

## **Quarterly National Accounts Inventory Estonia**

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## 1. OVERVIEW OF THE SYSTEM OF QUARTERLY ACCOUNTS

### 1.1. Organisation and institutional arrangements

The legal basis of the official statistics in Estonia is the Official Statistics Act that came into force in July 1997, with the latest amendment in September 2007. The Act defines the contents of official statistics, the conduct of official statistical surveys, the scope of the statistical bodies, the role of Statistics Estonia in preparation of the list of official surveys and implementation of the statistical methods used in conducting surveys, the duties of agencies conducting official surveys and the respondents and their obligations and liabilities. It also includes regulations on the data protection, the transmission and dissemination of data.

Main providers of the official statistics are Statistics Estonia and the Bank of Estonia. Statistics Estonia is responsible for most part of the official statistics. The Bank of Estonia compiles the Balance of Payment. Additionally it is in charge of monetary and financial institutions' statistics.

The main task of Statistics Estonia is to provide public institutions, business sector and research institutions, international organisations and individuals with reliable and objective information service on economic, demographic, social and environmental situation and trends in Estonia. Statistics Estonia is a part of the statistical system in Europe and contributes to the development of international statistics.

Statistics Estonia is under the jurisdiction of the Ministry of Finance. Director General is nominated by the Minister of Finance on permanent terms. The internal organisation is characterized by five departments engaged in the production of statistics: National, Financial and Environment Accounts Department, Price and Wages Statistics Department, Enterprise Statistics Department, Agricultural Statistics Department and Population and Social Statistics Department. Those departments are supported by Data Collection, Information Technology, Methodology, Marketing and Dissemination Departments and General Department.

In Statistics Estonia, national accounts are compiled in National, Financial and Environment Accounts Department by National Accounts Service with the staff of 11, by Input-Output Tables Service with 7 employees and by 7 employees under direct subordination of the head of the department responsible for general government and financial sector accounts.

**National Accounts Service** is responsible for quarterly and provisional annual national accounts: non-financial corporations and households sectors' accounts, regional accounts, household final consumption expenditure, gross fixed capital formation, consumption of fixed capital, changes of inventories, compilation of exports and imports of goods and services at previous year prices.

**Input-Output Tables Service** is responsible for final gross domestic product (GDP) estimates derived from the supply and use tables, compilation of symmetric input-output table, estimates for the Non-Profit Institutions Serving Households (NPISH) sector and Tourism Satellite Accounts.

**Unit under direct subordination of the head of the department** is responsible for the General Government finance statistics, General Government Accounts, General Government deficit and debt statistics, financial accounts, financial intermediate services indirectly measured (FISIM) calculations and net taxes on products. The department is also responsible for financial corporations sector, general government sector and final consumption of the sector, net taxes on products and FISIM calculations for quarterly and provisional annual national accounts.

Exports and imports of goods at current prices are compiled in Foreign Trade Statistics Service of Enterprise Statistics Department. For the agriculture sector, Economic Accounts for Agriculture (EAA) with detailed data on output, intermediate consumption and value added components are derived from Agricultural Statistics Department. Seasonal and working-day adjustment and forecasting are modelled in Methodology Department.

In total, 17 employees are involved in the Quarterly National Accounts (QNA) compilation in Statistics Estonia.

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## **1.2. Publication timetable, revisions policy and dissemination of quarterly national accounts (QNA)**

Flash estimate of the GDP growth is published on the 43th day after the end of the reference quarter. Flash estimate is calculated only by production approach. First estimate of the QNA, based on supplementary data and calculated by the production, expenditure and income approaches, is published on the 70th day after the end of the reference quarter. Revision of the quarterly calculated principal national accounts indicators is regularly carried out based on the Structural Business Survey, government accounts, revised Balance of Payments and supply and use tables. Estonia meets all the requirements of the Regulation of the European Parliament and Council No 1392/2007 about the transmission of QNA data.

## **1.3. QNA compilation approach**

Statistics Estonia compiles national accounts, including QNA, according to the concepts, definitions, classifications and accounting rules of the European System of Accounts (ESA95). Quarterly GDP is compiled by three approaches: production approach, expenditure approach and income approach. Income approach largely uses the same sources as production approach. The GDP by income approach is not an independent approach as some components, such as operating surplus and mixed income, are derived residually. Transactions in goods and services are calculated on an accrual basis.

## **1.4. Balancing, benchmarking and other reconciliation procedures**

Statistical discrepancy between quarterly GDP calculations by the production and expenditure approaches is not removed. Statistical discrepancy is eliminated only from the annual GDP data based on supply and use tables. Supply and use tables are published in t+36 months.

Annual values of the variables are the sums of respective quarterly values. Data in the supply and use tables (t+36 months) and annual surveys serve as the basis for the respective QNA data. Extrapolation techniques are used for intermediate years, using the years for which cost detail is available as benchmark years. Benchmarking and adjustments for quarterly accounts based on annual data are applied to several components.

## **1.5. Volume estimates**

QNA is calculated at current and at previous year prices. Annual overlap technique has been selected for the previous year prices calculations. In Estonia, Laspeyres indexes are used. Estimates at previous year prices are chain-linked. Reference year is 2000. Production-based accounts are calculated by single deflation.

## **1.6. Seasonal adjustment and working-day correction**

QNA is calculated by raw data, whereas seasonal adjustment and working-day correction are made to the completed calculations of GDP and its components. In Estonia, the seasonal adjustment interface DEMETRA (software TRAMO/SEATS based on model-based approach) is applied to national accounts. Adjustment is made both to the calculations at current prices and volumes after chain-linking.

## **1.7. Additional information**

QNA data are available in the database of Statistics Estonia at the following address:

[http://pub.stat.ee/px-web.2001/I\\_Databas/Economy/databasetree.asp](http://pub.stat.ee/px-web.2001/I_Databas/Economy/databasetree.asp)

## 2. PUBLICATION TIMETABLE, REVISIONS POLICY AND DISSEMINATION OF QUARTERLY NATIONAL ACCOUNTS

### 2.1. Release policy

International Monetary Fund's (IMF) Special Data Dissemination Standards (SDDS), which Estonia has promised to comply with, require the advance notification of the publication dates of the statistics of certain areas (national accounts, price indices, labor market, external trade, population, etc.). IMF special standard is the reason why Statistics Estonia publishes the yearly dissemination calendar of releases already at the end of September with exact dates for the next year. By the advance notification of publication dates equal treatment of consumers is ensured, providing them with a simultaneous access to official statistics. Figures yet unpublished are sent only to the Bank of Estonia — another official producer of statistics in Estonia.

On a regular basis, quarterly gross domestic product (GDP) is published as follows:

1. Flash estimate of the GDP growth is published on the 43th day after the end of the reference quarter. Flash estimate is calculated only by production approach. Only a press release with the GDP growth rate and preliminary explanations is released. Press release is available at 8.00 a.m. CET on <http://www.stat.ee/news-releases>. No data are published in the database of Statistics Estonia.
2. First estimate of the QNA, based on supplementary data and calculated by the production, expenditure and income approaches, is published on the 70th day after the end of the reference period. Respective press release and data of the QNA in the database of Statistics Estonia are published at 8.00 a.m. CET (see <http://www.stat.ee/> and [http://pub.stat.ee/px-web.2001/I\\_Databas/Economy/databasetree.asp](http://pub.stat.ee/px-web.2001/I_Databas/Economy/databasetree.asp)).

The gap between the quarterly growth rates of flash estimated GDP and GDP first estimate since 2000 has been 0.25 percentage points.

Statistics Estonia can make current minor corrections to the published figures, whereas the public is notified of the corrections in the database.

### 2.2. Contents published

All time series compiled with the uniform methodology are available from the 1st quarter 1995 in the statistical database of Statistics Estonia. In the statistical database of Statistics Estonia the QNA is published by the following division (see [http://pub.stat.ee/px-web.2001/I\\_Databas/Economy/databasetree.asp](http://pub.stat.ee/px-web.2001/I_Databas/Economy/databasetree.asp)):

GDP:

- GDP at current prices, million kroons (both raw data and seasonally and working-day adjusted)
- GDP chain-linked volume (reference year 2000), million kroons (both raw data and seasonally and working-day adjusted)
- Chain-linked index, 2000=100
- GDP change compared with the same period of previous year, chain-linked, % (both raw data and seasonally and working-day adjusted)
- GDP change compared with previous period, chain-linked, % (both raw data and seasonally and working-day adjusted)
- GDP at current prices, million euros
- GDP chain-linked volume (reference year 2000), million euros
- GDP at current prices, million US dollars
- GDP chain-linked volume (reference year 2000), million US dollars

**By institutional sectors and by economic activities (A31):**

- Value added at current prices, million kroons
- Value added chain-linked volume (reference year 2000), million kroons
- Value added growth compared with previous period, chain-linked, %
- Value added growth compared with the same period of previous year, chain-linked, %
- Chained index, 2000=100
- Contribution to GDP growth, percentage points

**By expenditure approach:**

- GDP component at current prices, million kroons
- GDP component's chain-linked volume (reference year 2000), million kroons
- GDP component's change compared with previous period, chain-linked, %
- GDP component's change compared with the same period of previous year, chain-linked, %
- Chained index, 2000=100
- Contribution to GDP growth, percentage points
- Gross fixed capital formation by economic activities

**By income approach:**

- Compensation of employees
- ..wages and salaries
- ..employers' social contribution
- Consumption of fixed capital
- Taxes on production and imports
- Subsidies (-)
- Operating surplus and mixed income

**2.3. Special transmissions**

In order to coincide with the requirements set out by ESA95, Estonia transmits quarterly indicators of national accounts to Eurostat via GESMES. The tables are transmitted by the deadline of t+70 days. Estonia meets all the requirements of the Regulation No 1392/2007 of the European Parliament and of the Council with respect to the transmission of national accounts data.

Apart from Eurostat, quarterly special transmissions are made to various institutions including but not limited to the Bank of Estonia, Ministry of Finance and various financial institutions.

**2.4. Policy for metadata**

Estonian metadata correspond to the requirements of Special Data Dissemination Standard (SDDS), hence providing information regarding external debt of the general government, monetary authorities, the banking sector, and other sectors. A comprehensive description of the metadata used can be accessed from Statistics Estonia's website: <http://www.stat.ee/sddseng>.

**2.5. Revisions policy**

Revisions of the QNA data can be divided into three groups:

1. Regular revisions
2. Major regular (benchmark) revisions and
3. Major occasional revisions

In principle, regular revision of the national accounts data in Estonia is in compliance with the EU revision policy for national accounts data.

Revision of the quarterly calculated principal national accounts indicators is regularly carried out based on the Structural Business Survey (SBS) which results are published in 21 months (in September) after the end of the year subject to revision. In addition, as the Balance of Payments and government accounts of the previous year are revised as well, QNA of the first quarter of the current year has to be revised. The revised figures are published in September.

The final regular revision of the national accounts figures is based on the supply and use tables (SUT). SUT is published in December in t+36 months. Revised QNA figures based on SUT are published in t+45 months (in September, i.e. together with the revised figures based on SBS).

Both major regular and major occasional revisions are carefully planned and the revised figures are published in the statistical database of Statistics Estonia in September. The public is informed early enough about the incoming major revisions via regular QNA-focused press releases.

Since 2001, Statistics Estonia has implemented several major occasional revisions, mainly for meeting methodological requirements of ESA95 and other EU statistical requirements. The latest revisions concerned the introduction of a new methodology of estimating dwelling services based on the user cost method in

2004, the FISIM allocation to user sectors in 2005, the integration of the SUT framework into the regular national accounts compilation process in 2006 and introduction of chain-linking methods for QNA and Annual National Accounts (ANA).

Since 2006, QNA and provisional ANA have been regularly revised based on supply and use tables (t+45 months) and Structural Business Survey (t+21 months).

**Table 1 Revisions carried out by Statistics Estonia**

Year	Revisions	Revised period
2001	<ul style="list-style-type: none"> <li>Improved estimates for non-observed economy;</li> <li>Output of insurance services according to ESA95;</li> <li>Net taxes on products made on accrual (time adjusted cash method) basis.</li> </ul>	1993 onwards
2002	<ul style="list-style-type: none"> <li>Rebasing national accounts at constant prices from fixed 1995 to fixed 2000</li> </ul>	1993 onwards
2004	<ul style="list-style-type: none"> <li>Introduction of a new methodology of estimating dwelling services based on the user cost method;</li> <li>A number of methodological changes based on the results of different Eurostat projects.</li> </ul>	1993–2003
2005	<ul style="list-style-type: none"> <li>FISIM allocation to user sectors/industries;</li> <li>Introduction of employers' imputed social contributions (D.122) for general government;</li> <li>Methodological changes in the calculation of FISIM output and the new treatment of the central bank.</li> </ul>	1993–2004
2006/	<ul style="list-style-type: none"> <li>Introduction of the supply and use tables into the annual NA compilation process;</li> </ul>	2000–2005/
2007	<ul style="list-style-type: none"> <li>Estimates for own-account produced software and fixed assets by enterprises;</li> <li>Improvements of estimates for exhaustiveness.</li> </ul>	1995–1999
2008	<ul style="list-style-type: none"> <li>Introduction of chain-linking methods for QNA and ANA.</li> </ul>	1995 onwards
2009	<ul style="list-style-type: none"> <li>Update of the methodology for calculating actual and imputed rent</li> <li>Reclassification of certain units from non-financial corporations sector to general government sector</li> </ul>	1995 -2008 2002 -2008



### 3. OVERALL QUARTERLY NATIONAL ACCOUNTS COMPILATION APPROACH

#### 3.1. General architecture of the quarterly national accounts (QNA) system

Statistics Estonia compiles national accounts, including QNA, according to the concepts, definitions, classifications and accounting rules of the European System of Accounts (ESA95). Quarterly GDP is compiled by three approaches:

1. Production approach
2. Expenditure approach
3. Income approach.

Production approach is considered to be the most reliable one in the GDP compilation, due to the availability of more detailed information and a better possibility to compare estimates obtained from many alternative data sources.

Statistics Estonia follows the institutional sector division in respect of the data compilation for the production and income approach. Five institutional sectors are distinguished:

- non-financial corporations (S.11)
- financial corporations (S.12)
- general government (S.13)
- households (S.14) and
- non-profit institutions serving households (NPISH) (S.15).

Each sector is broken down into activities or into activities and sub-sectors. The breakdown by institutional sectors is used for estimates of value added (incl. output and intermediate consumption), gross capital formation, exhaustiveness and sector accounts.

Transactions in goods and services are calculated on an accrual basis. Transactions in goods and services have different price references for their recording. Output is valued at basic prices in the cases of market production and production for own final use, while intermediate consumption is valued at purchasers' prices. In national accounts, the valuation of taxes is on accrual (time-adjusted cash method) basis.

Since non-market output has no prices, it is valued at the total production costs. According to the ESA95 methodology, the whole output value of general government is estimated as the sum of intermediate consumption, compensation of employees, consumption of fixed capital and other taxes on production. There are no other subsidies on production for government non-market producers. As non-profit institutions serving households are also non-market producers, the output calculations are made on the basis of costs.

At present, direct estimation methods dominate in the production approach. However, most of the exhaustiveness adjustments are not based on direct observations, and should therefore be considered as indirect methods.

**Expenditure approach** is an independent approach as the various expenditure components are completely estimated.

GDP at market prices by expenditure approach is derived as the sum of the components of household final consumption expenditure, final consumption expenditure of government and final consumption expenditure of NPISH, gross fixed capital formation and valuables, changes in inventories, net exports of goods and services.

Household final consumption expenditure is valued at purchasers' prices. Acquisitions of fixed assets are valued at purchasers' prices. Exports and imports of goods and services are recorded at f.o.b. value. Changes in stocks are valued at current average prices of the accounting period. In national accounts, changes in inventories are valued at basic prices for stocks of finished goods and work-in-progress and at purchasers' prices for inventories of materials and supplies and goods for resale. Two kinds of adjustments are made for the inventories data provided by source statistics: first, for the inventories of finished goods and work-in-progress, mark-up adjustment for operating surplus is made to arrive at basic prices; secondly, holding gains are eliminated from changes in inventories of finished goods, work-in-progress, inventories of materials and goods for resale.

Indirect estimation methods are derived from the national accounts estimates on production of agricultural, fuel wood and fishing products for own final use by households, actual rentals of dwelling services and purchasing of the motorcars by household. The calculations of gross fixed capital formation of new dwellings in the households sector are also based on the indirect estimation model. Dwelling services are valued according to the user cost method.

**Income approach** uses to a large extent the same data sources as production approach. This means that the two approaches coincide with respect to use of the surveys and administrative sources involved. The GDP by income approach is not an independent approach as some components like operating surplus and mixed income are derived residually.

Income approach distinguishes between the following components: compensation of employees, consumption of fixed capital, other taxes on production and imports, other subsidies on production, operating surplus and mixed income.

Most of the basic data available for the compensation of employees and other taxes and subsidies on production are directly measured. However, gross operating surplus, including mixed income, is calculated indirectly as the residual between GDP estimated via the production approach and the remaining components of the income approach. Consumption of fixed capital is based on the indirect estimation model.

### 3.1.1. Classifications

QNA is based on the following classifications:

- Estimates of output, intermediate consumption, gross fixed capital formation and consumption of fixed capital are compiled in the breakdown of 60 and employment data of 17 economic activities according to the Estonian Classification of Economic Activities (EMTAK 2003) which is in conformity to NACE Rev. 1.1 classification.
- Estimate of household final consumption expenditure is broken down by 110 commodity groups (by a 4-digit level) of COICOP (Classification of Individual Consumption by Purpose).
- Calculation of exports and imports of goods is distributed into 35 subdivisions by using the 2-digit level CPA (Statistical Classification of Products by Activity in the European Economic Community) codes.
- The borderline between individual and collective goods and services is drawn on the basis of COFOG (Classification of the Functions of Government). The classification of the functions of government is used for dividing government output and then government final consumption expenditure is based on the COFOG 1999 version. The government functions are split into 69 different functional groups (COFOG level II).

## 3.2. Balancing, benchmarking and other reconciliation procedures

### 3.2.1. Balancing of quarterly GDP

GDP is compiled independently by production approach and by expenditure approach. GDP compiled by income approach is automatically equal to the GDP compiled by production approach by using gross operating surplus and mixed income as a residual item.

Statistical discrepancy between quarterly GDP calculations by production and expenditure approaches is not removed. Statistical discrepancy is calculated for the GDP at current prices and at previous year prices, while only the GDP at current prices is published (note that data at previous year prices are not published in Estonia).

Statistical discrepancy is eliminated only from the annual GDP data based on supply and use tables. Supply and use tables are published in t+36 months, whereas revised QNA figures based on SUT are published in t+45 months.

### 3.2.2. Benchmarking of quarterly and annual national accounts

Annual values of the variables of ANA are the sums of respective quarterly values. Data from the SUT (t+36 months) and Structural Business Survey (t+1 year), Household Budget Survey (since 2010), Labor Force Survey serve as a basis for the respective QNA data. Extrapolation techniques are used for intermediate years, using the years for which cost detail is available as benchmark years.

The quarterly values of output, intermediate consumption, compensation of employees, other net taxes on production are usually less than the similar data collected by annually conducted surveys (e.g. Structural Business Survey). Therefore, adjustment is made to the quarterly data. The percentage of discrepancy between annual data and the sum of quarterly data in corresponding period of the previous year is calculated and the current year's data are adjusted by this per cent.

Due to insufficient information on the household final consumption expenditures (i.e. water supply, refuse and sewerage collection, electricity, gas, liquid fuels, heat energy, motor cars, motor cycles, games of chance, other financial services), there are special estimations for quarterly calculations. The benchmark estimate for

services is the same quarter of the last specified year, changes in the services of business survey and changes in consumer price indexes (CPIs).

Quarterly sources underestimate gross fixed capital formation of non-financial corporations. Therefore, in order to obtain the final estimate, this discrepancy is taken into account and the initial estimate is corrected by using the annual data of previous period.

Benchmarks and extrapolations are used in case of housing services produced by owner-occupiers. In the calculations of dwellings services, for estimating net stock of owner-occupied dwellings (user cost method), the Housing and Population Census data of 2000 are used as benchmarks. Estimations on net stock for other periods are extrapolated by using data on gross fixed capital formation and consumption of fixed capital.

### 3.3. Volume estimates

QNA volumes are calculated at previous year prices and chain-linked. Reference year is 2000.

National accounts at previous year prices are calculated for both the production and expenditure bases. Production-based accounts are calculated by single deflation. It means that only output is deflated, while value added at previous year prices is extrapolated. While the general government sector output is calculated as the sum of value added and intermediate consumption, value added is deflated. Value added and intermediate consumption are deflated separately in the NPISH sector. Output and intermediate consumption are deflated separately in the financial sector. Double deflation of QNA will be implemented in 2011.

In Estonia, the Laspeyres indexes (the value of the basket of goods available in year  $t$  at prices of year 0, related to the original basket of year 0) have been used in calculations at previous year prices.

Currently, consumer price, producer price, construction price and export and import price indices are used upon deflation.

Calculation of the value added of the government sector is cost-based. Upon deflation of the GDP components of that sector, the special case of physical volume index, i.e. the change in the number of employees, is applied. Volume indices are also used in the calculation based on constant prices in several other economic activities (e.g. transport, mining industry, electric energy, gas and water supply).

The national accounts components are deflated or extrapolated at as detailed level as possible.

In Estonia, annual overlap technique (AOL) has been selected for the calculations at previous year prices and the quarterly chain-linking method, i.e. a quarter at average prices of the previous year is related to the average of the four quarters of year  $t-1$  at prices of year  $t-1$ .

AOL has been selected since:

- it is more practical for the Laspeyres volume measures in national accounts,
- it meets the time consistency criterion, i.e. annual sums of quarterly chain-linked figures equal to the corresponding chain-linked annual figures,
- it ensures the uniformity with the techniques already used by the majority of EU Member States.

Variables of chain-linked volumes are non-additive (except at the reference year and at the year following the reference year).

Contribution to GDP growth is calculated for institutional sectors, economic activities, components of domestic demand, and exports and imports by using the following formula:

$$\begin{aligned} \text{Contribution of X to GDP growth} &= \frac{X_{pyp}(t,j) - X_{syp}(t-1,j)}{GDP_{syp}(t-1,j)}, \\ X_{syp}(t-1) &= X_{pyp}(t-1,j) * \text{implicit deflator growth } t-2 / t-1, \end{aligned}$$

where

X	a component of GDP
pyp	at previous year prices
syp	at same year prices
t	current year
t-1	previous year
j	quarter

Variables of the estimates at previous year prices and chain-linked data are published in the statistical database of Statistics Estonia (see clause 2.2).

### 3.4. Seasonal adjustment and working-day correction

In Estonia, the seasonal adjustment interface DEMETRA (software TRAMO/SEATS based on model-based approach) is applied to the seasonal adjustment procedure of national accounts time series. Seasonal adjustment and working-day correction are applied both to current price values and to chain-linked values.

The seasonal adjustment process consists of at least three main sub-procedures. All of them are used by applying a concrete software. The three procedures are:

1. Pre-adjustment (or pre-treatment)
2. Pure seasonal adjustment
3. Revisions policy.

The main objective of **pre-adjustment** is to ensure a reliable estimation of the seasonal component. This is done by detecting and correcting the series from data and/or components, called as “non-linearities”, which could hamper the estimation of seasonality. The following procedures of pre-adjustment are used: graphical analysis of the series, outliers’ detection and correction of the series from various types of outliers (additive outliers, transitory changes and level shifts), working-day adjustment, correction for moving holidays (e.g. Easter), model selection (automatic or manual model selection). We use complete automatic procedures for outlier detection and a partially automatic procedure for calendar adjustment and model selection. Working-day adjustment is made only if a significant (or a nearly significant) working-day effect was presented. We use default calendar for Estonia implemented in DEMETRA. The graphical analysis of the series is sometimes used for supporting the model type selection.

**Pure seasonal adjustment** is done in the traditional way. All series are adjusted by using the direct approach. There exists a problem of consistency between raw and seasonally adjusted series for QNA. We know that it is unrealistic to assume that seasonality is neutral over the full year. Therefore, it is possible to force the sum of seasonally adjusted data over each year to equal the sum of raw data. Time consistency of seasonally adjusted time series can be achieved by using special software. One of these is ECOTRIM, a program developed for Windows, which supplies a set of mathematical and statistical techniques to carry out temporal disaggregation. Temporal disaggregation is a process of deriving high frequency data from low frequency data optionally by using related information. The program performs an indirect approach to the disaggregation problem: the disaggregated series are estimated by using the available aggregated series and in case there is a set of known related indicators. The aggregated data are generally available in the form of sum over a period of time (e.g. annual values).

We use univariate temporal disaggregation methods for providing the time consistency requirement of QNA. We do not take into account contemporaneous constraints on the GDP and its components. It means that there are statistical discrepancies between the quarterly values of seasonally adjusted GDP and the sum of seasonally adjusted quarterly components of GDP when calculated by using the three referred methods.

**Quality of seasonal adjustment.** We use the seasonal adjustment interface DEMETRA version 2.2 (software TRAMO/SEATS based on model-based approach). Our quality indicators are produced by this software and we mainly use only these quality measures. All time series are checked and in case of bad quality indicators our time series are resolved until an acceptable solution is reached. In addition to the quality of seasonal adjustment for the GDP, we also use the difference of annual percentage change of seasonally adjusted GDP (SA GDP) ( $\text{change SA GDP}_t / \text{SA GDP}_{t-4}$ ) and annual percentage changes of original data of GDP. We prefer the solution where this difference during last four years is quite small.

It should be noted that the quality of seasonal adjustment for our time series depends on the quality of used software.

**Revisions policy.** Revision strategy adopted by most countries is to link revisions in seasonal adjustment data to revisions in raw data. Seasonally adjusted and working-day corrected data are usually revised when new data become available. As we use the model-based approach for seasonal adjustment, ARIMA models are applied. It is true that the ARIMA models, used for seasonal adjustment, are slowly changing in time. On the other hand, parameters of these models are, as a rule, affected by new observations. Therefore, re-identification and re-estimation of the ARIMA models and coefficients (including regression coefficients for working-day adjustment) are very important for all time series.

As a rule, we try to re-identify models once a year when data for the 4th quarter are available. We try to re-estimate parameters each time when seasonal adjustment is performed, it means every quarter when new observations are available. If quarterly observations are available we use the already estimated ARIMA and

regression coefficients. The last big revision in our seasonal adjustment of time series with the help of changing models and parameters was conducted in 2008 due to the changing series span (number of observations): before revisions, our time series were started at 1st quarter 2000, the new starting time was 1st quarter 1995.

## 4. GDP AND COMPONENTS: THE PRODUCTION APPROACH

### 4.1. Non-financial corporations sector (S.11)

#### 4.1.1. General information

Calculation of the value added by production approach is compiled by the economic activities classification — the Estonian Classification of Economic Activities (EMTAK 2003), which is in conformity with NACE Rev. 1.1. Changeover to the updated classification, EMTAK 2008, which is in conformity with NACE Rev. 2, will take place in September 2011.

Value added of the non-financial corporations sector is calculated by the following economic activities (2-3-digit NACE):

**Table 3 List of economic activities used in the compilation of S.11 value added**

Economic activity	Classification code
Agriculture	01
Forestry	02
Fishing	05
Mining and quarrying	C (10,11,14)
Manufacturing	D (15-37)
Electricity, gas and water supply	E (40,41)
Construction	45
Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	G (50,51,52)
Hotels and restaurants	H (551-555)
Transport, storage and communication	I (60,61,62,63)
Real estate activities, renting and business activities	K (70-74)
Education	80
Health and social work	85
Other community, social and personal service activities	O (90-93)

#### 4.1.2. Data sources

The main data sources for the quarterly calculation of non-financial corporations output, intermediate consumption and value added are the respective statistical surveys of Statistics Estonia:

- Calculation of agriculture, fishing and forestry is based on the data from the quarterly survey of economic indicators of agriculture, hunting, forestry and fishery;
- Calculation of manufacturing and energy activities is based on the data from the quarterly survey of manufacturing, energy and water supply economic activity;
- Calculation of wholesale and retail trade activities is based on the data from the quarterly survey of services economic activity;
- Calculation of construction is based on the data from the quarterly survey of construction economic activity;
- Calculation of wholesale and retail trade, transport and hotels and restaurants is based on the data from the quarterly surveys of trade economic activity, transport economic activity and hotels and restaurants economic activity;
- Data of passenger transport, passenger traffic volume, transport of goods and freight turnover come from the quarterly surveys of railway transport, road transport, sea transport and air transport;
- Consumer, producer and construction price indexes come from the respective monthly surveys;
- Data of the sale of motor vehicles come from the survey of newly registered vehicles.

#### 4.1.3. Calculation of output of non-financial corporations at basic prices

Output is calculated at basic prices and it includes:

- Sales of enterprises (net);
- Purchased goods (-);
- Purchased services and real estate for resale purpose (-);
- Payments to subcontractors (+);
- Changes in inventories of finished goods at basic prices (-);
- Changes in inventories of work-in-progress at basic prices (-);
- Own account products (+).

Product subsidies (adjusted by holding gains), own-account production of computer software and output produced by dwellings (rent) owned by enterprises are added to the output calculation.

#### 4.1.4. Calculation of intermediate consumption of non-financial corporations

Intermediate consumption is calculated indirectly on the basis of costs of the accounting quarter and the ratio of costs to intermediate consumption in the same quarter in 2000.

Intermediate consumption is evaluated at purchasers' prices existing at the time of purchase in the production process in order to minimize the impact of price changes during the materials and raw materials being stored. Its volume is adjusted by the value of holding gains, which is separately calculated. Payments to subcontractors are added to intermediate consumption.

Financial intermediate services indirectly measured (FISIM) is added to the intermediate consumption.

The quarterly calculated output, intermediate consumption, compensation of employees, other net taxes on production are usually smaller than calculations based on the similar data of Structural Business Survey (annual). Therefore, quarterly data have to be adjusted. The percentage of discrepancy between annual data and the sum of quarterly data in corresponding period of the previous year is calculated and the current year's data are adjusted by this per cent. The correction is made by pro rata distribution of discrepancies between the sums of quarterly evaluations and annual evaluations. In addition, the quarterly data are subjected to a regular revision based on the Structural Business Survey and supply and use tables.

#### 4.1.5. Calculation of value added of non-financial corporations

Value added at basic prices is calculated as the difference between output and intermediate consumption. Estimates are also made for exhaustiveness.

Calculation of value added at previous year prices is calculated by single deflation. It means that only output is deflated, whereas value added is estimated by multiplying output by the previous year's rate of value added in output. Producer price, construction price, consumer price or volume indexes are applied in the calculations at previous year prices of the respective economic activities.

### 4.2. Financial corporations sector (S.12)

#### 4.2.1. Data availability

As the financial sector consists of five sub-sectors, the data used for calculation of value added are different.

- Central bank (the Bank of Estonia) (S.121) calculations are compiled based on the quarterly data from the Bank of Estonia (compensation of employees, consumption of fixed capital, intermediate consumption, other taxes on production, other subsidies on production).
- Sub-sector of other monetary financial corporations (S.122) calculations are compiled based on the quarterly report of profits and losses of commercial banks (aggregated) (fees and commission income, fees and commission expenses, administration costs except the staff expenses, other operating income and other operating expenses from the banking survey).
- Sub-sector of other financial intermediaries except insurance corporations and pension funds (S.123) calculations are compiled based on aggregated quarterly report of profits and losses of leasing companies and other financial intermediaries except insurance corporations and pension funds (data for leasing corporations are commission income, other income, commission expenses and other administrative expenses from the banking survey. Data for other financial intermediaries except insurance corporations and pension funds are commission income, other income, commission expenses and other administrative expenses from the statistical survey).

- Sub-sector of financial auxiliaries (S.124) is compiled based on aggregated quarterly report of profits and losses of financial auxiliaries.
- Sub-sector of insurance corporations and pension funds is compiled based on aggregated quarterly report of profits and losses, balance sheets and consumptions of insurance corporations and pension funds.

#### 4.2.2. Calculation of financial sector output

The financial sector output consists of market output, non-market output of the central bank, financial intermediation services indirectly measured (FISIM), own-account produced software and income in kind (i.e. for private use of business cars). Market output consists of direct fees and commissions. FISIM calculations are made in two sub-sectors: S.122 and S.123. The central bank is treated as non-market producer; its output is measured as the sum of costs and is entirely allocated to the intermediate consumption of credit institutions.

Non-FISIM output of other monetary financial corporations (S.122), other financial intermediaries except insurance corporations and pension funds (S.123) and financial auxiliaries (S.124) is calculated as the sum of commission income and other income.

#### 4.2.3. Calculation of financial sector intermediate consumption

Intermediate consumption of the financial sector is calculated as the sum of intermediate consumption of a sub-sector and FISIM minus income in kind.

Intermediate consumption is the sum of various operating costs, which, for commercial banks, are obtained from banking statistics, for the Bank of Estonia — from the breakdowns of its financial statement, for big leasing companies — from the profit and loss account published by the central bank, and for others — from the survey "Financial intermediation and auxiliary services". Intermediate consumption of commercial banks is the sum of items from the profit and loss account: administrative expenses except wages and salaries and social insurance cost plus commission expenses. The output of central bank exceeding the amount of services explicitly charged is entirely allocated to the intermediate consumption of credit institutions. For other financial institutions, the sources of data are the operating costs available at the breakdown level from profit and loss statements.

#### 4.2.4. Calculation of insurance corporations and pension funds (S.125) output and intermediate consumption

- Output of life insurance services =

Gross earned premiums + commissions income - gross claims incurred to policy-holders + premium supplements + change in life insurance technical provision and in other technical provisions = output of life insurance services + other income

- Output of non-life insurance =

Gross earned premiums - gross claims incurred to policy-holders + premium supplements + change in other technical provisions = output of non-life insurance and reinsurance services + other income

- Intermediate consumption of insurance corporations and pension funds =

Reinsurers' share of earned premiums + reinsurers' share of premium supplements - reinsurers' share of claims incurred - reinsurance commissions - reinsurers' share in change of life provision - reinsurers' share in change of other technical provisions = reinsurance services consumed + commissions paid + services bought + other expenses

Value added is calculated as the difference between output and intermediate consumption.

#### 4.2.5. Calculations at previous year prices

In the financial sector, output and intermediate consumption are deflated separately.

The financial sector output is deflated by the CPI services index, except in case of insurance companies. The output of insurance companies is deflated by CPI of insurance services.

Intermediate consumption is deflated by sector-specific CPIs (from the goods and services classifier).



### 4.3. General government sector (S.13)

#### 4.3.1. Data sources

In the general government sector, the main data sources are based on the bookkeeping system of government accounting provided by the Ministry of Finance. The bookkeeping system provides the monthly and annual data of general government institutions on an accrual basis. Reports on the state and local budgets' execution are used as additional information.

Other indicators used for previous year price estimations:

- Number of employees (from Statistics Estonia)
- Consumer price index (from Statistics Estonia)

#### 4.3.2. Calculation of value added at current prices

The value added of general government at current prices is estimated by the total production costs as the sum of compensation of employees, consumption of fixed capital and other taxes on production.

Compensation of employees includes:

- wages and salaries in cash (gradual salaries; increase of gradual salaries; premiums; holiday benefits; additional pay for ancillary years, for academic degree, for command of foreign languages, for extra tasks and other additional pays);
- wages and salaries in kind (housing services and food allowances for members of the Defence Forces, payments of daily allowances of business trips expenses, use of business cars, etc);
- employers' actual social contributions: social tax (health and pension insurance) and unemployment insurance premium (unemployment insurance);
- employers' imputed social contributions: officers' additional pension for ancillary years, state pensions by special acts, and state additional pension (President, members of the Parliament, Auditor General, Chief Justice, Judge, Chancellor of Justice, police officers and members of the Defence Forces).

For calculating consumption of fixed capital (CFC) in the general government sector, the simplified perpetual inventory method (PIM) is used. It is based on the application of depreciation and discards functions and involves estimation of gross capital stocks. Year 1995 is used as a starting point for gross stock and CFC estimation, because in that year the general government institutions revaluated their fixed assets. In order to get CFC estimates at current prices, gross capital stocks are revaluated into replacement prices by using the changes in relevant price indexes. The same indexes are used to get CFC estimates at current prices, since quarterly estimation is based on gross capital stocks at previous year prices. The linear depreciation method is used.

Other taxes on production payable by the general government sector include: taxes on land, pollution resulting from production activities, specific exploitation of water resources, business and professional licenses.

Output of the general government sector at current prices is estimated as the sum of value added and intermediate consumption.

**Table 4 Coefficients of mortality and depreciation by type of asset in the general government sector**

	Discard rate	Depreciation rate
Buildings and structures	2–8.4%	1.5–2.9%
Transport equipment	5%	12,5%
Computer hardware	7,5%	20%
Other machinery	8.2%	10%
Intangible assets	6.5%	20%

Intermediate consumption includes administration expenses and other operating cost, excluding the accounting items treated as:

- gross fixed capital formation (hardware and software acquisition);
- wages and salaries in kind (daily allowances);
- social transfers in kind.

According to the ESA95 rules, all expenditure on military equipment and materials are included in intermediate consumption. Military constructions and equipment, which could be used for civil purposes are classified as gross fixed capital formation. Additionally, intermediate consumption of dwelling services is added to the estimation.

The general government output is broken down by the 12 NACE industries:

A.01	Agriculture
A.02	Forestry
K.70	Real estate activities
K.702011	Letting of own residential buildings (actual rent)
K.72	Computer and related activities
K.73	Research and development services
K.74	Other business activities
L.75	Public administration and defence services; compulsory social security services
M.80	Education services
N.85	Health and social work services
O.90	Sewage and refuse disposal, sanitation and similar activities
O.92	Recreational, cultural and sporting activities

#### 4.3.3. Calculations at previous year prices

For previous year price estimations, a direct volume measurement in aggregate is used and the components of value added (excluding consumption of fixed capital) are not estimated separately. The total value added at previous year prices is estimated for each of the 12 NACE groups mentioned above by using volume indices of changes in the number of full-time employees. Data concerning changes in the number of employees are available from the labour force as well as wages and salaries statistics.

### 4.4. Households sector (S.14)

#### 4.4.1. Data sources

Data for the quarterly households sector calculations come mainly from Statistics Estonia:

- Calculation of the output, intermediate consumption and value added (both at current and previous year prices) of agriculture, forestry and fishing is based on the quarterly survey of agriculture, hunting, forestry and fishery;
- Construction calculations are based on the data from the quarterly survey of the economic activity of construction (production in small enterprises (with 1–9 employees));
- Consumer, producer and construction price indexes come from the respective monthly surveys;
- Data on the consumption of fixed capital, construction for own use, taxes on production and subsidies for agriculture, hunting and related service activities and FISIM are calculated in Statistics Estonia;
- Calculations of dwelling and non-residential completions are made based on the data from the register of construction works (orders for new dwellings).

#### 4.4.2. Calculation of the value added of households sector

Quarterly calculations of households sector can broadly be divided into the following groups:

- Observed economy
  - Calculation of agricultural, hunting and related services activities (ca 6.5% of the value added of observed economy of S.14)
  - Calculation of dwelling services (ca 75% of the value added of observed economy of S.14)
  - Calculation of the households sector specific activities.
- Non-observed economy (ca 10–11% of the value added of S.14 sector).

The observed part of households sector is calculated by the following activities:

- Agriculture, hunting and related service activities

Agricultural Statistics Department of Statistics Estonia calculates output, intermediate consumption and value added at current prices and at previous year prices. FISIM (financial intermediate services indirectly measured) is added to intermediate consumption.

- Forestry, logging and related service activities

Output at current prices is the sum of forestry for own final use, which is by assumption on the same level as in the same period of the previous year, and market production of forestry.

Intermediate consumption of market and non-market production is calculated based on their share in output in the previous period. Value added is residual. FISIM is added to intermediate consumption.

For the calculations at previous year prices, a corresponding consumer price index (CPI) is applied.

- Fishing, fish farming and related service activities

Output at current prices is the sum of fishing for own final use and market production of fishing. Data for own final use are received from the Household Budget Surveys (HBS) or from the respective models. Market production is extrapolated based on its share in the previous period. Intermediate consumption of market and non-market production is calculated based on their share in output in the previous period. Value added is residual.

For the calculations at previous year prices, the corresponding consumer price index (CPI) is applied.

- Construction

Output at current prices is the sum of construction for own final use and market construction production. Market production is extrapolated based on its share in the previous period. In addition, data of production in small enterprises (with 1–9 employees) are used as well.

Intermediate consumption of market and non-market production is calculated based on their share in output in the previous period. FISIM is added to intermediate consumption. Value added is residual.

For the calculations at previous year prices, the construction price index is applied.

- Real estate, renting and business activities

Output at current prices is the sum of dwelling services and other real estate, renting and business activities. Output of other activities of real estate, renting and business activities is based on the share in households sector of the previous period. Intermediate consumption is calculated by its share in output in the previous period. FISIM is added to intermediate consumption.

Actual rent (output) of dwelling services at previous year prices is received by the volume index of dwelling stock. Output at current prices is calculated by deflation with consumer price indexes. Intermediate consumption is deflated as well, whereas value added at current prices is the residual. Value added of imputed rents at previous year prices is received by the volume index of dwelling stock and then intermediate consumption at previous year prices is calculated on the basis of the share in previous year. Output is the sum of value added and intermediate consumption. Value added and intermediate consumption at current prices are calculated by deflation with the construction (maintenance) and corresponding consumer price indexes, output is the sum of value added and intermediate consumption. FISIM is added to intermediate consumption and to output.

Consumption of fixed capital is calculated in value added of dwelling services. The main data sources for estimating the consumption of fixed capital and net stock of dwellings are the Population and Housing Census 2000, current housing statistics and price statistics data. Katz's method C is used for the estimates of net stock and consumption of fixed capital, this requires unit data from a single census. Estimations are made by ownership and type of dwelling.

Output of mining and quarrying (NACE C), manufacturing (D), electricity (E), wholesale and retail trade (G), hotels and restaurants (H), transport (I), financial intermediation (J), education (80), health and social work (85), other services (O, P) at current prices are extrapolated based on their share in the previous period.

Intermediate consumption is calculated based on their share in output in the previous period. The value FISIM is added to intermediate consumption. Value added is residual.

For the calculations at previous year prices, the corresponding consumer and producer price indexes are applied.

In general, the previous year structure of value added by its components is used within disaggregation of the value added regarding the economic activities of households sector. Consumption of fixed capital is calculated separately. Mixed income and operating surplus are residual.

## **4.5. Non-profit institutions serving households (NPISH) (S.15)**

### **4.5.1. Data sources**

According to the statistical profile database which serves as the frame for statistical surveys, there were 25,600 non-profit institutions as at 1st November 2008.

The main data sources used for quarterly estimations are: the Tax and Customs Board data on social tax, and the data on payments subject to social tax of non-profit organizations, and the latest available annual survey of non-profit organizations.

Data on economic expenditures, compensation of employees and taxes on production come from the survey of non-profit institutions. Annual survey of non-profit institutions is a special statistical sample survey for national accounts purposes. For 2007, the sample size consisted of 1,715 units, divided into 19 strata. Although the survey of non-profit organizations is a sample survey, political parties are entirely covered. Organizations with 20 and more employees are entirely covered, rest of the organizations are sampled. Data received by survey forms are grossed up by using administrative data. For that purpose, the Tax and Customs Board data on payments subject to social tax are used. The Tax and Customs Board data are grouped in accordance with the strata in sample and the multipliers for every stratum are calculated.

Income in kind is calculated on the basis of Household Budget Survey (HBS) and Tax and Customs Board data received from National Accounts Service.

Consumption of fixed capital is calculated by National Accounts Service.

Humanitarian aid in goods is calculated on the basis of data on exports-imports transactions without monetary compensation received from National Accounts Service.

### **4.5.2. Methods of calculation**

As NPISH units are non-market producers, the output is calculated on the basis of costs.

Value added is the sum of costs for wages and salaries, social contribution paid by employees, unemployment insurance premium, taxes on production and consumption of fixed capital.

Compensation of employees is calculated mainly on the basis of Tax and Customs Board data on payments subject to social tax. In addition, a certain share of payments for business trips is treated as compensation of employees. This part of payments for business trips is added on the basis of the last annual survey data corrected by development trend. Based on the Household Budget Survey and Tax and Customs Board data, wages and salaries in kind are added to compensation of employees.

The data on payments subject to social tax are received from the Tax and Customs Board.

As sample of the survey of non-profit organizations consists of 19 strata, data received from the Tax and Customs Board are divided by the same strata by NACE activities. The statistical survey of non-profit institutions covers not only non-profit institutions serving households. Agricultural associations included in the survey are added to the households sector (S.14), while employers' organizations and educational organizations are market producers of the non-financial corporations sector (S.11).

Data on the non-profit institutions of financial intermediation activity are not taken into account, because these organizations belong to the financial corporations sector (S.12). Data of health care institutions are not taken into account, because they belong either to the general government (S.13) or non-financial corporations (S.11) sectors.

The non-profit organizations founded by central or local governments mostly belong either to the government sector (S.13), or in case they are market producers — to the corporations sector (S.11). Their data are not taken in account for calculating the indicators of the NPISH sector.

Taxes on production are derived on the basis of data originating from the last available survey of non-profit organizations and the latest available data of land tax at the Tax and Customs Board.

Consumption of fixed capital is calculated on the basis of data originating from the last available survey of non-profit organizations following the GDP development trends and export and import price indices.

Principles for estimating the consumption of fixed capital for non-profit institutions serving households are the same as for the general government. Starting year for gross capital stock is set at 2000. There exist no earlier data about the capital stock of NPISH. Coefficients of mortality and depreciation are calculated for each type of asset and can be seen in Table 7.

**Table 5 Coefficients of mortality and depreciation by type of asset in the NPISH sector**

	Discard rate	Depreciation rate
Buildings and structures	4.3%	2.0%
Transport equipment	2.3%	13.0%
Computer hardware	10.6%	20.0%
Other machinery	7.7%	10.0%

For intermediate consumption calculations, the last available survey data are used.

Intermediate consumption consists of economic expenditures, humanitarian aid in goods and FISIM, which is added later. Intermediate consumption for quarterly estimations is calculated by strata on the basis of the last available survey data. The weight of value added, weight of output of the corresponding quarter of the year and extrapolation of components of the value added on the basis of the same quarter of the previous year are used for estimating quarterly intermediate consumption. First, quarterly value added is derived, after that — output, intermediate consumption is calculated as the difference between output and value added. A certain share of payments for business trips is treated as compensation of employees and subtracted from economic expenditures. Humanitarian aid in goods is calculated quarterly on the basis of exports-imports data and added to intermediate consumption.

FISIM is added to intermediate consumption.

After the calculations are ready by strata, the data are grouped by four main activities (real estate, education, social care and other organizations).

At the same time, the calculations of non-profit institutions as market producers are made and thereafter delivered for the compilation of non-financial corporations (S.11).

Calculation of value added at previous year prices: after calculations are done at current prices, the results are deflated. For the components of value added, except consumption of fixed capital, and for intermediate consumption, except FISIM, the CPI is used.

## **4.6. Financial intermediation services indirectly measured (FISIM)**

### **4.6.1. Data sources**

The majority of data for FISIM calculations come from the Bank of Estonia:

- Data for commercial banks' assets (loans) and liabilities (deposits, loans); includes stocks and weighted average interest rates.
- Data for commercial banks' long-term loans vis-à-vis households divided by purpose of loans; includes stocks and weighted average interest rates.
- Consolidated profit/loss account of commercial banks.
- Balance sheets and profit/loss accounts of savings and loan associations.
- Assets and liabilities data for leasing companies that have joined the Estonian Leasing Association.
- Leasing portfolio of big leasing companies with the breakdown by leasing objects and by type of leasing.
- Consolidated balance sheet and profit/loss account of big leasing companies.
- Data for mutual funds' deposits.
- International Investment Position.

In addition, balance sheets and profit/loss accounts of other financial intermediaries, except insurance corporations and pension funds (S.123), and of financial auxiliaries (S.124) come from the corresponding survey of Statistics Estonia.

### **4.6.2. Calculation and allocation of FISIM**

FISIM is allocated to user sectors. FISIM calculations are made in two sub-sectors: commercial banks (S.122) and leasing companies (S.123). Sub-sector S.122 consists of commercial banks, savings and loan associations. Commercial banks give more than 99% of all loans and deposits of S.122 and the most detailed data are available for them. Big leasing companies that have joined the Estonian Leasing Association dominate in S.123. Big leasing companies give about 80–90% of loans granted to resident non-financial intermediaries in S.123. The other part of S.123 includes corporations dealing with financial leasing, companies managing pawnshops and institutions granting loans outside the banking system.

As there are no interest data with the necessary breakdown, interest flows are estimated by using weighted average interest rates. Interest rates used for both S.122 and S.123 are the commercial banks' weighted average interest rates (representing existing business). Firstly, stocks and interest rates are allocated according to the necessary breakdown. Secondly, interest flows are estimated. Thirdly, the estimated interest flows are adjusted to the real data received from profit and loss accounts. Internal and external reference rates used in the FISIM calculation are calculated as stipulated in the Commission Regulation (EC) No 1889/2002.

On the loans side, FISIM calculated by institutional sector is allocated among industries recorded as the NACE Rev.1.1 60 activities (A60) proportionally to the stocks of loans for each industry if relevant. Allocation of FISIM among industries at the NACE 60 division level is based on the output for each industry. On the deposits side, FISIM is allocated among industries proportionally to the output for each industry. FISIM on loans and deposits of households as consumers is allocated to household final consumption expenditure. FISIM on loans of households as owners of unincorporated enterprises is allocated to intermediate consumption. FISIM on dwelling loans is allocated to intermediate consumption.

Imported FISIM on loans and deposits is allocated to non-financial corporations (S.11), commercial banks (S.122), leasing companies (S.123), financial auxiliaries (S.124), insurance corporations and pension funds (S.125) and general government (S.13).

#### 4.7. Estimation of exhaustiveness

QNA includes estimations of exhaustiveness. Adjustments for exhaustiveness are made for transactions that are not directly observed by regular statistical surveys or administrative sources.

Estimates of exhaustiveness for QNA are made in four institutional sectors: non-financial corporations sector (S.11), financial corporations sector S.12, households sector (S.14) and NPISH sector (S.15). Overall adjustment of exhaustiveness encompasses adjustments for:

- non-registered underground economy (N1)
- illegal activities (N2)
- misreporting of economic indicators (N6)
- other GDP under-coverage (N7)

For deflation, consumer price indexes (CPI) and producer price indexes (PPI) are applied respectively to legal economy; only items in the exhaustiveness type N2 are exceptional. Illegal figures are deflated by using own-account price indexes.

- Adjustments for non-registered underground economy (N1)

The estimation methods for QNA calculations for S.11 are in principle the same as for annual accounts. Thus, the problem lies in the data credibility and availability. The main data sources are business reports and the Estonian Labour Force Survey (ELFS). The discrepancy between employment data on the supply side and the data on the demand side is considered as hidden employment and is used for measuring non-observed production. Additionally, annual information is used to smooth the poor data quality and meet the trend.

As for households, there are no quarterly data available, so the non-registered underground economy for N1 is a derivative that uses all available information from the whole non-observed economy and previous year quarterly distribution of households. The obtained figure is distributed between activities by using legal output of households.

- Adjustments for illegal activities (N2)

Calculations of illegal activities cover prostitution and smuggling of tobacco, alcohol and motor fuel in S.11, and the production and distribution of drugs and smuggling of medicines in S.14. The used data inputs are quite similar to the annual ones. More specifically, they are obtained from the police, Estonian Bureau of Forensic Medicine, Estonian Tax and Customs Board, Foreign Trade Statistics Service of Statistics Estonia, Monthly Bulletin of Statistics Estonia and the media. Annual figures are usually obtained by summing up the corresponding quarterly figures, except the cases where some additional information becomes available after the compilation of quarterly figures has been accomplished.

- Adjustments for misreporting of economic indicators (N6)

Calculation for S.11 is based on the business statistics data where wage fund in every activity is available. The quarterly wage fund in every activity is multiplied by the indices of activity that are derived from the estimation of the base year.

Estimation for households for the type N6 of exhaustiveness is similar to the type N1 described above.

- Adjustments for other GDP under-coverage (N7)

The estimates are made for income in kind in sectors S.11, S.12, S.14 and S.15, and for tips in S.11 and S.14. The estimation is largely extrapolated with quarterly HBS data as a key; usage of HBS data without extrapolation is impossible due to a poor quality of the survey that has very small percentage of respondents.

Tips are estimated for hotels, restaurants and bars (S.11) and for taxi drivers (S.14). Quarterly figures are usually extrapolated by using the annual data of the previous year with legal output structure and overall run of cabdrivers.

## 4.8. Taxes less subsidies on products (D.21-31)

### 4.8.1. Data sources

For the compilation of taxes and subsidies on products, the main data sources are based on the monthly reports on the execution of state and local governments' budgets provided by the Ministry of Finance. There are also special reports from the Tax and Customs Board comprising detailed information concerning the goods subject to customs duties or the local package of excises duties and some statistics produced by the other services within Statistics Estonia used for volume indices calculations. Data for the subsidies on agricultural products are obtained from the reports on executed national aid schemes from the Estonian Agricultural Registers and Information Board which is a government institution subordinated to the Ministry of Agriculture. For the subsidies on transportation and postal services, data from the Ministry of Finance are used.

### 4.8.2. Calculation of taxes less subsidies on products at current prices

Taxes and subsidies on products are defined in line with the ESA95 classification. All the data on taxes and subsidies at current prices are obtained directly from a certain source: monthly reports on the execution of the state and local governments' budgets.

**Table 6 Detailed overview of the classification of taxes on products**

D21	Taxes on products	
D211A	Value added tax	In the central government bookkeeping, VAT to the EU is also included under the VAT heading.
D2121A	Customs duties	Customs duties relate to the value of imported goods released for free circulation. The value of customs duty is calculated by applying the duty rate (a certain percentage) to the value of imported goods.
D2122C	Excise duties	Data are based on information from the customs declarations of the Tax and Customs Board.
D2122CA	Alcohol excise	
D2122CB	Tobacco excise	
D2122CC	Fuel excise	
D2122CE	Package excise	
D2122CG	Energy excise	
D214AA	Package excise	Excise tax by domestic producers.
D214DA	Car registration fee	Part of the state duty accrued to the state budget.
D214FA	Gambling tax	It is charged on gambling tables and machines used for games of chance located on licensed premises.
D214IA	Local sales tax	Relates to goods and services sold to final consumers.

Taxes and subsidies on products are time-adjusted according to Regulation (EC) No 2516/2000<sup>1</sup>, pursuant to which cash receipts are time-adjusted so that the cash is attributed when the activity took place to generate

<sup>1</sup> Regulation (EC) No 2516/2000 of the European Parliament and of the Council of 7 November 2000 modifying the common principles of the European system of national and regional accounts in the Community (ESA) 95 as concerns taxes and social contributions and amending Council Regulation (EC) No 2223/96.

tax liability (or when the amount of tax was determined, in case of some income taxes). Simple time adjustment of one month is used for VAT and for taxes on imports.

Subsidies on products are subsidies payable per unit of goods or service produced or imported and they are divided into import subsidies (D.311) and other subsidies on products (D.319). In Estonia no import subsidies are paid to enterprises. Other subsidies on products are divided into three groups — agricultural subsidies, subsidies on transport and on postal service.

Agricultural subsidies classified as subsidies on products are paid for crop (specified in EU legislation), for maintaining suckler cows and for raising ewes. Preliminary quarterly expenditures of agricultural subsidies are based on the estimation of annual amount of subsidy, which is divided equally between quarters. In the first revision of annual figures, data of actual accrual expenditures are used and division into quarters is found out based on quarterly output.

Subsidies on transport are divided into four subcategories — road, rail, air and water transportation. Amounts of subsidies are based on the cash data while compiling preliminary quarterly accounts and checked against accrual data later during the revisions. There are no large differences between the cash and accrual data.

Subsidy on postal services is paid to support the delivery of periodical publications in rural areas. Amounts of subsidies are based on the cash data while compiling preliminary quarterly accounts and checked against accrual data later during the revisions. The cash and accrual data are found to be perfectly aligned.

#### **4.8.3. Calculation of taxes less subsidies on products at previous year prices**

Taxes less subsidies on products at previous year prices are estimated by using respective price and volume indexes. Estimates at previous year prices for each tax and subsidy are calculated separately. For taxes based on the quantity of products, the previous year price is diverged by the volume projection for each individual tax, especially excises which subgroups are taxed by different taxation prices.

Due to the lack of sufficient information, value added tax (VAT) at previous year prices is estimated indirectly. Currently, estimates at previous year prices for the turnover tax are made as follows:

1. The first step is to calculate the tax ratio of previous year gross value added (GVA) at current prices to previous year VAT at current prices.
2. The next step is to calculate the current year VAT at previous year prices by dividing the current period GVA at previous year prices by previous year tax ratio.

The taxes on sales and on gambling, betting and lotteries at previous year prices are estimated by using the deflation approach (CPI aggregate).

Subsidies like passenger transport and certain postal services are diverged at previous year prices by using the corresponding CPI component. Detailed data on government payments to producers in agriculture become available only after the end of the financial year when the accounts for agriculture are compiled (EAA); therefore, the estimates at previous year prices are based on the data of previous periods.



## 5. GDP COMPONENTS: THE EXPENDITURE APPROACH

### 5.1. Household final consumption expenditure

Systematic tabular approach is used for compiling the household final consumption expenditure (HFCE) of Estonia. The same set of analytical tables is used for annual and for quarterly estimates.

It gives a possibility to use the same framework for all HFCE estimates and ensures better comparability between data. HFCE estimates are broken down by 110 commodity groups (by a 4-digit level of COICOP).

#### 5.1.1. Data sources and calculation methods

The main data sources for quarterly HFCE estimates are:

- Household Budget Survey (HBS) (sample survey, one of the main data sources, which provides detailed information about purchases of goods and services per person. Conducted until 2008 regularly, starting from 2008 the survey is carried out at two-year intervals). There is a general tendency that HBS underestimates expenditures of wealthier households. Therefore, additional weights based on the Tax and Customs Board data are used. For quarterly estimates, when HBS is not conducted, a HBS-based regression model is used instead;
- Sales of goods and services (survey carried out by Statistics Estonia), which is another important data source received from statistical reports. The commodity breakdown derived from the retail trade (RT) survey distinguishes between: foodstuffs; alcoholic beverages and tobacco products; clothing, footwear, woven materials; motor vehicles, spare parts and fuels; other goods. The raw data of HBS are used to allocate these six commodities (NACE 50, 51 and 52) for services to COICOP groups;
- Balance of Payments (the data about the expenditure of non-residents in Estonia and residents abroad are obtained from the Balance of Payments, which uses the results from the foreign visitors survey for non-residents and the tourism survey for residents carried out by Statistics Estonia);
- Administrative sources and information from big suppliers, other sources (statistical survey of insurance corporations, the Estonian Motor Vehicle Registration Centre, transport statistics, tourism and population statistics, government accounts database, consumer and producer price indices);
- Data from the production approach (actual and imputed rentals, adjustments for consumption of households' own production (fishing and forestry), output of restaurants and hotels, tips for restaurants and hotels, illegally produced/imported goods and services (narcotics, prostitution and smuggling of medicines, alcohol, tobacco and motor fuel), adjustments for enterprises that are not covered with the statistical profile used for the survey, income in kind).

Due to insufficient information there are some special estimations for the quarterly calculations (i.e. water supply, refuse and sewerage collection, electricity, gas, liquid fuels, heat energy, motor cars, motor cycles, games of chance, other financial services). The benchmark estimate for services is the same quarter of the last specified year, the changes in the services of enterprises survey and the change of CPIs.

HFCE includes purchased goods and services for own consumption (agriculture, fishing, forestry). Additionally, adjustments are made to the following components:

- wages and salaries in kind (information is primarily from HBS),
- non-observed retail sales, for underestimated purchases,
- consumption of occasional and temporary activities,
- purchases outside the retail trade,
- sales from intentionally non-registered units,
- illegally produced/imported goods and services (narcotics, prostitution, smuggling alcohol, tobacco, and fuels),
- resident households' expenditure in the rest of the world and non-residents' expenditures on the economic territory.

Adjustments are also made to take into account consumption of people living in institutions and tips. All HFCE adjustments and estimates are in line with ESA95.

In most cases at least two independent estimates are obtained for each COICOP group; in some cases there are three estimates from among which the best estimate is chosen: from retail trade statistics, the HBS-based model estimation and estimation from other sources. Commodity flow method is not used in Estonia for quarterly HFCE estimates.

### 5.1.2. Calculations at previous year prices

For QNA, exactly the same deflation method is used as for annual national accounts. HFCE is calculated at 4th level of COICOP groups and the same commodity detail is used for deflation. Prices are the purchasers' prices, including VAT. The consumption of households' own production is valued at producers' prices. For deflation, the CPI and producer price indexes (PPI) (the latter is used for deflation of consumption of households' own production) are used. For illegally produced goods and services, own-account index calculated by National Accounts Service is used. For the expenditures of resident households in the rest of the world, the weighted CPI for the main target tourist countries is used. For non-residents' expenditures on the economic territory, the same CPIs are used as for the expenditures of households living in Estonia.

## 5.2. Government final consumption

Government final consumption expenditure at current prices is estimated on the basis of total output value, from which market output for own final use is excluded and social transfers in kind related to expenditure on products supplied to households via market producers are added.

*Market output* includes government income from sales of goods and services. Classification of the revenue is provided by the government accounting classification. The main categories of sales are: state fees, rental income, education and health services.

*Output for own final use* covers own-account produced software included in the gross fixed capital formation (GFCF) estimates. Value of own-account produced software is estimated using the number of employees, the wages connected with this production.

*Social transfers in kind* of market goods and services cover general government expenditure on products supplied to households via market producers. The main categories include general government expenditure on appliances for disabled people, steam and hot water services, education services, school milk, health services and medicines.

For estimation of the final consumption expenditure (excluding FISIM and social transfers in kind) of general government at previous year prices, the same deflator is applied as for the government sector production. Social transfers in kind are deflated by using the consumer price index. FISIM is deflated separately and then added to the estimation.

The borderline between *individual* and *collective* goods and services is drawn on the basis of COFOG. The classification of the functions of the government used for dividing government output and government final consumption expenditure is based on the COFOG 1999 version. The government functions are split into 69 different functional groups (COFOG level II). The individual consumption expenditure is allocated to divisions 07 Health, 08 Recreation and Culture, 09 Education, 10 Social Protection (excluding expenditure on R&D with non-specified categories under each division and groups 08.3 broadcasting and publishing services, 08.4 religious and other community services).

## 5.3. Final consumption expenditure of NPISH

Final consumption expenditure of the NPISH sector is derived as the difference between its output (the sum of intermediate consumption, compensation of employees, consumption of fixed capital and other taxes on production) and its market sales. The sources for final consumption estimations of NPISH are the same as for the production approach.

After output is calculated according to the production method, sales of goods and services are subtracted and final consumption expenditure is received. In case of NPISH, the main part of sales of services consists of sporting services, adult education services and renting. Figures of sales of goods and services are derived on the basis of the data from the latest available survey of non-profit organizations.

Output is deflated by components, sales of goods and services are deflated by CPI.

## 5.4. Gross fixed capital formation and acquisitions less disposals of valuables (P.51+P.53)

Quarterly estimates of gross fixed capital formation (GFCF) at both current and previous year prices are estimated by five institutional sectors, activity level A60, by type of fixed assets (breakdown into 6 types of fixed assets (AN\_F6): dwellings, other buildings and structures, transport equipment, other machinery and equipment, cultivated assets and intangible fixed assets).

GFCF includes acquisitions of new and existing tangible assets during the accounting period, including major repair and land improvement, less disposals of tangible assets. Fixed assets acquired under financial leasing contracts (in the total value of capital goods) as well as own-account construction and major repair are included in GFCF. Acquisitions less disposals of intangible assets, including own-account produced software, are also taken into account. The quarterly structure of GFCF of short term statistics are later on used to divide annual data into quarters in case of S11, S12, S14 and S15. Quarterly data on valuables are only available in the general government sector.

- GFCF of the non-financial corporations sector (S.11)

Data on GFCF in non-financial corporations sector are collected with quarterly surveys “Economic indicators” and “Economic indicators of agriculture, hunting, forestry and fishery”. GFCF is estimated by type of fixed assets (six types) and by activity A60. Different transactions with fixed assets, distinguished in the source data, can be seen in Table 9. Disposals are distributed by assets by using the sales structure of the latest SBS data.

**Table 7 Transactions with fixed assets**

Transaction	Assets
Investments	Buildings and structures
	Construction and major repair
	Transport equipment
	Computer hardware
	Other machinery and equipment
	Plantations
Capital lease	Livestock
	Total
	Transport equipment
	Computer hardware
Sales	Total

Experience shows that quarterly sources underestimate the GFCF of non-financial corporations. Therefore, in order to obtain the final estimate, this discrepancy is taken into account and the initial estimate is corrected by using the annual data of previous period.

Own-account software is extrapolated from annual estimates by using the growth of output in computer services as an indicator.

- GFCF of financial corporations sector (S.12)

Many different data sources are combined in the estimation of quarterly GFCF of financial corporations. Data on financial intermediation companies (NACE Rev 1.1: 65) other than central bank, commercial banks and leasing companies; and also on activities auxiliary to financial intermediation (NACE Rev 1.1: 67) are collected with survey “Financial intermediation and auxiliary services”. The survey provides data by assets on both investments and sales.

Quarterly data on fixed assets of commercial banks are collected and provided by the central bank. Data are also available by investment product. The central bank also provides aggregate data about acquisitions and disposals of fixed assets of the central bank itself and large leasing companies, which can be found on its website. GFCF is allocated by types of fixed assets by using the structures of annual data of previous periods.

Own-account software is extrapolated from annual estimates by using the growth of output in computer services in S.11 as an indicator.

- GFCF of general government sector (S.13)

Quarterly GFCF of General Government is estimated by using the General Government Accounts data, which are compiled by the Ministry of Finance. All government units are obliged to report their quarterly balances, expenditures and revenues on accrual basis. Information on fixed assets is available by single unit and by type of fixed assets. Different transactions with fixed assets are distinguished, including non-monetary transactions, which are also taken into account in the GFCF estimates. Quarterly GFCF of the general government is calculated by activity A60 and by fixed assets on an accrual basis.

Own-account software is extrapolated from annual estimates using the growth of output in computer services in S.11 as an indicator.

Quarterly estimates of valuables are also based on the General Government Accounts data. Specific account is designated for showing transactions with non-amortizing assets.

- GFCF of households sector (S.14)

GFCF of households sector covers investments made by sole proprietors and investments in dwellings.

GFCF of sole proprietors covers the purchases and leasing contracts of fixed assets by households. Calculations are made by activity A60 and by the asset breakdown (six types) classification. Most recent annual data are used as the base in calculations. Assumption is made that GFCF of sole proprietors has the same growth rate as that of enterprises.

GFCF of dwellings includes investments in new dwellings, maintenance and repair of existing dwellings, brokerage and notary commissions and state tax. Information about new dwellings comes from real estate statistics. In case of brokerage and notary commissions, data about approved purchase-sale contracts of real estate are used. State tax is available from the General Government Accounts data. Expenses on maintenance and repair are obtained by using the growth rate in building material retail sales as an indicator.

- GFCF of NPISH sector (S.15)

For the NPISH sector, no quarterly data on fixed assets are collected. Estimates on quarterly GFCF are based on the data of the same period of the previous year; growth in salaries by activity is used as an indicator to estimate the growth of GFCF. GFCF in the NPISH sector is calculated by activity and by assets. The same indicator is used for all assets.

#### 5.4.1. GFCF calculations at previous year prices

GFCF price indexes do not differ neither by institutional sector nor by economic activity. There is a description of all indexes in Table 10.

In case of dwellings, the GFCF data are more detailed, which allows for more specific deflation. In addition to new dwellings, which are deflated with construction price index, the corresponding index is used for major repairs and notary commissions, and the volume index for brokerage commissions.

**Table 8 Indexes applied to the deflation of fixed assets**

Fixed assets	Indexes
Buildings and construction	Construction price index
Transport equipment	Weighted average of producer price index and import price index of motor vehicles and trailers (NACE: 34)
Machinery and equipment	Weighted average of producer price index and import price index of machinery and equipment (NACE: 29), other electrical machinery (NACE: 31), communication equipment (NACE: 32) and medical/optical instruments (NACE: 33).
Computer hardware	Producer price index of computers and computer equipment in the USA, corrected with exchange rate.
Intangible assets	Weighted average of producer price index of prepackaged software and applications software in the USA, corrected with exchange rate.
Plantations	Producer price index.
Livestock	Consumer price index of meat.

## 5.5. Changes in inventories (P.52)

### 5.5.1. Data sources and coverage

Changes in inventories are estimated by institutional sectors and by type of inventories.

- Changes in inventories in non-financial corporations sector (S.11).

Quarterly data on inventories are collected through Agricultural Statistics Department's survey "Economic indicators of agriculture, hunting, forestry and fishery" for agriculture, hunting and forestry and fishing, Business Statistics Department's surveys "Manufacturing, energy and water supply economic activity" for manufacturing and electricity, gas and water supply, "Construction economic activity" for construction, "Trade economic activity" for retail and wholesale trade activities, "Hotels and restaurants economic activity" for hotels and restaurants, "Transport economic activity" for transport, storage and communication activity,

“Service economic activity” for real estate, education and other activities. The surveys are based on sample survey. The data collected by the sample survey are expanded to the whole number of enterprises.

- Changes in inventories in financial corporations sector (S.12).

Quarterly data on inventories are collected through General Government and Financial Sector Statistics Department’s survey “Financial intermediation and financial auxiliaries” for financial intermediation. The information is collected from all enterprises.

- Changes in inventories in general government sector (S.13).

Quarterly administrative data on the stock of inventories are held by the government accounting bookkeeping system for public administration and defence; compulsory social security. All enterprises are covered.

There is no quarterly information available on inventories for households (S.14) and for NPISH (S.15).

Surveys provide information on book value of inventory at the beginning and at the end of accounting period by four types of inventories: materials and supplies (P.521), work-in-progress (P.522), finished goods (P.523) and goods for resale (P.524).

Enterprises use the historical cost method for accounting inventories: record entries of inventories at current prices at the time of transactions and withdrawals of inventories at the prices at the time of acquisition, but not at prices at the time of withdrawal. The prices, at which the stocks of inventories in the enterprises’ balance sheets and the inventory withdrawals are valued, depend on the inventory valuation method used by enterprises.

The Estonian accounting regulations allow the use of three types of historical cost methods: specific identification method, first-in-first-out (FIFO) method, weighted average cost method.

Data on historical cost methods applied by enterprises are collected since 2003 by the benchmarking survey.

Enterprises value inventories of finished goods (P.523) and inventories of work-in-progress (P.522) at production costs. Inventories of material and supplies (P.521) and goods for resale (P.524) are valued at purchasers’ costs.

There is no direct information available on inventories by products and commodity composition of stock for quarterly calculations. Structure of inventories by products is assumed to be equivalent to the annual (two years before the current year) output, cost and turnover.

### **5.5.2. Technique for measuring change in inventories and holding gains**

According to ESA95, inventories of materials and supplies (P.521) and goods for resale (P.524) should be valued at purchasers’ prices, inventories of finished goods (P.523) and work-in-progress (P.522) — at basic prices.

Thus, adjustment needs to be made for enterprises’ data on inventories of finished goods (P.523) and work-in-progress (P.522) through making up the production costs by operating surplus. Operating surplus is calculated by using ratios of production costs to sales of previous year by activities.

According to ESA95, entries and withdrawals of inventory are valued at the time the entries and withdrawals are made. Holding gains arise from changes in prices during the period they are held in inventory, therefore lag between the times they are produced/acquired and disposed/used must be excluded. For the transition from business accounting and administrative concepts to ESA95 concepts, the following steps are involved:

The book values of inventories at the opening and closing of the period are converted to constant prices of base year. For this purpose, appropriate deflators need to be calculated.

Difference between the constant price values of stock of inventories at the beginning and end of the period provides an estimate of volume changes in stock of inventories at base period prices. In principle, this notion is equivalent to the change in quantities of inventories between the beginning and end of an accounting period.

The volume change in the stock of inventories at base period prices is multiplied by an average price index for the current accounting period. The changes in inventories at average current prices of accounting period are converted to previous year prices.

Holding gains are estimated as the difference between changes in inventories at the historical cost method prices and estimated changes in inventories at average current prices of a period. Holding gains of inventories of finished goods (P.523), work-in-progress (P.522) and goods for resale (P.524) are removed from the estimates of output. Holding gains of materials and supplies inventories (P.521) are added to

intermediate consumption. The main issue in the application of the above technique relates to the calculations of deflators for the opening and closing book values of inventories.

### 5.5.3. Derivation of deflators for book values

Deriving of deflators for book values of opening and closing inventories implies taking into account the age structure of inventories. Usually no data are available for the weights of various age groups in the opening and closing stock in the business inventory accounting.

However, an approximation is made by using the data on stock holding period, calculated independently for opening and closing stocks. Stock holding periods are estimated in months by activities for work-in-progress (P.522), finished goods (P.523), goods for resale (P.524) and inventories of materials and supplies (P.521) according to the following formula:

Level of inventories by the end of a period / Sales of a period (for P.521, P.522, P.523, P.524) or Materials expenses of a period (for P.525) \* Number of months in a period = Inventory turnover period (stock holding period) in months

As the age structure of inventories is different under the FIFO and weighted-average cost methods, a different procedure is used for deriving the deflators under each business inventory accounting method.

The FIFO valuation of inventories implies that prices used for the valuation of inventories at any given point of time are prices of the latest acquisitions. Deflators are derived according to IMF recommendations on the age structure of inventories for various stock turnover periods.

The weighted-average cost method implies that prices used for the valuation of inventories at any point of time are the average of price of the last acquisition and the average prices of stock prior to the last acquisition. Deflators are derived according to Eurostat recommendations.

Price indices used to construct the deflators for book value inventories are producer price indices for revaluations of stock of work-in-progress (P.522), finished goods (P.523) and materials and supplies (P.521), consumer price indices — for revaluations of stock of goods for resale (P.524).

### 5.5.4. Benchmarking technique

Quarterly information on book value of inventory at the beginning and end of accounting period must be seen against the annual information collected through the Structural Business Survey based on the annual sample, which is different from the quarterly one.

In this case the following formulas are applied:

$$A_1 = A_0 * ((A_0/A_4) / (X_1/X_0 * X_2/X_1 * X_3/X_2 * X_4/X_3))$$

$$A_2 = A_1 * ((A_0/A_4) / (X_1/X_0 * X_2/X_1 * X_3/X_2 * X_4/X_3))$$

$$A_3 = A_2 * ((A_0/A_4) / (X_1/X_0 * X_2/X_1 * X_3/X_2 * X_4/X_3))$$

$$A_4 = A_3 * ((A_0/A_4) / (X_1/X_0 * X_2/X_1 * X_3/X_2 * X_4/X_3))$$

where

- A book value of inventory according to the annual survey
- X book value of inventory according to the quarterly survey
- 0 beginning of the year and first quarter
- 1 end of first quarter and beginning of second quarter
- 2 end of second quarter and beginning of third quarter
- 3 end of third quarter and beginning of fourth quarter
- 4 end of fourth quarter and the year.

Provisional quarterly and quarterly with annual benchmarking estimates of changes in inventories and holding gains are calculated by economic activities and type of inventories. Economic activity's digit level depends on the availability of price indices. Estimates are mainly represented at the 2-digit NACE level. For manufacture of food products, energy, transport and trade 3- or 4-digit levels are applied.

Final quarterly estimates of changes in inventories according to the supply and use table benchmarking are calculated by type of inventory only in case of inventories of material and supplies (P.521) and goods for resale (P.524). In case of inventories of finished goods (P.523) and work-in-progress (P.522), annual benchmarking technique is applied and estimates by economic activities and type of inventories are assigned.

## 5.6. Exports and Imports

### 5.6.1. Calculation at current prices

Exports and imports of goods and services at current prices are based on two main data sources — foreign trade statistics and balance of payments (BoP).

Foreign trade statistics are compiled in Statistics Estonia and based on two parallel data collection systems: Intrastat and Extrastat. Intrastat collects data about the exchange of goods with the EU Member States, Extrastat covers the exports and imports of goods with non-Member States of the EU. Extrastat data are fixed in customs declarations, and enterprises in Estonia do not have to refer to Statistics Estonia in case of exchange of goods with non-Member States of the EU.

BoP is compiled by the Bank of Estonia. The methodological base for the compilation of balance of payments is the IMF Balance of Payments Manual. In national accounts, the estimates of exports of goods follow the same concepts as the balance of payments. Exports include normal export of goods produced in Estonia and belonging to Estonian legal persons the sale of which provides receipts to residents, re-export of goods after inward processing, and supplies for foreign vessels and aircrafts stores. Re-export from customs warehouses is excluded.

The estimates of imports of goods follow the same concepts as the balance of payments. Imports include normal imports of goods imported for domestic consumption which are paid by residents, and imports of goods for inward processing with notification of intended return. Goods received through aid programmes are also included.

Exports and imports of goods at current prices in national accounts correspond to the BoP data without FISIM. Exports and imports of goods are subdivided similarly to BoP into five groups (General merchandise, Goods for processing, Repairs on goods, Goods procured in ports by carriers, Non-monetary gold). In addition, 'general merchandise and goods for processing' is distributed into 35 subdivisions by using the 2-digit level CPA (Statistical Classification of Products by Activity in the European Economic Community) codes.

Exports and imports of services are distinguished according to categories of the BoP. Thus, exports and imports of services taken from the BoP and FISIM are added by Statistics Estonia.

Exports of goods are valued at f.o.b. prices that include the value of goods and the cost of insurance and transportation to the border of the exporting country. The f.o.b. value is equivalent to the purchaser's price. In foreign trade statistics, imports of goods are valued at c.i.f. prices which include the value of goods and the transportation and insurance costs up to the importing country. The c.i.f. value corresponds to the basic price as import duties and excise taxes on imports are not included in the value. For the imports of goods, a correction for c.i.f./f.o.b is made whereas Statistics Estonia publishes exports and imports data at f.o.b prices.

### 5.6.2. Calculation at previous year prices

First, exports and imports at current prices are deflated or extrapolated to estimate the previous year prices. FISIM is added to the exports and imports of services at previous year prices. After that the chain-linked volume measures in the reference year are compiled by using the volume indices and chain-linked indices.

Exports and imports of goods are deflated by the groups of BoP, but 'general merchandise and goods for processing' is distributed into 35 subdivisions by using the 2-digit level CPA codes. This results in a more detailed and accurate deflation. For goods, mainly the specific export and import price index is used. If there is no relevant export or import index, the relevant producer price index is used, if appropriate.

For the exports of repairs of goods, the average of the following CPIs is used: maintenance of dwellings, repair of household appliances, maintenance of transport equipment and maintenance of audio-visual, photographic and information processing equipment. For the imports of repairs of goods, the weighted average of CPIs of important trade partners is used.

Exports of services are deflated by the groups of BoP. Exports of services are deflated by using mainly the domestic CPIs. For freight, the transport volume indicator (tonne-kilometres) is used. Other transport services include, for example, maintenance and cleaning of transportation equipment and other supporting services provided by imports, airports and other terminal facilities, therefore the average of CPIs for transport services and other services in respect of personal transport equipment is used for the deflation of that entry. For royalties and fees, the index showing changes in the average wages is used. 'Operational leasing services' is deflated by using the average of CPIs for the manufacture of machinery and equipment, manufacture of electrical and optical equipment and manufacture of motor vehicles, trailers and semi-trailers.

Imports of services are deflated by using the weighted average of CPIs of the most important trade partners and of the most important countries of destinations of Estonian tourists. Weights are obtained from the tourism statistics of Statistics Estonia, which provide information about stay-days in main destinations of Estonian residents; and from foreign trade statistics, which provide data about exports and imports by country.

#### **5.6.3. Geographical split for the EU/euro area**

The estimations of exports and imports data about the EU Member States, institutions of the EU, euro area, members and non-members of the Economic and Monetary Union and third countries are based on the BoP. These estimations also provide information about the subdivision of data by the EU and third countries. The current price data on exports and imports by the EU Member States and third countries are provided for the period 2002–2008.

FISIM is separately calculated by Statistics Estonia and added to the estimates. Since FISIM is not available by countries, the structure of exports and imports of services of the EU/third countries is used to divide it between the sub-sectors of the rest of the world (S.2).

Data by chain-linked method are not compiled for the geographical split.

Foreign trade statistics publish the exports and imports data by country.



## 6. GDP COMPONENTS: THE INCOME APPROACH

The income approach uses to a large extent the same sources as the production approach. This means that the two approaches coincide with respect to use of the surveys and administrative sources involved. The GDP by income approach is not an independent approach as some components like operating surplus and mixed income are derived residually.

The income approach distinguishes between the following components: compensation of employees, other taxes on production and imports, other subsidies on production, operating surplus, mixed income and consumption of fixed capital.

**Compensation of employees** includes wages and salaries (D.11) and employers' social contributions (D.12). Wages and salaries are paid to the employees working with employment contract for a fixed or unfixed period (including contracts of seasonal work), persons with a service contract and employees working under the Public Service Act. Wages and salaries include payments to employees for time actually worked as well as remuneration and payments for days not actually worked, such as vacation pay, compensation and pay for stoppage of work, pay for short-time working, pay for assimilated leave in the event of vocational training and in obtaining formal education and payments in kind. Compensation of employees is estimated by institutional sector and by activity.

**Employers' social contributions** (D.12) consist of actual (D.121) and imputed social contributions (D.122). Employers' actual social contributions (D.121) are statutory social contributions paid by employers to the budget of state health insurance fund and pension insurance fund. Employers pay social tax on payments in cash and in kind made to natural persons. Social tax rate is generally 33 per cent, 13 per cent of the taxable amount is paid to the health insurance budget and 20 percent — to the pension fund.

**Other taxes on production** (D.29) include taxes on land, pollution resulting from production activities, charge for specific exploitation of water resources, fishing-right fees, business and professional licenses, motor vehicle and advertising taxes. Other taxes on production are estimated by institutional sector and by activity.

**Other subsidies on production** (D.39) mainly consist of support payments from national aid schemes for various agricultural activities. Other subsidies on production are valued pursuant to the accrual principle.

**Gross operating surplus** is calculated as a residual item between gross value added from the production approach and the components of value added. **Mixed income** is generated in activities of the households sector, where the distinction between wages and profits of entrepreneur is most difficult to define. Mixed income contains both payments for work and entrepreneurship. Mixed income is derived residually.

**Consumption of fixed capital** (CFC) is estimated in conjunction with estimates of the capital stock. Statistics Estonia uses two different valuations of capital stock:

1. Gross stock is applied to CFC estimates in the general government, NPISH, non-financial and financial corporations sectors;
2. Net stock is in use for households sectors and also for CFC calculations for dwellings.

Gross stock is value of the assets that are under the control of producers and still in use and are valued at "as new" prices, irrespective of their age or actual condition. Gross capital stock comprises the cumulative value of past investments less cumulative retirements. Net capital stock represents the cumulative value of past investments less the cumulated consumption of fixed capital. Estimates of consumption of fixed assets are distributed by institutional sectors. Activity and asset breakdowns are based on the classification of gross fixed capital formation.

## 7. POPULATION AND EMPLOYMENT

### 7.1. Data sources

Primary data sources for compiling population and employment data include the Labour Force Survey (LFS) which is carried out by Statistics Estonia and provides detailed data regarding persons employed, hours worked and jobs inhabited by the NACE A17 breakdown. Further information regarding residents working abroad and non-residents employed in Estonia is acquired from various ministries.

### 7.2. Methodology

Since the 2nd quarter of 2007, data of the Estonian LFS (ELFS) are published 45 days after the reference quarter. As data are final, no preliminary estimates are published. The results are available simultaneously to all consumers at 8.00 CET on the day of release by issuing a news release "Employment and Unemployment". At the same time, the data of ELFS are published in the statistical database on the web site of Statistics Estonia [http://pub.stat.ee/px-web.2001/I\\_Databas/Social\\_life/databasetree.asp](http://pub.stat.ee/px-web.2001/I_Databas/Social_life/databasetree.asp).

Main differences between the labour force definitions of ELFS and ESA95 are the following:

- 1) according to ESA95, conscripts are employees while ELFS defines them as economically inactive population;
- 2) according to ESA95, employment includes also non-residents (foreigners staying less than one year in Estonia) working for resident producer units while ELFS does not include them;
- 3) according to ESA95, employment does not include residents who are working abroad or in the extra-territorial organisations in Estonia while ELFS does;
- 4) according to ESA95, employment includes voluntary employees if their volunteer activities result in goods, e.g. the construction of a dwelling, church or other building, while ELFS does not.

The ELFS data are adjusted as much as possible to the ESA95 definition for using them in national accounts. In order to arrive at the results consistent with the requirements of the national accounts standard established by ESA95, data received by the Labour Force Survey (ELFS) are adjusted by the following data:

- non-resident employees crossing state border regularly,
- persons working at the age older than 75 years,
- soldiers dispatched to foreign missions,
- government institution employees stationed outside the country,
- government institutions stationed outside the country employing local workers,
- persons on maternity leave.

It is assumed that persons included in LFS hold only one job. Persons on maternity leave are accounted for as employees but not taken into account when calculating hours worked, nor are they taken into account when calculating jobs.

For the purpose of providing prudent information regarding employment, the information in table 1200 (employees and employment by industry and region) transmitted to Eurostat is demographically adjusted by weighting counties with the number of employees in that particular county. The same approach is applied when demographically adjusting the data in table 303 (employment).

### 7.3. Data transmission

The data transmission in relation to population and employment is mainly done via quarterly tables 110 (population and employment) and 111 (employment by industry). The aforementioned tables differ in respect to the variables, with table 110 concentrating mainly on population and employment, reflecting data on population and economically active population.

Data for economically active population are not transmitted to Eurostat as is the case with unemployed persons. However, data regarding self-employed employees are transmitted by using the national concept approach.

Table 110 is presented quarterly with the deadline of t+70 days. In contrast to table 110, table 111 concentrates on employment by industry by A6 breakdown, and employees and self-employed persons both also by the A6 breakdown.

Table 111 is also transmitted quarterly with the deadline being t+70 days. In contrast to table 110 in which the data were transmitted by persons, the data in table 111 additionally include figures of hours worked.

Tables 1200 and 303 are more detailed, with table 1200 reflecting data which are demographically adjusted, and 303 having a detailed breakdown of A60.

## 8. FROM GDP TO NET LENDING/BORROWING

Several balancing items are used to execute the compilations from GDP to net lending/borrowing: firstly, gross and net national income (B.5g, B.5n), then net national disposable income (B.6n) and net saving (B.8n). All the mentioned balancing items give important information about the national economy. In addition to balancing items, distributing transactions, transactions in products and other flows are also used.

### 8.1. Data sources

- Balance of Payments (BoP) from the Bank of Estonia
- Data from the General Government Financial Sector Statistics Department of Statistics Estonia
- General Government Accounts
- Pension Centre
- The investment funds survey "Financial intermediation and activities auxiliary to financial intermediation"

### 8.2. Primary income from/to the rest of the world (ROW) (D.1 to D.4), gross national income

Gross national income (B.5g) is calculated by adding primary income receivable from the rest of the world (D.1\_D.4 from RoW) to gross domestic product (B.1g) and subtracting primary income payable to the rest of the world (D.1\_D.4 to RoW).

$$B.5g = B.1g + D.1\_D.4_{fromROW} - D.1\_D.4_{toROW}$$

To compile primary income receivable from the rest of the world (D.1\_D.4 from RoW), compensation of employees (D.1), property income (D.4), FISIM and subsidies received from the institutions of the EU (D.3) are used.

$$D.1\_D.4_{fromROW} = D.1_{fromROW} + D.4_{fromROW} (fisim) + D.3$$

To compile primary income receivable to the rest of the world (D.1\_D.4 to RoW), compensation of employees (D.1), property income (D.4), FISIM and taxes on production and imports paid to the institutions of the EU (D.2) are used.

$$D.1\_D.4_{toROW} = D.1_{toROW} + D.4_{toROW} (fisim) + D.2$$

Compensation of employees contains wages and salaries and employers' social contributions that residents paid to non-resident workers and non-resident enterprises paid to resident workers. Property income, which in accordance with the balance of payments is investment income, reflects in general lines the income receivable from the foreign investment claims (directly, from portfolio and other investments claims) and the income payable on claims (interests, dividends and other proprietary income). Reinvested income reflected in the form of direct investment which constitutes, in accordance with the size of investment, a change in the proportional part of investment undertakings' retained profit, is also considered investment income.

Information on compensation of employees from/to RoW (D.1) is available in the BoP on a quarterly basis and it does not contain taxes. There are no conceptual or methodological differences between national accounts and BoP in the compilation of this aggregate, thus the sum of the BoP quarterly figures matches exactly the annual NA values.

Property income from/to RoW (D.4) is mainly based on the BoP data. Investment income is taken from the BoP, and FISIM is added by Statistics Estonia. FISIM is compiled by the General Government and Financial Sector Statistics Department.

Taxes on production and imports paid to the institutions of the EU (D.2) and subsidies received from the institutions of the EU (D.3) are calculated on the basis of General Government Accounts (accrual data) by the General Government and Financial Sector Statistics Department.

### 8.3. Consumption of fixed capital (K.1), net national income, acquisitions less disposals of non-financial non-produced assets (K.2)

Net national income (B.5n) is calculated by subtracting consumption of fixed capital (K.1) from gross national income (B.5g).

$$B.5n = B.5g - K.1$$

Quarterly consumption of fixed capital (K.1) is calculated for each institutional sector by the economic activity NACE A60. In all sectors the perpetual inventory method (PIM) is used. In case of households sector, K.1 is calculated by using net capital stock. Gross capital stock is used in all other sectors.

Acquisitions less disposals on non-produced non-financial assets consist of transactions with tangible (K.21) and intangible assets (K.22). In case of tangible fixed assets, only land is observed in Estonia. Since the sum of transactions with land always adds up to zero for S.1, there is no need for quarterly calculations of K.21.

Intangible non-financial assets include patents, copyrights, trademarks, franchises and leases or other transferable contracts. Data on international transactions with such assets can be found in the BoP compiled by the Bank of Estonia. BoP offers quarterly data about K.22 in the form applicable to ESA95 regulations.

#### **8.4. Current transfers from/to the rest of the world (ROW) (D.5 to D.7), net national disposable income (B.6n)**

Net national disposable income (B.6n) is calculated by adding current transfers receivable from the rest of the world (D5\_D7 from RoW) to net national income (B.5n) and subtracting current transfers payable to the rest of the world (D5\_D7 to RoW).

$$B.6n = B.5n + D.5 - D.7_{fromROW} - D.5 - D.7_{toROW}$$

Current transfers from/to RoW are based on balance of payments except foreign/external aid. The foreign/external aid data are based on the information about the General Government Accounts (accrual data) received from the General Government and Financial Sector Statistics Department.

#### **8.5. Adjustment for the change in net equity (D.8), net saving (B.8)**

Net saving (B.8n) is calculated by subtracting final consumption (P.3) from net national disposable income (B.6n).

$$B.8n = B.6n - P.3$$

Final consumption consists of the consumption of households, government and non-profit institutions serving households (NIPISH). The final consumption data are based on the National Accounts GDP expenditure approach methodology.

Adjustment for the change in net equity of households in pension funds reserves (D.8) is compiled on the basis of the General Government and Financial Sector Statistics Department data. The D.8 data sources are the Pension Centre (*Pensionikeskus*) and the investment funds survey "Financial intermediation and activities auxiliary to financial intermediation". The Pension Centre provides information about the pension funds' volumes. The investment funds survey "Financial intermediation and activities auxiliary to financial intermediation" collects data about the pension funds' profit statements.

#### **8.6. Capital transfers (D.9), net lending/borrowing (B.9)**

Net lending/borrowing (B.9n) is calculated by adding capital transfers from RoW (D.9 from RoW) to net savings (B.8n) and subtracting the following components in succession: capital transfers to RoW (i.e. D.9 to RoW), net capital formation (P.5n), acquisitions less disposal of non-financial non-produced assets (K.2) and statistical discrepancy (stat.disc.).

$$B.9n = B.8n + D.9_{fromROW} - D.9_{toROW} - P.5n - K.2 - stat.disc.$$

Net capital formation (P.5n) consists of gross fixed capital formation (P.51) and changes in inventories (P.52) less consumption of fixed capital (K.1).

Capital transfers from the RoW contain mainly investment grants because capital taxes have not been implemented in Estonia. Capital transfers from RoW are based on the information received from the General Government and Financial Sector Statistics Department.

Capital transfers to the RoW are based on balance of payments.

## 9. GDP FLASH ESTIMATES

In Estonia, growth rate of the flash estimated GDP is published on the 43th day after the reference quarter. The results are available simultaneously to all consumers at 8.00 CET on the day of release by issuing a news release. Flash estimated GDP is not published in Statistics Estonia's statistical database.

Flash estimate of the GDP is calculated by the production approach only. GDP growth is calculated by the chain-linking method. The average discrepancy between flash estimates and first estimates of the quarterly GDP growth rates calculated during the past two years has been 0.2 percentage points.

Flash estimates of **non-financial corporations sector (S.11)** are primarily based on administrative data of monthly net turnover from the Tax and Customs Board. As only net turnover of two first months of the quarter are available, data for the third month are forecasted by the econometric method. In the corporations sector, flash estimate calculations are made by 32 economic activities. Value added for manufacturing (D) is calculated by 21 activities and for electricity, gas and water supply (E) — by four activities. Value added at previous year prices is calculated by the single deflation method, i.e. only output is deflated.

Forecasting is carried out by the seasonal autoregressive integrated moving average (SARIMA or simply ARIMA) models and the TRAMO/SEATS method (program). The same methodology is used for forecasting other missing data as well. The majority of forecast results are good or very good. In summary, more than 73% of time series have forecasts with the relative error less than 5%.

Data for calculating the flash estimate of **financial corporations sector (S.12)** are based on the same sources as for the first estimates of QNA. The data, which are not available for the flash estimate, are extrapolated. Flash estimate of FISIM is calculated on the basis of available data on financial intermediation from the Bank of Estonia, while missing data are extrapolated on the basis of previous quarters. FISIM is added to the calculations of economic activities.

The value added of **general government sector (S.13)** is estimated on the basis of total production costs as the sum of compensation of employees, consumption of fixed capital and other taxes on production. Most of the data on compensation of employees and other taxes on production are obtained directly from quarterly state and local budgetary reports. The missing data are extrapolated on the bases of previous quarterly and annual accounting figures.

Flash estimate of the value added of **NPISH sector (S.15)** is calculated as the sum of compensation of employees, consumption of fixed capital and other taxes on production. Data from the Tax and Customs Board are used as the main basis for the value added calculations, because wages and salaries plus social contributions constitute approximately 90% of the value added created by NPISH.

Flash estimate of **households sector (S.14)** is based on the available information of:

- the preliminary data from the Agricultural Statistic Department of Statistics Estonia;
- the growth rate of dwelling services;
- extrapolation of the value added of economic activities specific to the households sector.

**Taxes less subsidies on products (D.21-31)** at previous year prices are estimated for the total economy by using price and volume indices related to a detailed level of taxes and subsidies. Estimates at previous year prices for all above-mentioned taxes and subsidies are calculated separately.

The value added of sectors is adjusted by FISIM (via intermediate consumption).

Adjustments are made for the same sectors and types of exhaustiveness as in QNA. Figures are obtained by using the extrapolation technique with legal output as the main indicator, and mechanical projections.

Besides calculations by raw data, the flash estimated GDP is adjusted seasonally and working-day corrections are made.