow and Lin	II	VAT turnover
21. Transport, storage, communication	Chow and Lin	II	VAT turnover
22. Financial intermediation	Chow and Lin	I	Debit and credit rates

---

[21] In the absence of reliable quarterly data, this branch is subject to smoothing (Chow and Lin, with a constant and a trend with the only indicators).

[22] Production in the "Mining and quarrying of energy-producing materials" branch has been zero since 1994.

Branches - Products	Method of estimation	System of estimation	Quarterly data
23. Insurance services	Chow and Lin	I	Constant + trend[23]
24. Letting of own property	Chow and Lin	I	Constant + trend
25. Other business-related services	Chow and Lin	II	VAT turnover
26. Public administration	Chow and Lin	I	Constant + trend
27. Education	Chow and Lin	I	Constant + trend
28. Other services (market and non-market)	Chow and Lin	I	Constant + trend

4.2   Financial intermediation services indirectly measured (FISIM)

The estimate of production of financial intermediation services indirectly measured (FISIM) is obtained according to the Chow and Lin method using the differential between the debit and credit interest rates as a quarterly indicator.

4.3   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.

4.4   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).

---

[23]   Insurance sector production can be approximately estimated as the difference between premiums collected and claims paid out. While premiums follow an upward trend, the same cannot be said of claims, which are highly variable; in extreme cases, one could even picture an occasionally negative production level. It is thus claims, rather than premiums, that determine production in the insurance sector.   It would therefore undoubtedly be useful to look into the possibility of including quarterly statistics on accidents (car accidents, fires, storm damage, etc.) as indicators.

CHAPTER 5   ESTIMATION OF GROSS DOMESTIC PRODUCT FROM THE EXPENDITURE APPROACH

5.1   The different components of the expenditure approach

The various components of the expenditure approach (household consumption, NPI 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;
-   the results of a survey on the volume of architects' building plans for investment in housing;
-   budget data for public investment;
-   balance of payments and foreign trade statistics for exports and imports of goods and services.

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. Method I (direct volume estimate) is used for investment in housing. The other components are estimated under method II.

Table 4 sets out the different sources and methods.

Table 4:   Sources and methods for estimating the various GDP expenditure components

Type of expenditure	Method of estimation	Quarterly information
Household consumption	Chow and Lin	VAT turnover in retail trade + VAT turnover in the horeca sector + trend
NPI consumption	Chow and Lin	Constant + trend
Public consumption	Chow and Lin	Budget data
GFCF of enterprises	Chow and Lin	Investment according to VAT records
GFCF in housing	Chow and Lin	Volume of building plans according to a quarterly survey of architects
GFCF of general government	Chow and Lin	Budget data
Changes in inventories	Balance, checked with the help of ad hoc data	Models of stocking behaviour in Belgium and business surveys
Exports and imports	Chow and Lin	Balance of payments statistics

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.

5.2.1   Business surveys conducted among enterprises

The only information available in Belgium within the strict time-limits set for producing the quarterly accounts comes from the business surveys and is qualitative in nature. It concerns a question about assessments of the volume of stocks of finished products in manufacturing industry (question 18 of the business survey[24]).

Opinion on the level of stocks of finished products refers to a "normal" situation, itself subjective, variable over time and according to the economic situation.

The analysis points up a very close link between the stock behaviour pattern (described by the figure derived from answers to question 18 in the business survey) and cyclical developments (measured by the trend in GDP). During a downturn (upturn), stocks are deemed to be lower (higher) than normal.

While the link appears quite clearly, it is nevertheless difficult to use current results from business surveys as a direct instrument for measuring changes in stocks.

5.2.2   Econometric modelling of changes in inventories

The macroeconomic models enabling an understanding of stock formation are based on reasons for stocking revealed at the microeconomic level. Four reasons have been identified:

-    stock-building may be seen as a way of avoiding or limiting marginal production costs over time; in this case, stocks are used for maintaining steady output, serving as an adjustment variable to smooth out temporary fluctuations in sales;
-    the second motive for holding stocks is based on the assumption that the company can produce more efficiently under certain conditions or in certain periods; it is therefore in its interest to take advantage of these positive productivity situations to produce more than necessary and build up stocks;
-    the third reason for holding stocks lies in companies' aversion to the risk of failing to meet unexpectedly strong demand; building up sufficient stocks enables them to guard against goods being out of stock if demand exceeds output;
-    the last reason for holding stocks is based on speculation: the company may sometimes consider it to be more advantageous to stock-pile its production than to sell it if it is anticipating higher selling prices in future.

---

[24] 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?"

There are two main macroeconomic models based on these reasons for holding stocks:

- the steady output model, based on the first reason for holding stocks: in this model, a strategy of minimising costs over time leads the company to keep output steady relative to trends in sales; stocks therefore act as a buffer and follow a counter-cyclical trend;
- the stock accelerator model, based on the third reason for holding stocks: this model assumes that the enterprise holds a stock of finished products in proportion to its output level; when the economy is expanding, output is high and enterprises want to hold more stocks; conversely, when output falls, they run down their stocks proportionately; stocks therefore follow a pro-cyclical trend.

The clear link established between the trend in economic activity and changes in inventories is an incentive to take modelling in stock behaviour further at quarterly level in order to obtain a real forecasting instrument for changes in inventories.

The equation used is specified on the basis of the theoretical reasons for stock formation described above. The estimate is primarily obtained by taking account of the anticipated and unanticipated movement in demand excluding stocks. Anticipations are ascertained via adjustment mechanisms and are therefore based solely on past and current trends in demand. Consequently, the determinants adopted are past changes in stocks (VS) and current and past changes in demand excluding stocks (VDhs).

$$VS = a + b \; VS_{-1} + c \; VDhs + d \; VDhs_{-1} + e \; VDhs_{-2} + f \; VDhs_{-3} + g \; VDhs_{-4}$$

This equation is estimated on a quarterly basis by the ordinary least square method. The results are set out in Table 5.

Table 5:   Technical characteristics of quarterly modelling of changes in inventories

Regressor	Coefficient	Standard error	Student statistic
Constant	2.18	2.19	1.00
VS_{-1}	0.36	0.17	2.08
VDhs	- 0.45	0.08	- 5.36
$VDhs_{-1}$	- 0.13	0.09	- 1.47
$VDhs_{-2}$	0.20	0.07	2.62
$VDhs_{-3}$	0.15	0.07	2.23
$VDhs_{-4}$	0.17	0.07	2.25

Number of observations: 49
R^2 adjusted: 0.61
Durbin-Watson: 1.86

These results, estimated on a quarterly basis, shed new light on prevailing stock behaviour in Belgium, by identifying two stock-formation strategies which differ according to time-scales. The disaggregation into quarters revealed that stocks are used to maintain steady output in view of demand in the current and preceding quarters. This smoothing role may be interpreted as companies' response to unexpected demand or as an inertia in the production process, which takes time to adapt to demand. On the other hand, stocks adapt by acting as an accelerator in the light of earlier demand (dating from two or more quarters ago), which gives an indication of market expectations.

The technical characteristics of this regression are satisfactory: the statistical adjustment is good (explaining more than 60 p.c. of the variance) and, with the exception of the intercept and the previous quarter's demand[25], all the variables have a significant influence. The predictive qualities of this equation are nevertheless not enough for it to be considered on its own as the only instrument for forecasting changes in inventories in the quarterly accounts.

The method of estimating changes in inventories in the quarterly accounts is therefore multimodal and is used as a complement to all the data sources available, namely:

- the balance necessary for matching the output and expenditure approaches in the quarterly national accounts;
- the findings of the business surveys on managers' assessment of stocks;
- the results from the modelling established on the basis of historic stocks and current and past demand.

When combined appropriately, this range of instruments makes it possible to adjust the final estimate of gross domestic product.

---

[25] The insignificant influence of demand from the previous quarter can no doubt be explained by the transition made during the course of this quarter between the production smoothing strategy and the accelerating effect.

CHAPTER 6   ESTIMATION OF GROSS DOMESTIC PRODUCT 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 p.c. 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 (Chow and Lin). The estimates are made according to a breakdown into 7 branches of activity (nomenclature A6 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 Chow and Lin method. The quarterly indicator is constructed 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 - NSSO-PLA), 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 NSSO-PLA only once. This adjustment is based on the assimilation, with the help of the National Register number, of the number of people questioned in the context of the labour force survey and their affiliation to the two social security bodies: for each branch of activity, the proportion of workers registered with the two organisations is extrapolated on to the actual population recorded in the NSSO's files and deducted from that.

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[26], 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 NSSO-PLA does not correspond exactly to national accounts concepts.

---

[26] The Crossroads Bank for Social Security cross matches the data from the different social security bodies on the basis of National Register entries.

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

- workers not liable for tax 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;
- undeclared work, estimated in a consistent manner with adjustments to the calculation of value added and the wages in the national accounts.

There is also a category to be removed from the statistics. In both the Flemish Region and the French-speaking Community, an early retirement scheme was set up in the mid-1980s, under which teachers aged 55 years or over can choose to be given leave of absence for personal reasons in the period leading up to official retirement. In accordance with the ESA 1995 definition of employment, this category of teachers is left out of the employment figures.

At the end of these calculations, an estimate of the stock of domestic paid employment as at the end of the quarter is obtained.

Since it is used together with flow variables such as value added and the wage bill, the situation at the end of the quarter can nevertheless not be considered representative of the whole of the quarter. The European authorities recommend the use of a quarterly average. In the Belgian national accounts, it is obtained by the arithmetic mean of the situation at the start and the end of the quarter.

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.

The same conversion as that used for employees is applied to get from the situation at the end of the quarter to a quarterly average.

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 NSSO-PLA, 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 p.c. 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 p.c. 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 (120 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. In order to convert the figures for paid employment expressed in persons to figures expressed in hours, there are thus almost 1,400 conversion coefficients that have to be calculated for each quarter.

To estimate the number of paid hours worked by part-timers, the number of hours officially declared to the NSSO are 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 obtainde 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 120 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. Belgium has a temporary derogation for this variable. A method will be developed shortly. It will be based on the findings of the labour force survey.

CHAPTER 8   FROM GROSS NATIONAL PRODUCT TO NET LENDING/NET BORROWING

The estimate of Belgium's net lending or net borrowing is obtained by adding to GDP, on the one hand, the balance of the various types of earned (compensation of employees) and property (interest and dividends) income received from and paid to the rest of the world and, on the other hand, the balance of the different types of transfers (current and capital transfers), and by subtracting consumption and investment expenditure from the total thus derived.

8.1   Primary incomes receivable from/payable to the rest of the world and gross national income

Primary incomes comprise earned income (compensation of employees), property income, as well as taxes on production and imports less subsidies. Gross national income is obtained by adding to GDP the balance of primary incomes receivable from/payable to the rest of the world.

8.1.1   Earned income receivable from/payable to the rest of the world

The quarterly estimate of incoming and outgoing flows of earned income (compensation of employees) is the end result of a regression according to the Chow and Lin method using balance of payments statistics as an indicator.

8.1.2   Property income receivable from/payable to the rest of the world

Property income (interest and dividends) is calculated according to the same basic structure, using complete balance of payments data.

8.1.3   Taxes on production and imports payable to the rest of the world

Taxes on production and imports paid to the rest of the world are obtained from general government accounts data, notably for taxes paid to the European Union.

8.1.4   Subsidies receivable from the rest of the world

Subsidies received from the rest of the world are simply subject to quarterly smoothing of the annual figure.

8.2   Consumption of fixed capital, net national income and acquisitions less disposals of non-financial non-produced assets

Net national income is obtained by deducting consumption of fixed capital (depreciation) from gross national income.

8.2.1   Consumption of fixed capital

There is no quarterly estimate of the fixed capital stock. Quarterly consumption of fixed capital is therefore merely derived from the annual figure by a simple smoothing method, which is perfectly suited to this type of aggregate that moves in very regular patterns.

8.2.2   Acquisitions less disposals of non-financial non-produced assets

Acquisitions less disposals of non-financial non-produced assets are estimated on the basis of corresponding balance of payments data.

8.3   Current transfers received from/paid to the rest of the world and disposable net national income

Disposal net national income is obtained by adding to net national income the balance of current transfers receivable from/payable to the rest of the world.

The quarterly estimate of these current transfers is based on corresponding balance of payments data.

8.4   Adjustment for the change in net equity of households in pension funds reserves and net saving

There is no adjustment for changes in net equity of households on pension funds in Belgium.

Net saving is obtained by deducting national final consumption from disposable net national income.

8.5   Capital transfers and net lending/net borrowing

The estimate of capital transfers received from/paid to the rest of the world is based on corresponding balance of payments data.

Net lending/net borrowing is obtained by taking gross fixed capital formation and changes in inventories out of net national daving and adding the balance of capital transactions with the rest of the world.

CHAPTER 9   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.

9.1   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 + 70 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 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.

9.2   Flash employment estimate

The NAI is shortly 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 dependent variable, that is, the variable for which a rapid estimate is sought, is total employment as given in the national accounts. Construction of a flash indicator is based on the selection of a set of economic variables (business survey findings, value added according to the national accounts, temporary work, etc.), changes in which make it possible to estimate changes in the dependent variable, in this case, employment. The variables have been definitively selected and synchronised according to the usual criteria (individual t-test, global F-test, R² adjusted, standard error).

National Accounts Institute

Banque Nationale
DE BELGIQUE
Eurosystème

2007-07-25

COMMUNIQUÉ DE PRESSE

links: publication   BelgoStat On-line   General information

Economic activity rises by 0.6 p.c. in the second quarter of 2007

According to the first flash estimate of gross domestic product (GDP), economic growth remained strong in the second quarter of the year 2007. In volume terms, GDP, adjusted for seasonal variations and calendar effects, grew by 0.6 p.c. on the previous quarter. Compared with the same quarter of the previous year, this result reflects a stabilisation of growth (2.9 p.c.).

Estimates for the previous quarter have been updated on the basis of a more complete version of the main basic data (industrial production indices, VAT statistics, foreign trade and balance of payments figures).

During the first quarter of 2007, GDP, adjusted for seasonal variations and calendar effects, increased by 0.7 p.c. in volume terms on the previous quarter. Compared with the corresponding quarter of the previous year, this result points to a slight slowdown in growth (2.9 p.c., against 3.0 p.c. in the previous quarter).

The increase in value added was reflected in all branches of activity, whether industry (0.4 p.c. more than in the previous quarter), services (0.7 p.c.) or, above all, construction (1.1 p.c.).

In the first quarter of the year, the number of workers rose by 0.4 p.c. on the previous quarter. Compared with the first three months of 2006, this expansion works out at an increase of 1.4 p.c., or almost 61,000 workers.

Households were the main driver of economic activity in the first quarter, increasing their consumption expenditure (0.8 p.c.) and their investment in housing (1.0 p.c.).

Although they posted a smaller increase, investment by enterprises and exports of goods and services remained at a high level.

QUARTERLY AGGREGATES

GROSS DOMESTIC PRODUCT- VOLUME CHANGES

(data adjusted for seasonal and calendar effects)

		Percentage changes compared to	
		the corresponding period of the previous year	the previous period
2004	I	2.3	0.6
	II	2.9	1.1
	III	3.1	0.9
	IV	2.8	0.2
2005	I	1.9	-0.2
	II	1.2	0.4
	III	0.9	0.6
	IV	1.7	1.0
2006	I	2.7	0.8
	II	3.1	0.7
	III	3.3	0.8
	IV	3.0	0.7
2007	**I**	**2.9**	**0.7**
	II	**2.9**	**0.6**

MAIN AGGREGATES

(Percentage changes in volume compared to the previous period, data adjusted for seasonal variations and calendar effects)

	2005			2006				**2007**
	II	III	IV	I	II	III	IV	**I**
1. Value added								
Industry	0.5	0.1	-0.1	0.8	1.3	0,9	0.6	**0.4**
Construction	0.7	2.4	2.7	1.5	1.9	2.1	0.7	**1.1**
Services	0.3	0.7	0.7	0.9	0.7	0.6	0.5	**0.7**
2. Expenditure								
Private consumption expenditure (1)	0.3	0.3	0.8	0.8	0.5	0.7	0.3	**0.8**
General government final consumption expenditure	-0.2	0.1	0.3	0.3	0.6	0.6	0.5	**0.5**
Total gross fixed capital formation	3.1	-2.2	0.1	3.4	2.0	1.6	0.6	**3.6**
enterprises	4.2	-3.2	0.7	2.7	2.2	1.7	5.6	**-0.1**
housing	0.7	1.1	0.4	1.0	1.8	1.9	0.9	**1.0**
general government (2)	0.7	-2.8	-4.5	15.5	1.3	0.0	-36.0	**57.2**
Domestic demand (excluding stocks)	0.8	-0.3	0.6	1.2	0.8	0.9	0.4	**1.3**
Changes in inventories (3)	0.2	0.8	0.5	-0.4	0.2	0.5	-0.3	**-1.3**
Exports of goods and services	0.5	0.1	1.1	-0.1	1.8	1.0	2.7	**0.3**
Imports of goods and services	1.2	0.4	1.5	-0.2	2.4	1.6	2.1	**-0.7**
Net exports of goods and services (3)	-0.4	-0.2	-0.2	0.1	-0.4	-0.5	0.6	**0.9**
3. Employment								
Number of workers	0.3	0.1	0.1	0.4	0.4	0.3	0.3	**0.4**

(1) Including non-profit institutions serving households.

(2) The large fluctuations recorded in gross fixed capital formation by general government may be explained by sales of public property, booked as disinvestments.

(3) Contribution to the quarterly change in GDP.

PIB et évolution conjoncturelle

Legend:
- Comptes trimestriels, pourcentage de variation du PIB en volume à un an d'écart, données corrigées des effets de calendrier (échelle de gauche)
- Estimation flash, idem (échelle de gauche)
- Courbe synthétique de conjoncture de la BNB, données lissées (échelle de droite)
- Courbe synthétique de conjoncture de la BNB, données brutes corrigées des variations saisonnières (échelle de droite)
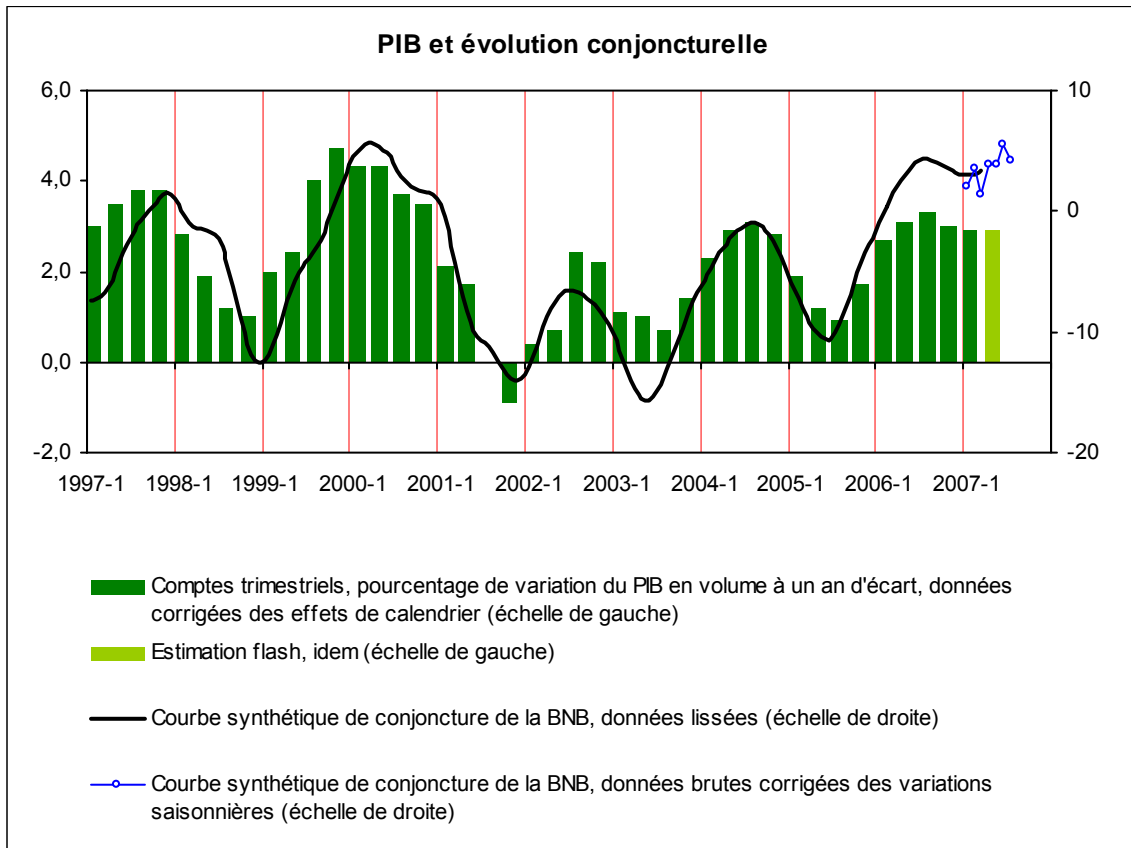
GDP and trend in economic activity
Quarterly accounts, year-on-year percentage change in GDP by volume, data adjusted for calendar effects (left-hand scale)
Flash estimate, idem (left-hand scale)
NBB synthetic business curve, smoothed data (right-hand scale)
NBB synthetic business curve, gross data adjusted for seasonal variations (right-hand scale)

National Accounts Institute

BanqueNationale
DE BELGIQUE

Eurosystème

2007-09-12

COMMUNIQUÉ DE PRESSE

liens: BelgoStat On-line   Information générale

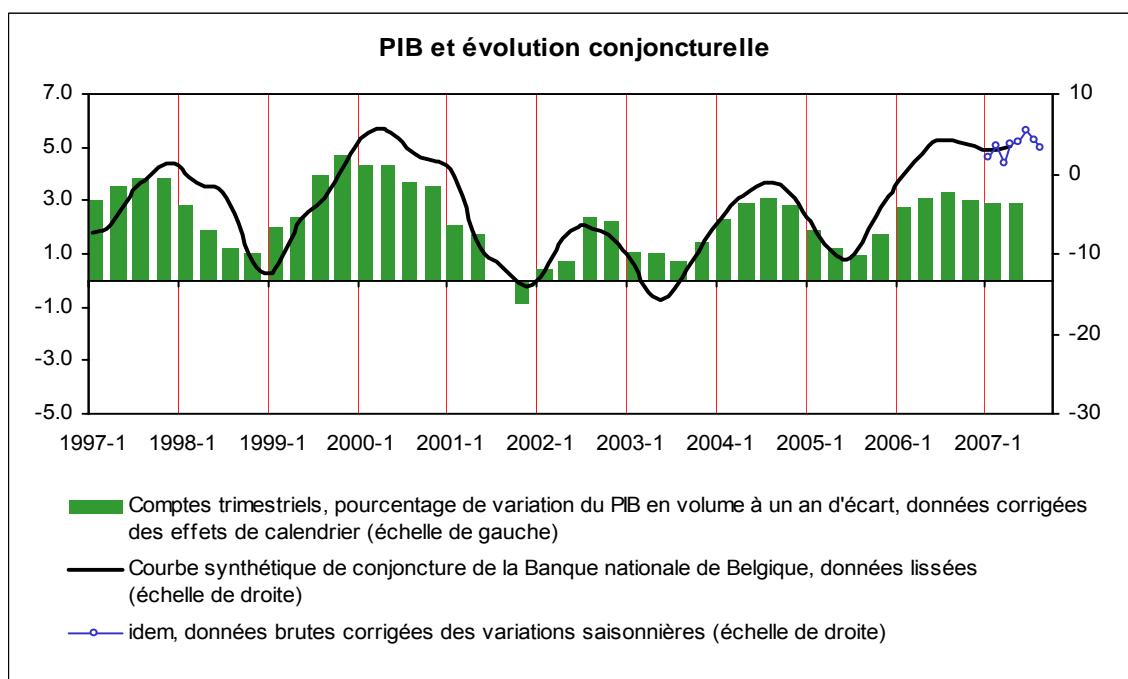**Economic activity rises by 0.6 p.c. in the second quarter of 2007**

During the second quarter of 2007, gross domestic product (GDP), adjusted for seasonal variations and calendar effects, grew by 0.6 p.c. on the previous quarter. Compared with the same quarter of the previous year, this result reflects a stabilisation of growth (2.9 p.c.).

The increase in value added was concentrated in the services sector (0.7 p.c.). In contrast, the rate of production hardly accelerated at all in industry (0.1 p.c.) and construction (0.3 p.c.).

Economic activity has been largely supported by domestic demand. Households increased their consumption expenditure (0.7 p.c.). Enterprises have not been standing still either, stepping up their investment (1.2 p.c.).

Foreign demand also remained strong. Exports of goods and services rose by 1.0 p.c.

In the second quarter, the number of workers rose by 0.4 p.c. on the previous quarter. Compared with the second quarter of 2006, this expansion works out at an increase of 1.4 p.c., or more than 60,000 workers.

PIB et évolution conjoncturelle

Comptes trimestriels, pourcentage de variation du PIB en volume à un an d'écart, données corrigées des effets de calendrier (échelle de gauche)

Courbe synthétique de conjoncture de la Banque nationale de Belgique, données lissées (échelle de droite)

idem, données brutes corrigées des variations saisonnières (échelle de droite)

Communication   boulevard de Berlaimont 14   tél. + 32 2 221 46 28   TVA BE 0203 201 340
Banque nationale de Belgique s.a.   BE-1000 BRUXELLES   www.nbb.be   RPM Bruxelles

GDP and trend in economic activity
Quarterly accounts, year-on-year percentage change in GDP by volume, data adjusted for calendar effects (left-hand scale)
National Bank of Belgium synthetic business curve, smoothed data (right-hand scale)
Idem, gross data adjusted for seasonal variations (right-hand scale)

QUARTERLY AGGREGATES

GROSS DOMESTIC PRODUCT- VOLUME CHANGES

(data adjusted for seasonal and calendar effects)

		Percentage changes compared to	
		the corresponding period of the previous year	the previous period
2004	I	2,3	0,6
	II	2,9	1,1
	III	3,1	0,9
	IV	2,8	0,2
2005	I	1,9	-0,2
	II	1,2	0,4
	III	0,9	0,6
	IV	1,7	1,0
2006	I	2,7	0,8
	II	3,1	0,7
	III	3,3	0,8
	IV	3,0	0,7
2007	I	2,9	0,7
	II	**2,9**	**0,6**

MAIN AGGREGATES

(Percentage changes in volume compared to the previous period, data adjusted for seasonal variations and calendar effects)

	2005		2006				2007	
	III	IV	I	II	III	IV	I	**II**
1. Value added								
Industry	0.1	-0.1	0.8	1.3	0.9	0.6	0.4	**0.1**
Construction	2.4	2.7	1.5	1.9	2.1	0.7	1.1	**0.3**
Services	0.7	0.7	0.9	0.7	0.6	0.5	0.7	**0.7**
2. Expenditure								
Private consumption expenditure (1)	0.3	0.8	0.8	0.5	0.7	0.3	0.8	**0.7**
General government final consumption expenditure	0.1	0.3	0.3	0.6	0.6	0.5	0.5	**0.5**
Total gross fixed capital formation	-2.2	0.1	3.4	2.0	1.6	0.6	3.6	**1.0**
enterprises	-3.2	0.7	2.7	2.2	1.7	5.6	-0.1	**1.2**
housing	1.1	0.4	1.0	1.8	1.9	0.9	1.0	**0.4**
general government (2)	-2.8	-4.5	15.5	1.3	0.0	-36.0	57.2	**0.3**
<mark>Domestic demand (excluding stocks)</mark>	-0.3	0.6	1.2	0.8	0.9	0.4	1.3	**0.7**
<mark>Changes in inventories (3)</mark>	0.8	0.5	-0.4	0.2	0.5	-0.3	-0.5	**0.6**
Exports of goods and services	0.1	1.1	-0.1	1.8	1.0	2.7	0.2	**1.0**
Imports of goods and services	0.4	1.5	-0.2	2.4	1.6	2.1	0.2	**1.9**
Net exports of goods and services (3)	-0.2	-0.2	0.1	-0.4	-0.5	0.6	0.0	**-0.7**
3. Employment								
Number of workers	0.1	0.1	0.4	0.4	0.3	0.3	0.4	**0.4**

(1) Including non-profit institutions serving households.

(2) The large fluctuations recorded in gross fixed capital formation by general government may be explained by sales of public property, booked as disinvestments.

(3) Contribution to the quarterly change in GDP.