QUARTERLY NATIONAL ACCOUNTS

Inventory

Estonia

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Contents

1. OVERVIEW OF THE SYSTEM OF QUARTERLY NATIONAL ACCOUNTS

1.1. Organisation and institutional arrangements

Quarterly National Accounts (QNA) are compiled at Statistics Estonia by the National Accounts Unit in the Economic and Environmental Statistics Department. This unit is responsible for multiple domains that can be divided into three sections:

- Quarterly and Annual National Accounts, Regional Accounts, Non-Financial Sector Accounts;
- Supply and Use tables, Input and Output tables;
- Government and Public Finance statistics.

A part of the data sets relevant to National Accounts is compiled by Eesti Pank (the central bank of Estonia). This concerns Balance of Payments and Financial Accounts. The exchange of data sets and the revision policy are agreed upon with a mutual cooperation agreement between the institutions. Additional auxiliary data relevant to national accounts (i.e. labour statistics) are compiled by other departments within Statistics Estonia.

The National Accounts Unit consists of 23 persons, half of whom are directly involved with the compilation of QNA. The compilation of QNA is fully integrated into Annual National Accounts (ANA), which guarantees full consistency in the time series and allows for a better understanding of industry-specific issues.

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1.2. Publication timetable, revision policy and dissemination of QNA

The first quarterly estimates are published at T+2 months, on the last working day of the second month after the end of the reporting quarter. This release is accompanied by a press release and detailed tables in the public database. The release includes Gross Domestic Product (GDP) compiled by the production, expenditure and income approaches.

National Accounts (NA) are fully in line with the Harmonized European Revision Policy. Quarterly GDP is constantly revised and can change with subsequent releases. Any corrections within the first 12 months after the initial release are the result of adjustment in NA source data. Seasonally adjusted time series are open to updates regardless of whether the underlying data have been revised or not.

ANA are revised with the Structural Business Statistics (SBS) at T+2 years and with the release of Supply-use tables (SUT), which takes place at T+4 years. As the annual and quarterly time series are fully consistent, every annual revision also adjusts quarterly estimates.

1.3. QNA compilation approach

The methodology for the compilation of QNA is based on the European System of Accounts ESA 2010. This is consistent with the System of National Accounts of the United Nations (SNA 2008).

The compilation of QNA in Estonia is significantly based on the bottom-up approach by summing up the source data. The Short-Term Business Survey and government sector accounting data provide a strong basis for the production approach. For that reason, the production approach is the main method of QNA. In addition, the expenditure approach is also used. There are some discrepancies between the two approaches which are solved through the balancing process. The income approach cannot be used autonomously as there is no reliable quarterly data source for entrepreneurial income. As a result, operating surplus and mixed income are residual items in QNA.

The most important data sources for QNA are short-term business statistics, government sector accounting data and the Household Budget Survey (HBS).

1.4. Balancing, benchmarking and other reconciliation procedures

While some differences between the production and expenditure approaches are balanced during the compilation process, QNA is not fully balanced. An internal target of 3% of GDP is held as a quality target for statistical discrepancy.

Estonia also publishes the statistical discrepancy. This is done for two reasons. Firstly, different data sources have their own quality issues. As the estimates are compiled by summing up source data, there is no one single source for discrepancies in the final results. Secondly, statistical discrepancy also provides additional information for users by keeping the GDP components clean of any adjustments not directly related to the corresponding source data.

As the QNA and ANA time series are fully consistent, quarterly estimates need to be adjusted with every revision in annual estimates. The first estimate of the last full year in the time series is the sum of its quarters. However, every subsequent revision to the annual estimate is an independent compilation process. This means that the quarterly estimates need to be revaluated once the annual revision is complete. Benchmarking of the quarterly estimates is done using the proportional Denton-Cholette method. This is done on a relatively detailed level as described later in this inventory (Chapter 3). Appropriate indicators for the benchmarking are updated on a regular basis, to provide stronger consistency with source and comparable macro-economic statistics.

1.5.   **Volume estimates**

QNA volume data are published as a chain-linked series at the reference year 2015 prices. The growths compared with the previous period and the corresponding period of the previous year are published as QNA volume data. These are constructed with the annual overlap method, in which volume estimates at the average prices of the previous year are used. The index type used for the measurement of volumes is the Laspeyres index.

Quarterly GDP at current prices and at previous year's prices is estimated by the production and expenditure base. Quarterly value added at previous year's prices is compiled using the double deflation method. The preferred approach is the deflation product-by-product.

In order for the quarterly data to be consistent with the annual national accounts, the annual overlap method was chosen. The variables of chain-linked volumes are non-additive (a chain-linked volume of GDP is not equal to the sum of its components).

For logical reasons, the differences arising in the chain links are not eliminated by calculation. To ensure consistency between the QNA and ANA price and volume measures, the ANA measures are derived from the quarterly measures. Consistency with SUT is achieved by using the Denton benchmarking techniques for QNA data.

1.6.   **Seasonal and calendar adjustment**

Seasonal and working day adjustment in QNA is based on TRAMO/SEATS models. Adjustments to the data series are done using the Demetra 2.2.0 software. The set of QNA time series that are subject to seasonal and working day adjustment corresponds to the transmission programme of ESA 2010. All the time series are adjusted in current prices: the majority of them are also adjusted in chain-linked values with the reference year 2015. Each time series is adjusted individually. There is no summing-up of time series to arrive at aggregates. Seasonal and working day adjustments are done in the same model, there are no separate time series estimated for those items. The adjusted QNA time series are not benchmarked to annual values in order to provide better information on economic trends in the time series.

2. PUBLICATION TIMETABLE, REVISON POLICY AND DISSEMINATION OF QNA

2.1. Release policy

QNA estimates are released at T+2 months on the last working day of the month. There are four QNA releases per year with one of the four coinciding with the release of ANA. There are no flash estimates. All release dates are published in the release calendar of Statistics Estonia at the beginning of the year. There are no releases outside of the official publications.

Each release of QNA can possibly include some revisions to the time series. The contents and extent of these revisions depend on new data sources becoming available and on revisions in other domains (e.g. Rest of the World (ROW), Government Finance Statistics (GFS) etc.). The Estonian QNA revision policy is aligned with the Harmonized European Revision Policy (HERP). The revisions align with the QNA publication timeline as shown in Table 1.

Table 1. Revision schedule of Quarterly National Accounts

	Reference period									
	Year T-4	Year T-3	Year T-2	Year T-1			Year T			
Publication										
February		1Q-4Q	1Q-4Q	1Q	2Q	3Q	4Q			
May							4Q	1Q		
August	1Q-4Q	1Q-4Q	1Q-4Q	1Q	2Q	3Q	4Q	1Q	2Q	
November									2Q	3Q

Q First release
Q Regular revision
Q Regular revision (if needed)

The release of QNA at the end of August is simultaneous with the release of ANA. As a result, the QNA time series is revised accordingly to keep full consistency between the two time series. In a regular year, this means the revision of the 17 most recent quarters. Year T-4 includes the most recent SUT and Year T-2 the most recent data from the SBS. In case of benchmark revisions, the entire time series is revised starting from 1995. If the time series needs further adjustment after the revisions, these adjustments would be released in February. In addition, all quarters of the reference year are open to revisions in February in order to complete the first estimate of annual figures. In May and November, only the quarter preceding the reference period can be revised.

Benchmark revision takes place every five years. However, minor adjustments to the entire time series might be made during regular ANA revisions. This can be caused by the verification cycle of gross national income (GNI).

In general, QNA are consistent with other domains. However, there can be some discrepancies due to vintages, caused by the production cycle of other domains. Quarterly Sector Accounts

(QSA) are compiled only after QNA have been finalised, to guarantee consistency between the domains. The first release of QNA includes a preliminary Balance of Payments (BOP). As a result, full consistency for ROW is achieved at the next publication for which a corrected BOP can be included. There may be temporary inconsistencies with Government Finance Statistics (GFS) data due to the verification cycle of the Excessive Deficit Procedure (EDP).

All QNA publications are accompanied by a press release and a full set of database tables. Data transmission to Eurostat according to the ESA 2010 transmission programme is done at the same time. In case of benchmark revisions and revisions resulting from the ANA production cycle, data users are informed in advance of pending methodological and other major adjustments. A detailed overview of the revisions is released with the QNA in August.

2.2. **Contents published**

The published QNA provide a detailed overview of GDP and the accompanying indicators. The data include GDP compiled by production, expenditure and income approaches; GNI and ROW data with balancing items; labour data; and productivity indicators. Non-financial sector accounts (NFSA) aligned with QNA provide a detailed breakdown of ROW. Due to the lack of data sources, the domestic sectors cannot be compiled on a quarterly basis. Only transactions visible from the GDP compilation process can be included into the NFSA.

GDP is published in current prices and chain-linked values, accompanied with chain-linked growth rates. Seasonally adjusted values are also supplied. GNI, ROW data and balancing items are published in current prices.

The production approach provides data on the breakdown of value added by NACE level, and on the output, intermediate consumption and components of value added by institutional sector. The components of value added by institutional sector published by Statistics Estonia are as follows:
- Wages and salaries;
- Employers' social contribution;
- Consumption of fixed capital;
- Net taxes on production;
- Operating surplus and mixed income.

While the data based on the income approach do not give a breakdown by institutional sector, they do provide a more detailed look at net production taxes by showing production and import taxes and subsidies. With the income approach, the values are published at current prices and as the share in GDP. With the production approach, the share in value added is given in addition to value at current prices.

The activities for which value added is published are as follows:
- Agriculture, forestry, fishing (A);
- Agriculture;
- Forestry;
- Mining and quarrying;
- Manufacturing;

- Energy supply;
- Water supply and waste management;
- Construction;
- Whole and retail trade;
- Transportation and storage;
- Accommodation and food service activities;
- Information and communication;
- Financial and insurance intermediation;
- Real estate activities;
- Professional, scientific and technical activities;
- Administrative and support service activities;
- Public administration and defence;
- Education;
- Health and social work;
- Arts, entertainment and recreation;
- Other service activities.

Value added is published in current prices and chain-linked values. In addition, growth rates, chain-linked indices, contributions to GDP growth and share in GDP are provided.

The expenditure approach provides data on
- components of GDP by transaction;
- the breakdown of household consumption by Classification of Individual Consumption by Purpose (COICOP);
- the breakdown of exports and imports by EU institutional unit.

The majority of indicators on the expenditure side are published in current prices and in chain-linked values. Similarly to the production approach, growth rates, chain-linked indices, contribution to GDP growth and share in GDP are given. Only the breakdown of exports and imports is provided in current prices and as share of the total.

The auxiliary data on GDP include
- productivity indicators per hour worked and person employed;
- unit labour cost;
- labour indicators (hours worked, number of jobs and number of persons employed).

The productivity and labour indicators are published both as unadjusted and as seasonally adjusted series. The productivity indicators are available in nominal and real terms.

The data obtained in the compilation process are more detailed than in the official data tables. Some detailed parts of the data can be shared and commented on upon direct inquiries. It is not considered good practice to publish detailed data which might be misunderstood without a deeper understanding of the compilation processes.

2.3. **Special transmissions**

The Estonian QNA is transmitted to Eurostat according to the ESA 2010 transmission programme simultaneously with the official publication. In order to provide users easier access to data, selected datasets are sent to domestic analysts on a regular basis simultaneously with the release of QNA.

The data include gross fixed capital formation (GFCF) by sector and assets at current as well as previous year's prices and chain-linked values (reference year 2015). In addition, the data include operating surplus, compensation of employees, inventories, statistical discrepancy, household final consumption expenditure (HFCE) and value added. The transmission includes data on the gross domestic product presented by the production, income and expenditure methods of calculation together with seasonally adjusted data.

2.4. **Policy for metadata**

Metadata information is published in the public database and on the website of Statistics Estonia at https://www.stat.ee. The data cover the entire compilation and dissemination process of QNA and follow the EURO-SDMX Metadata Structure (ESMS) standards. A comprehensive description of the metadata used can also be accessed from the website of Statistics Estonia.

The QNA inventory is published on the website of Statistics Estonia at https://www.stat.ee. Additional methodological descriptions of various components and methods are published there as well.

3. OVERALL QNA COMPILATION APPROACH

3.1. Overall compilation approach

3.1.1. General architecture of the QNA system

The compilation of QNA in Estonia is mostly built upon the direct approach. This means that detailed source data are used to compile estimates of various components of GDP, which are then summed up in order to arrive at the final estimate. The QNA also use indicators and modelling approaches to estimate less impactful components for which there are no short-term statistics (STS) available. However, the majority of components are based on data from surveys and official registries. There is no indirect estimation or independent modelling of GDP as a whole.

As ANA are also compiled with the direct approach, it means that both sets of accounts have a similar approach for compiling the estimates. The main differences between ANA and QNA concern data sources and the level of detail in those sources. While ANA have the use of more complete data sources, QNA need to compile estimates on a slightly more aggregated level. As ANA and QNA are fully integrated, QNA need to account for possible inconsistencies in short-term data in order to provide a coherent time series. The full integration of QNA and ANA time series allows the publication of ANA time series for components for which there are no detailed survey data yet available. The publication of the 4th quarter of a reference year is considered as the first estimate of the reference year as the sum of its quarters.

GDP is estimated by two independent methods – the production approach and the expenditure approach. The production approach is the headline indicator. There are no explicit residual items within the two methods and the statistical discrepancy is provided alongside the expenditure approach. GDP by income approach is compiled alongside the production approach, with operating surplus and mixed income being residual items.

The production approach is compiled by institutional sector on the two-digit NACE level. There is an expert in charge of every institutional sector. Net product taxes are compiled independently. The expenditure side is compiled by transaction – household final consumption, final consumption of the government sector, the consumption expenditure of non-profit institutions serving households, gross fixed capital formation, inventories, exports and imports. The calculation of financial intermediation services indirectly measured (FISIM) is done separately on a detailed level. The results are later added to the provisional estimates without FISIM. The same expert is responsible for the compilation of their items in both QNA and ANA. This guarantees the coherence of the time series in both domains. It also provides a better understanding of trends within the components. The compilation structure of QNA is showed in Figure 1.
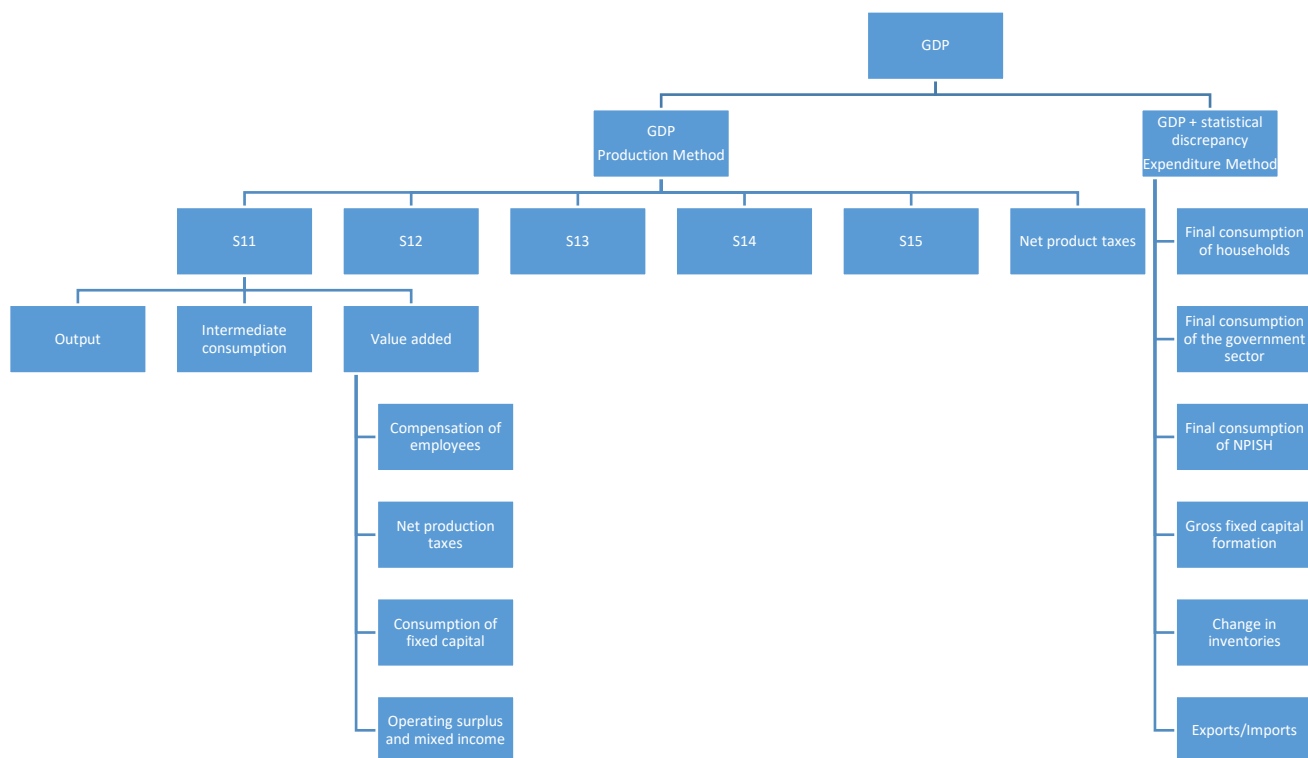
Figure 1. Compilation structure of QNA

QNA estimates are first compiled in current prices as nominal values. These estimates are later deflated to previous year's prices. Volume terms are achieved by chain-linking the time series. The production approach also utilises double deflation. As a result, the value added at previous year's prices is achieved as the difference of output and intermediate consumption. Seasonal and calendar adjustments are done as the last stage in the compilation process.

Currently, there is no SUT or input-output framework used as a base for the preliminary QNA estimation process. The integration of SUT takes place first for the ANA time series. The adjustments from SUT are carried over to QNA during the benchmarking process.

3.2. Balancing, benchmarking and other reconciliation procedures

3.2.1. Quarterly GDP balancing procedure

Between the production and expenditure approaches QNA is not fully balanced. The statistical discrepancy is published alongside the expenditure method in order to provide users information about the statistical differences between the two methods. However, the statistical discrepancy does not provide a full overview of everything that separates the two approaches. Many issues are solved during the compilation process of QNA. The balancing procedure of QNA can be divided into three steps: the consistency of components, the consistency of macroeconomic aggregates, and the final balancing of QNA.

As QNA are largely based on the direct approach, a set of deviations between the methods arise mostly due to the quality of STS. There can be a variety of causes for low quality in STS, such as a poor response rate to surveys, a lack of specific surveys, differences in accounting practices in enterprises etc. The items most susceptible to these issues are gross fixed capital formation, inventories and final consumption of households. This is also the reason why the GDP estimated via the production approach is considered as the headline indicator. For some of these issues, adjustments can be done within QNA; however, final corrections are introduced during the compilation of SUT. For this reason, a statistical discrepancy exists in QNA and ANA for all the years that are not integrated with SUT.

As household surveys (e.g. the HBS) are, for various reasons, considered to be relatively low-quality in general, the consistency of an item has been partly guaranteed by modelling in STS. During the compilation of QNA, these results are validated and adjusted with data from retail sales and other information used for the compilation of indicators on the production side.

Gross fixed capital formation and inventories provide a more serious hurdle to overcome. Enterprises often utilise accounting methods whereby they fully report on their investments only on an annual basis. Hence, ad-hoc adjustments are required for QNA. This means that investment activity reported in STS needs to be compared with the production side and with auxiliary information. Estonia's relatively small size means that a variety of economic information on larger projects is often reported in the media and is also available in various publicly accessible development programs. Such information can become available even before the reference periods of QNA. Additional data are used to create a balance sheet of construction activity for further quality controls.

Inventories are a special case as there can be a variety of accounting methods applied to inventories by enterprises. Even though Estonia utilises a complex model for the estimation of inventories and holding gains, the results from the model still need to be compared with the rest of QNA items in order to guarantee full consistency. As a result, inventories is the item most often utilised during the final balancing process.

The consistency of both components and macroeconomic aggregates is validated through various checks:
- analysis of volumes and growth rates in the time series;
- identification of outliers in the preliminary results;
- comparison of QNA vintages;
- feedback from preliminary aggregates;
- analysis of deflators on detailed and aggregated level;

- feedback from sector accounts;
- feasibility of results within the economic environment;
- comparison with auxiliary macroeconomic indicators;
- discussion round with NA experts.

The final balancing of QNA takes place once the checks in the previous stages have been done. Balancing can target multiple components – output, intermediate consumption, deflators, inventories, gross fixed capital formation. Some sectors are excluded from the balancing process as their data sources are highly robust. This applies to S.13 General Government and S.12 Financial Corporations. In case of the S.15 non-profit institutions serving households (NPISH) sector, the compilation process is such that no additional balancing is needed.

Internally, the scope of statistical discrepancy that is considered acceptable in terms of QNA quality has been set at 3% of GDP. This limit is observed for current prices, previous year's prices and chain-linked values. It is strictly followed for current prices for the full length of the time series. However, it cannot be fully applied to previous year's prices in periods of economic turmoil. This also means that it does not fully apply to chain-linked values. Nevertheless, the statistical discrepancy should stay within the set limits for the most recent years and be stable, even when outside of limits, for historical periods.

The statistical discrepancy varies from period to period and there is no single reason causing this. While the regular differences in QNA and ANA data sources can be accounted for, there are macroeconomic trends that cannot be fully estimated based on STS. It should also be noted that the need for the balancing process is evaluated regardless of the size of the statistical discrepancy (i.e. even when it is less than 1% of GDP). And, often enough, some balancing is still required in order to guarantee the coherence of QNA. It is not common for the statistical discrepancy to fall outside of the 3% limit after the preliminary results have been compiled. In a stable economy, the statistical discrepancy tends to stay relatively uniform and big changes in the pattern are more common to economically uncertain times.

3.2.2. Benchmarking of QNA and ANA

During the initial compilation of QNA, there is only a limited amount of short-term data available. This limits the scope and detail of the estimates that can be produced in the timeframe of two months after the end of the reference period. In order to guarantee the quality and increase the detail of the macroeconomic data, it is necessary to revise the data on a later date. This can be done once more data about the economy are available, either from surveys or official registries. However, most of such data are available and published only on an annual basis. This means that it is not possible to get direct quarterly estimates. To arrive at new QNA estimates, one must first compile annual estimates and then adjust the quarterly time series to fit the annual estimates.

As QNA and ANA are kept fully consistent, the first ANA estimate is published as the sum of quarters. There are no additional adjustments done and the first ANA estimate is the result of regular QNA compilation. The next ANA estimate for the reference period incorporates annual data sources and is compiled independently of QNA. Any subsequent compilation of ANA is the result of regular and benchmark revisions in the time series. All ANA estimates after the first one are benchmarked to arrive at revised QNA. This again ensures full consistency between

the domains – with the level of GDP determined by ANA but the quarterly trends of the economy by QNA. The compilation cycle of ANA is shown in Figure 2.

First estimate T+1	T+2	T+3	T+4
• QNA; ANA as sum of quarters	• SBS, annual business reports • R&D Survey • Annual tax reports • etc.	• Adjustments based on SUT for T-3 • Corrections to data if necessary	• SUT
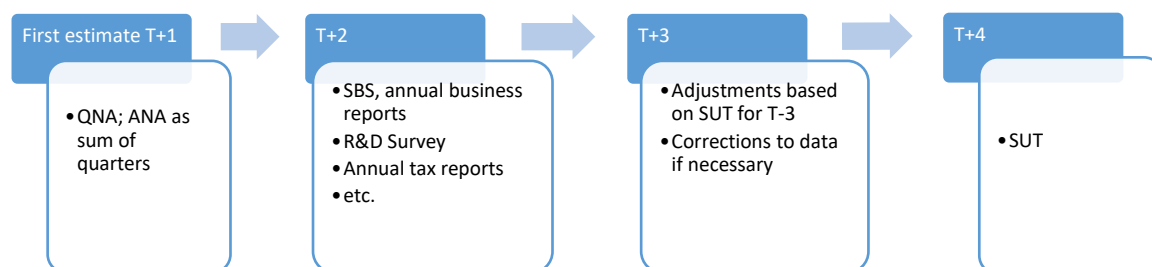
Figure 2. Compilation cycle of ANA

As in national accounts, there is no inherent need for monthly estimates and benchmarking is done on a quarterly basis. The majority of components are benchmarked on a slightly more detailed level than is required by the ESA 2010 transmission programme or published in the public database of Statistics Estonia. The level of detail used for benchmarking is determined by specialists, so that the results can be verified and compared to estimates arrived at during the first compilation of QNA. Output, intermediate consumption and value added are broken down into components that need to be analysed independently (i.e. market output, own-account research and development, non-observed economy, wages, subsidies etc.). These components either behave differently than others or are compiled at different stages of QNA.

The benchmarking is mainly carried out using the proportional Denton-Cholette method[1]. It is a deterministic (non-stochastic) procedure for temporal disaggregation of time series. It allows the generation of quarterly time series from the independently compiled ANA while keeping the quarterly trends of the initial QNA estimates. The process can be formulated as the following minimisation procedure:

$$min \sum_{t=2}^{T} \left[\frac{x_i}{i_i} - \frac{x_{t-1}}{i_{t-1}} \right]^2$$

Where the indicator 'time series at time t' is denoted with i_t and 'the QNA component at time t' with x_t. The time series for previous periods are denoted similarly with i_{t-1} and x_{t-1}. The whole process is constrained to annual totals to keep the consistency between annual and quarterly totals:

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[1] Di Fonzo, Marini. IMF Working Papers 2012/169. https://www.imf.org/external/pubs/ft/wp/2012/wp12169.pdf

$$\sum_{t \in T} x_t = x_T \qquad for \ \ T = 1, \dots, N$$

There exist multiple other benchmarking methods but the above-mentioned method is considered as the main one. Some special cases may require the use of other methods in order to arrive at more plausible results. Chow-Lin[2] is used in cases where the proportional Denton-Cholette method has proved to be insufficient in providing acceptable results. The additive Denton method is used for benchmarking the stocks of inventories.

Figure 3. Value added in food processing in the non-financial corporations sector

Figure 3 demonstrates the effect of benchmarking on value added (B.1G) at current prices in the food processing industry of the non-financial corporations sector. This time series is used as an example as it provides a case for a time series that has few outliers and behaves largely according to general economic trends. Benchmarking is not done on value added directly. Instead, the components of output (P.1) and intermediate consumption (P.2) from the first release have been used to benchmark the new annual totals of P.1 and P.2. Value added is found

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[2] Chow, G.C. and Lin, A.-L. (1971). Best Linear Unbiased Interpolation, Distribution and Extrapolation of Time Series by Related Series. The Review of Economics and Statistics, 53 (4) s. 372–375

as the difference between the two. As can be seen, the new benchmarked value added follows the pattern of value added from the first release.

Seasonally and calendar adjusted time series are not benchmarked. Benchmarking done to annual estimates would partly eliminate the effect of seasonal and calendar adjustment and thus make it more difficult to analyse the economic trends in the time series. The removal of seasonality and calendar effects introduces new annual estimates and these are published as they are as part of the adjusted time series.

3.2.3. **Other reconciliation(s) of QNA**

QNA go through laborious checking and balancing throughout the compilation process. Other reconciliations cannot always be separated from the balancing process. This is due to part of the balancing procedure being directly under the responsibility of the experts who compile the estimates to be aggregated later. However, the general quality control and reconciliation procedures are described in Figure 4.

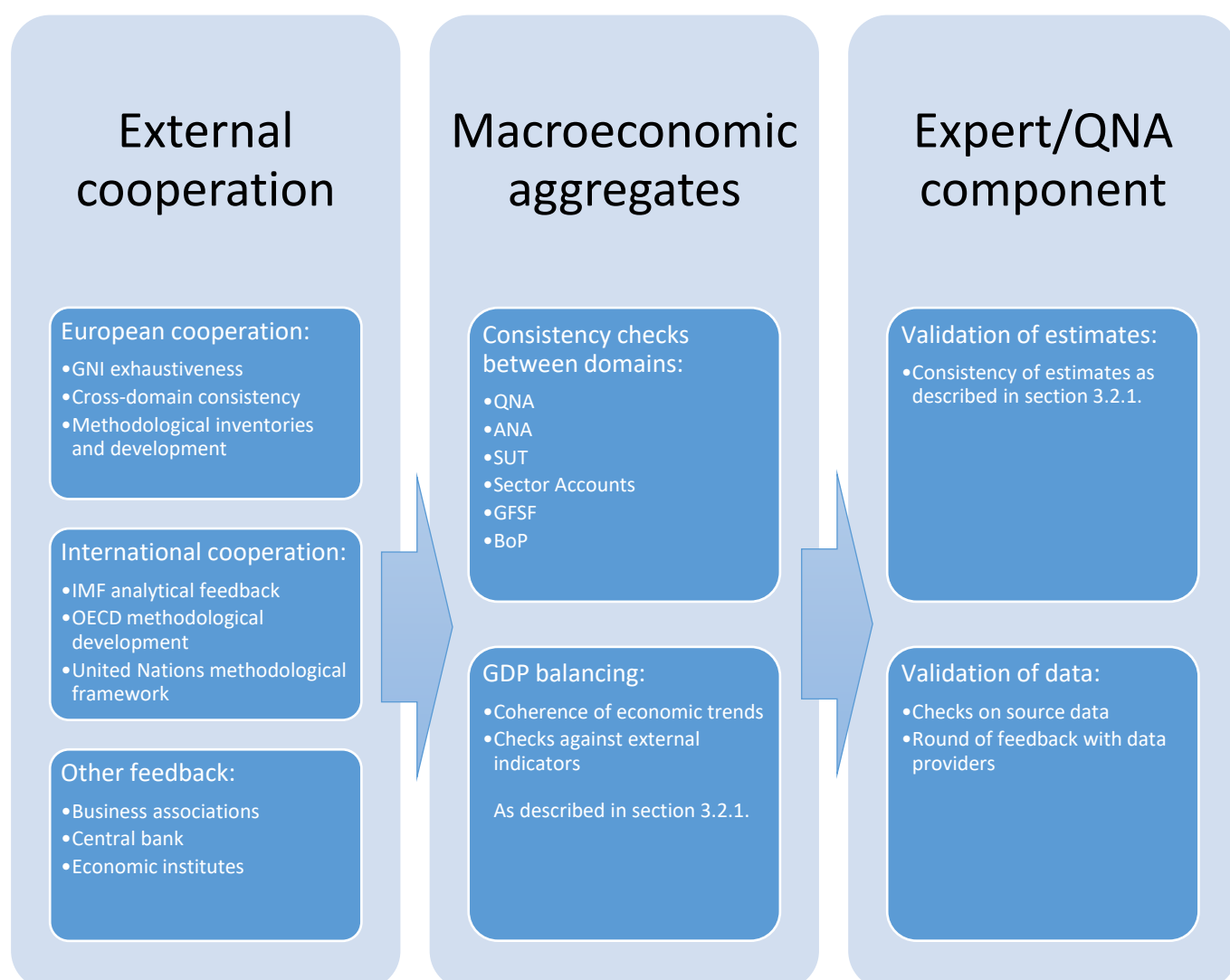| External cooperation	Macroeconomic aggregates	Expert/QNA component
European cooperation: •GNI exhaustiveness •Cross-domain consistency •Methodological inventories and development	**Consistency checks between domains:** •QNA •ANA •SUT •Sector Accounts •GFSF •BoP	**Validation of estimates:** •Consistency of estimates as described in section 3.2.1.
International cooperation: •IMF analytical feedback •OECD methodological development •United Nations methodological framework		
Other feedback: •Business associations •Central bank •Economic institutes	**GDP balancing:** •Coherence of economic trends •Checks against external indicators As described in section 3.2.1.	**Validation of data:** •Checks on source data •Round of feedback with data providers

Figure 4. Quality assurance in Estonian National Accounts

The first round of checks is done before the compilation of QNA begins. This includes the validation of source data, especially short-term business survey data and administrative sources. If irregularities are discovered, adjustments are done in the previous stages and national accounts are provided with a fresh data set. This stage is done by NA experts communicating with other departments or other institutions for data as necessary.

The second round of validation is also the responsibility of NA experts who compile the preliminary estimates. They analyse the time series for all components estimated to make sure that the results are plausible and in accordance with NA standards.

The final round of controls during the compilation process of QNA is done by the entire QNA team. In this round, experts review and validate the entire QNA and troubleshoot for possible inconsistencies between different components. The estimates are compared to other NA domains, to in-house sources and also to auxiliary indicators that have been published by other providers of data on macroeconomic trends. The last step in this process is the balancing of GDP.

After the compilation, there is one more stage of QNA reconciliation. It includes outside cooperation and feedback. The most significant part is played by Eurostat with their validation process and GNI verification cycles. NA also have methodological correspondence with IMF and are used in international cooperation. The latter includes Eurostat and OECD task forces and working groups, but also covers cooperation with neighbouring countries to discuss methodological issues and share practical experience.

The quality assurance of QNA is a continuous process which also benefits from regular upgrades in the compilation process, such as improvements in work flows and technological solutions. However, it is not an independent process as the consistency between different domains means that the quality of QNA is directly affected by the quality of data and estimates in the related domains.

3.2.4. **Amount of estimation in various releases**

NA include a great amount of hard data. While that is usual for annual estimates, it also applies to QNA where various short-term surveys and administrative sources provide a solid basis for macroeconomic estimates. Some imputations and models are used to fill in the gaps, but this mainly concerns a few minor components. The majority of QNA estimates are based on hard data already in the first release of GDP at two months after the end of the reference period.

The main sources for the first release of QNA are short-term business statistics and financial information from the government sector. While information on various taxes is also available, it does not provide direct input to QNA other than net product taxes. Instead, it provides a data set for the quality assurance and data validation procedure. Some minor components (i.e. exhaustiveness) use tax data as indicators in modelling.

Table 2. Share of hard data in QNA, percentage of final estimate

Component	Sector	1st estimate		1st revision	
		Data	**Model**	**Data**	**Model**
Gross value added	S11	90%	10%	90%	10%
	S12	100%	0%	100%	0%
	S13	100%	0%	100%	0%
	S14	5%	95%	5%	95%
	S15	90%	10%	90%	10%
Household consumption[3]		70%/45%	30%/55%	80%/50%	20%/50%
Government consumption		100%	0%	100%	0%
NPISH consumption		35%	65%	35%	65%
Gross fixed capital formation		100%	0%	100%	0%
Change in inventories		100%	0%	100%	0%
Exports/Imports		100%	0%	100%	0%
Compensation of employees	S11	95%	5%	95%	5%
	S12	100%	0%	100%	0%
	S13	100%	0%	100%	0%
	S14	95%	5%	95%	5%
	S15	99%	1%	99%	1%
Production taxes		0%	100%	0%	100%
Production subsidies		100%	0%	100%	0%

Table 2 presents the share of hard data in the first publication rounds of QNA. It shows that already the initial QNA rely heavily on hard data. Only a few data sources are added or revised at a later date. The impact of these sources is negligible. Major changes to the data used for the estimation of QNA come from annual sources. This impact is not demonstrated here as these figures have a direct impact on ANA instead. QNA are later benchmarked to ANA as described in the previous sections.

3.3. Volume estimates

3.3.1. General volume policy

The index type for the measurement of volumes is the Laspeyres index (the prices of the earlier period are applied to both periods). Quarterly chain-linked volume indices are derived by linking together quarter-to-quarter Laspeyres indices. It is the recommendation of ESA 2010 and Estonia agrees to use the Laspeyres formula when deriving chain-linked volume indices because of its several advantages. The benefits include consistency with supply and use tables

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[3] Household consumption has two data sources. In the years of HBS, the share of hard data is higher, compared to years with more extensive modelling.

compiled at average prices of the previous year, the simplicity of construction, and the opportunity to get consistency them for both seasonally adjusted and unadjusted data.

For the quarterly data to be consistent with the annual data, the annual overlap method was chosen. With the annual overlap method, the linking factors used to construct quarterly chain-linked Laspeyres volume estimates are the same as those used to construct the corresponding annual chain-linked volume estimates.

QNA volume data are published as a chain-linked series at the reference year 2015 prices. QNA at previous year's prices are calculated for both the production and the expenditure approach, based on the fact that the production side is estimated at basic prices while the expenditure side is estimated at consumer prices.

Production-based accounts are calculated by the double deflation method: output and intermediate consumption are deflated separately, and value added at previous year's prices is derived as the difference between output and intermediate consumption at previous year's prices.

For quarterly figures, double deflation is generally not recommended. However, for each transaction, the same estimation method should be used to derive estimates in both ANA and QNA, which is why Estonia applies the double deflation method for quarterly figures. If detailed quarterly data on output and intermediate consumption are available, the volume estimation of value added should be derived using the double deflation method. In Estonia, the lack of information for quarterly calculations is made up for by the use of similar information from previous years. It concerns the structure of goods and services for both output and intermediate consumption.

The preferred approaches for market output estimation are deflation product-by-product and the separate deflation of domestic and export sales using an appropriate producer price index (PPI) or service producer price index (SPPI). If the appropriate PPI or SPPI is not available, consumer price indices (CPIs) are applied.

The preferred methods for the estimation of intermediate consumption at previous year's prices are deflation product-by-product and the separate deflation of domestic and imported intermediate consumption. As official price indices of actual intermediate consumption required for the deflation of intermediate consumption are currently not available from price statistics, the same price indices as for the deflation of output are used. FISIM is deflated by an index reflecting the price change of domestic demand. The taxes and margins at previous year's prices for each product are calculated by applying the previous year's tax and margin rates to intermediate consumption at previous year's prices (i.e. the volume projection method is used).

The outputs of non-market activities (general government sector, NPISH, financial sector and imputed rents) are calculated as the sum of production costs (input method), where inputs are deflated at the cost level or extrapolated by volume indicators. Intermediate consumption is deflated at the product level using the appropriate price index. Consumption of fixed capital (CFC) is deflated using the CFC deflators derived from GFCF estimations. For the general government sector, the total value added at previous year's prices is estimated for each of the NACE groups by using the volume indices of change in the number of full-time employees. Data concerning changes in the number of employees are available from labour force statistics. For NPISH, compensation of employees and taxes on production are deflated using the overall

consumer price index (CPI). In case of imputed rents, operating surplus is deflated using the CFC deflators derived from GFCF estimations.

Household final consumption expenditure (HFCE) is calculated at the fourth level of COICOP groups at purchaser's prices including VAT. The same commodity detail is used for deflations by CPI. CPIs and PPIs are used to deflate the consumption of household production produced for own use. For the expenditures of resident households in the rest of the world, the weighted CPI for the main destination countries is used. For non-residents' expenditures in the economic territory, the Estonian CPIs are used. For the estimation of the final consumption expenditure of the general government and the output of NPISH, output for own final use, sales and social transfers in kind are deflated separately.

GFCF price indices differ neither by institutional sector nor by economic activity. Current price estimations for domestically produced machinery and equipment are deflated using the PPI of machinery and equipment; the deflator for import is used for equipment received from abroad. Construction estimates are deflated using the total construction cost price index.

Changes in inventories are deflated by products at a detailed level for different types of inventories. Materials and supplies are deflated using the relevant PPIs, except for fuel for which the CPI is used. Work-in-progress and finished goods are deflated using the relevant PPIs. Goods for resale are deflated using the relevant CPIs.

The exports and imports of goods are deflated by CPA groups using the relevant export or import indices. If there is no relevant export or import price index, the relevant PPI is used. The exports of services are deflated by CPA groups using the relevant CPIs. The imports of services are deflated by using the weighted average of CPIs and currency exchange rates of the most important trade partners according to the statistics of Eesti Pank (import of services by country).

3.3.2. **Chain-linking and benchmarking**

There is no need to proceed with benchmarking for the first quarterly estimates as the values are estimated directly from quarterly data sources. However, when it comes to revising the first estimates according to estimates that are based on annual sources and calculations, adjustments become necessary.

Current price values are benchmarked for the whole time series, while previous year's price values are benchmarked only for the periods where SUT provide the annual values. As SUT are fully integrated with ANA, they also have to stay coherent with QNA totals. Benchmarking for previous year's price values is done on a more aggregated level than for current price values. There is no need to have values for previous year's prices on the level of compilation. But the values are available for all the necessary macroeconomic aggregates. In the periods where no SUT is available, current price values are deflated according to the regular QNA procedure. Previous year's price values for ANA are arrived at as the sum of quarters.

Chain-linked volumes are arrived at according to the regular QNA process. The revised current and previous year's prices serve as the basis for this process. No additional adjustments are done via benchmarking.

3.3.3. **Chain-linking and seasonal adjustment**

The seasonal adjustment policy is uniform throughout the entire QNA. This means that chain-linked volumes and current price values use the same approach and methods. A direct method is used in all aspects. This means that all seasonally adjusted aggregates are produced independently of their components. No additional balancing or other adjustments are made. As a result, the seasonally adjusted aggregates and the sums of their components have different values. The seasonal adjustment policy is detailed in section 3.4.

3.4. **Seasonal and calendar adjustment**

QNA produce macroeconomic estimates that describe real-world economic processes. As a result, these estimates also have inherent seasonal effects and patterns. Not all goods and services are consumed at the same level throughout the year. As consumer behaviour changes from quarter to quarter, or even from month to month, it also impacts the production activity of enterprises. And this seasonality carries over to the entire economy. However, the seasonal fluctuations in the economy can make it more difficult to analyse the trends within the economy. A decrease in the GDP from quarter to quarter does not necessarily mean a downturn in the general economic trend. A year-to-year comparison might show that the economy is still on an upward trend.

The same logic applies to calendar adjustment. Not all quarters have the same amount of working days. This can be due to the length of months within quarters but also due to the amount of holidays within the same period. Generally, the fourth quarter tends to have fewer working days than the rest of the quarters, as people go on Christmas holidays and national holidays limit the number of days on which enterprises can stay open.

In order to have a clearer understanding of economic trends, it is important to eliminate seasonal and calendar effects from the final estimates. There are no separate time series published with just seasonally adjusted or only calendar adjusted data. All the adjusted and published time series account for both impacts.

Seasonal adjustment is applied to the time series identified in the ESA 2010 transmission programme. For seasonal and calendar adjustment, Estonia follows the ESS Guidelines on Seasonal Adjustment and aims to follow best practices. As the compilation of QNA in Estonia relies heavily on hard data, neither seasonally adjusted time series nor seasonal components are used during the compilation of QNA. Seasonal adjustment takes place only once the QNA have been finalised.

3.4.1. **Policy for seasonal adjustment**

A direct method is used for all-time series. This means that aggregates and their components are all adjusted independently. There are no additional adjustments made to consolidate the

differences between the adjusted aggregates and the sum of their components. This is considered to provide users with a clearer view of the economy. For the same reason, there is no post-adjustment benchmarking in order to match the adjusted time series to unadjusted annual totals.

The outliers for reference periods are generally determined automatically during the adjustment process. However, there are some cases where pre-determined outliers are introduced. There have been four economic events that have had a notable impact on the time series:
- the Russian crisis in 1998;
- the end of the dot-com bubble after the turn of the century;
- the Great Recession in 2009;
- the Covid-19 lockdown in 2020.

These events have caused notable shifts and/or outlier periods in multiple time series. In these cases, the automatic outlier detection is used only after the introduction of the outliers for these afore mentioned events.

For seasonal adjustment, Estonia uses the TRAMO/SEATS[4] method with the Demetra 2.2.0 program developed and provided by Eurostat. TRAMO/SEATS utilises ARIMA models with specific filters created for the adjustment of each time series. The selection of models is partly automatic. This means that the initial selection of a model is fully automatic but a subsequent adjustment and final selection is done by experts. There are no automatic parameters or validation procedures. Instead, all automatically selected models are evaluated and manual adjustments are done based on the diagnostics of the model and an analysis of results as deemed necessary by experts. This includes graphical analysis, descriptive statistics as well as the selection of the parameters of the models.

All-time series are handled separately according to the same principles. The models are selected separately for each time series. This applies to time series in current prices as well as to price-adjusted time series.

3.4.2. Policy for calendar adjustment

Calendar adjustment utilises the Estonian national calendar. This means that the number of working days is determined solely based on the general calendar and local national holidays. The national holidays and their impact on calendar adjustment are outlined in Table 3.

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[4] V. Gomez and A. Maravall (1996): Programs TRAMO and SEATS. Instructions for the User, (with some updates). Working Paper 9628, Servicio de Estudios, Banco de España. https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/DocumentosTrabajo/96/Fich/dt9628e.pdf

Table 3. Estonian national holidays and their impact on calendar adjustment

Date	Holiday	Length of impact
1 January	New Year's Day	1 day
24 February	Independence Day	1 day
Spring	Good Friday	1 day
Spring	Easter Sunday	1 day
1 May	May Day	1 day
Spring	Pentecost	1 day
23 June	Victory Day	1 day
24 June	Midsummer Day	1 day
20 August	Restoration of Independence	1 day, starting from 1998
24 December	Christmas Eve	1 day, starting from 2005
25 December	Christmas Day	1 day
26 December	Boxing Day	1 day

No additional adjustments for changes in consumption patterns due to holidays are made. The majority of holidays do not have a significant enough impact. While Christmas definitely has an impact on consumer behaviour, it is difficult to estimate the impact in the weeks leading up to it. This is mostly due to people planning ahead, so that the spending on presents takes place over a longer period of time. Easter, on the other hand, does not hold an important enough place in the Estonian culture to account for longer impacts. It is also important to note that the majority of indicators to be seasonally adjusted are based on the production approach. The impact on that side of QNA is more spread-out than on the consumption side.

In some cases, the calendar does not have a notable impact on the adjustment process. Hence, the calendar is not applied to every time series that goes through adjustment. In addition, four holidays are preceded by a shorter working day but the impact there has generally remained negligible with no need for an additional adjustment. The need to use and/or adjust the calendar in use is being revaluated continuously.

3.4.3. **Revision policy for seasonally adjusted data**

The general principle is to adjust the models used in seasonal and calendar adjustment once a year. This takes place during the publication of 2nd quarter estimates that coincide with the revisions in ANA. As the requirement for consistency between domains also calls for a revision of QNA, it may happen that the seasonality in time series also needs to be revaluated. However, the models used in seasonal adjustment are open to be revised at any publication. In case an abnormal event or a shift in economic trends takes place, it is justified to change the model and/or other parameters for any time series. This applies to all components of the process.

Calendar components can be adjusted at any given time, should there be a change in national holidays or a need for an adjustment in the count of working days due to other reasons.

The adjusted time series are recalculated with every publication. This means that the addition of a new period at the end of the time series can impact the estimation process of the model causing minor changes throughout the entire length of the time series. While the changes in the updated time series can be minuscule, the entire time series is published nevertheless.

4. GDP COMPONENTS: THE PRODUCTION APPROACH

4.1. Gross value added, including industry breakdowns

The calculation of value added by the production approach is compiled by economic activities according to the Estonian Classification of Economic Activities (EMTAK 2008), which is in conformity with NACE Rev. 2. Table 4 shows the list of economic activities (at the 2-digit NACE level) used in the compilation of value added.

Table 4. Economic activities used in the compilation of value added

Economic activity	Classification code
Agriculture, forestry and fishing	A (01, 02, 03)
Mining and quarrying	B (05_09)
Manufacturing	C (10_11, 13_15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31_32, 33)
Electricity, gas, steam and air conditioning supply	D (35)
Water supply; sewerage, waste management and remediation activities	E (36, 37_39)
Construction	F (41_43)
Wholesale and retail trade; repair of motor vehicles and motorcycles	G (45, 46, 47)
Transportation and storage	H (49, 50, 51, 52, 53)
Accommodation and food service activities	I (55, 56)
Information and communication	J (58, 59_60, 61, 62_63)
Financial and insurance activities	K (64, 65,66)
Real estate activities	L (68)
Professional, scientific and technical activities	M (69_70, 71, 72, 73, 74_75)
Administrative and support service activities	N (77, 78, 79, 80_82)
Public administration and defence; compulsory social security	O (84)
Education	P (85)
Human health and social work activities	Q (86)
Arts, entertainment and recreation	R (90_92, 93)
Other service activities	S (95, 96)
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	T (97_98)

The calculations of value added by the production approach are carried out separately for non-financial corporations, financial corporations, households, the general government and non-profit institutions serving households, and are compiled by economic activities.

In the calculation of value added in current prices, output is valuated at basic prices and intermediate consumption at purchaser's prices. To get purchaser's prices from basic prices, taxes on products are added and subsidies on products subtracted (see section 4.3.).

The adjustments for exhaustiveness (see section 4.4.), financial intermediation services indirectly measured (FISIM) (see section 4.2.), standing timber, own-account construction,

own-account software, and holding gains (see section 5.4), research and development (R&D) services and decommissioning costs are calculated separately and incorporated by sector and economic activities. The extrapolation method is used to calculate R&D services, where the indicator for the general government sector is the growth in output, and for other sectors, the moving average.

The calculations at the prices of the previous year are described in section 3.3.1. Revision policies and practices are described in section 3.2.2.

Data sources
Data sources vary by sectors.

The main source for data on the non-financial corporations sector is STS that provide comprehensive information for the calculation of output, intermediate consumption, value added and its components. Data based on annual reports from the Commercial Register are used additionally. More detailed information for some adjustments is included from the Structural Business Statistics survey.

The main source for data on the financial corporations sector is data produced and published quarterly by Eesti Pank. The rest of the financial intermediaries, auxiliaries and insurance companies are covered by quarterly statistical surveys carried out by Statistics Estonia.

Government finance statistics are based on detailed data from the information system of the State Shared Services Centre (SSSC). This is an agency in the governing area of the Ministry of Finance, which is responsible for managing the general rules of state accountancy. This is a set of uniform principles which public sector units have to follow when compiling and reporting financial statements to the SSSC. The reports presented to the SSSC are called Public Sector Financial Statements (PSFS).

The main data sources for the estimation of the value added of unincorporated enterprises (i.e. sole proprietors) owned by households are the annual tax declarations on business income (Form E) that they are required to submit to the Tax and Customs Board.

The main data sources for the estimation of the value added of non-profit institutions serving households are the Tax and Customs Board's data on social tax and payments subject to social tax of non-profit institutions, and the latest available annual survey of non-profit institutions.

Non-financial corporations produce most of the total value added. Since in the non-financial sector the bases and methods of calculation are similar across all industries, with the exception of agriculture, the calculations for this sector are described once for all industries.

Calculation of output of non-financial corporations at current prices
Market output is valued at basic prices. The value of output of non-financial corporations is calculated on the basis of SBS, which are produced closely following accounting standards. In business accounts, net turnover is valued at market prices excluding value added tax, excise duties paid by producers and traders, and subsidies received from public authorities or the institutions of the European Union. Stocks of finished products and work-in-progress are recorded at production cost in business accounts and in SBS.

Output is calculated at basic prices and it includes:
- sales of enterprises (net);
- purchases of goods and services for resale purpose (-);
- subsidies on products (+);
- payments to subcontractors in construction (-);
- changes in inventories of finished goods (data from the end of the period minus data from the start of the period) (+);
- changes in inventories of work-in-progress (data from the end of the period minus data from the start of the period) (+);
- own-account products (own-account construction, own-account R&D, own-account software, decommissioning costs) (+);
- standing timber (+);
- holding gains (+).

Calculation of intermediate consumption of non-financial corporations at current prices
For the evaluation of intermediate consumption, the formula P2/P1 (intermediate consumption / output) is used based on the data (average) of the respective period from the past two years. Intermediate consumption is evaluated at purchaser's prices existing at the time of purchase in the production process. In order to minimise the impact of price changes during the time that materials and raw materials are stored, its volume is adjusted by the value of holding gains. Entertainment, literary and artistic originals (-), R&D (-), registration fees of trucks (-), mineral exploration (-), and decommissioning costs (-) which are calculated separately are added to intermediate consumption. Payments to subcontractors and FISIM (see section 4.2.) are also added to intermediate consumption.

Calculation of value added of non-financial corporations at current prices
Value added at basic prices is calculated as the difference between output and intermediate consumption.

Calculation of value added of non-financial corporations at previous year's prices
See detailed description in section 3.3.1.

4.1.1. **Agriculture, forestry and fishing**

NACE: A

The quarterly calculation is done separately for the activities of agriculture, forestry and fishing. The total value added of agricultural, forestry and fishing activities was produced purely by the non-financial corporations and households sectors.

For agriculture, the Enterprise and Agricultural Statistics Department together with the Ministry of Rural Affairs compiles the Economic Accounts for Agriculture (EAA) according to Regulation (EC) No 138/2004. The Economic Accounts for Agriculture are annual and are compiled in two estimates. The first estimate is compiled by the end of November of the current year. It covers agricultural holdings and agricultural small units (below the threshold of

holdings); the latter are surveyed for national accounts purposes. It means that only agricultural activity is included in EAA. Input for EAA is also received from the Economic and Environmental Statistics Department (GFCF, CFC, FISIM, and agricultural input and output price indices).

On the basis of the final EAA, quarterly accounts are compiled by products for three quarters. The accounts are compiled by extrapolation. The value of products in the same quarter of the previous year is multiplied by the volume index and then by the price index. The distribution of products in quarterly accounts is less detailed than in EAA and is based on the requests of the Economic and Environmental Statistics Department. For crop products, volume indices are received from the quarterly questionnaire "Quarterly economic indicators" and they are based on sold volumes. For animal products, volume indices are received from the statistical activity "Livestock farming". Quarterly output price indices are received from agricultural price statistics. Data about subsidies on products (planned) are received from the Ministry of Rural Affairs.

Intermediate consumption is calculated for the industry as a whole by extrapolation. The volume index is the growth rate of production in relation to the same quarter of the previous year.

Both output and input indices are compiled on the basis of a gentlemen's agreement and also sent to Eurostat. According to Regulation (EC) No 138/2004, the second annual EAA estimate is compiled by 31 January of the year T+1. The second estimates of yearly EAA are compiled by the Ministry of Rural Affairs according to the methodology of EAA by using several statistical data sources and, if necessary, consulting with Statistics Estonia.

Thus, the data for the fourth quarter together with the adjusted estimates for the other quarters are compiled on the basis of the second estimates of EAA. Benchmarking of the quarterly estimates is done using the proportional Denton-Cholette method. The relevant indicators for the benchmarking are turnover and costs from the SBS.

Quarterly accounts are compiled separately for non-financial corporations (S.11) and the households sector (S.14).

For forestry and fishing belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

The forestry output of own final use in households is estimated using the number of farms, the quantitative estimation of fuel wood consumed for own use, and the average prices of timber. The output of households' market production is extrapolated based on own production output using its share in the activity's output in the latest annual data. The intermediate consumption of market and non-market production is calculated based on their share in output in the latest annual data. Value added is residual. FISIM (see section 4.2.) is added to intermediate consumption.

The fishing output of households is the sum of fishing for own final use and market production of fishing. The data on own final use are received from the HBS or from the respective models. The output of market production is extrapolated based on own production using its share in the activity's output in the latest annual data. The intermediate consumption of market and non-

market production is calculated based on their share in output in the latest annual data. Value added is residual. FISIM (see section 4.2.) is added to intermediate consumption

4.1.2. **Industry, excluding construction**

NACE:
B Mining and quarrying;
C Manufacturing;
D Electricity, gas, steam and air conditioning supply;
E Water supply; sewerage, waste management and remediation activities.

The total value added of NACE B–E industries was mainly produced by non-financial corporations. For industries belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

4.1.3. **Construction**

NACE: F

The total value added of construction activities was mainly produced by the non-financial corporations (93%) and households (7%) sectors.

For construction activities belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1

The output of construction for own consumption in households is based on the quarterly indices of retail sales of building materials from the Short-term Statistics. Intermediate consumption is based on its share in output based on the latest annual data.

4.1.4. **Trade, transport, accommodation and food services**

NACE: G Wholesale and retail trade; repair of motor vehicles and motorcycles

The total value added of trade activities was mainly produced by the non-financial corporations sector. For trade activities, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

NACE: H Transportation and storage

The value added of transportation and storage activities was produced by the non-financial corporations (92%), general government (6%) and households (2%) sectors. For transportation and storage activities belonging to the non-financial corporations sector, the calculations of

output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

For transportation and storage activities belonging to the general government sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for the general government sector described in section 4.1.9.

NACE: I Accommodation and food service activities

The total value added of accommodation and food service activities was mainly produced by the non-financial corporations sector. For accommodation and food service activities, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

4.1.5. **Information and communication**

NACE: J

The value added of information and communication activities was produced by the non-financial corporations (95%), general government (4%) and households (1%) sectors.

For information and communication activities belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

For information and communication activities belonging to the general government sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for the general government sector described in section 4.1.9.

4.1.6. **Financial and insurance activities**

NACE: K

The total value added of financial intermediation activities was mainly produced by financial corporations. The quarterly calculation for financial intermediation activities (K) is done separately for financial service activities, except insurance and pension funding; insurance, reinsurance and pension funding, except compulsory social security; and activities auxiliary to financial services, except insurance and pension funding.

The statistics on the central bank (Eesti Pank), credit institutions, big leasing companies and pension funds are produced and published quarterly by Eesti Pank. The rest of the financial intermediaries, financial auxiliaries and insurance companies are covered by quarterly statistical surveys carried out by Statistics Estonia. In case of non-response, annual administrative accounting data from the Commercial Register are used as necessary.
All financial institutions are market producers, with the exception of the central bank, the output of which consists both of non-market and market production.

The output of non-market production is calculated as the sum of costs, i.e. its intermediate consumption, compensation of employees, social contributions, consumption of fixed capital and other taxes less subsidies on production and depreciation, plus own-account software.

Market output is calculated as the sum of commission income, other income, income in kind and own-account software.

For non-life insurance, output is calculated as follows: premiums earned plus premium supplements minus adjusted claims accrued minus increases in technical reserves plus other income. Premiums earned are calculated as follows: premiums written minus the change (less increase or plus decrease) in the reserves for premiums earned. Adjusted claims accrued are calculated as follows: claims paid plus the change (less increase or plus decrease) in the reserves for claims outstanding. The sum of costs method is not applied.

For life insurance, output is calculated as follows: premiums earned plus premium supplements minus benefits due minus increases (or plus decreases) in technical reserves and with-profit insurance.

For pension schemes, output and intermediate consumption are equal to operating costs, so that value added is always zero.

The output of activities auxiliary to financial services, except insurance and pension funding, is calculated as the sum of commission income, other income, income in kind, own-account software, and research and development.

The intermediate consumption of financial service activities, except insurance and pension funding, is the sum of commission expenses, administrative expenses except staff costs, operating expenses, other expenses and non-market output of the central bank, plus FISIM; income in kind is excluded.
For insurance, intermediate consumption is calculated as follows:
- reinsurers' share of premiums earned;
- reinsurers' share of premium supplements (+);
- reinsurers' share of adjusted claims accrued (+);
- reinsurance commissions (-);
- reinsurers' share in change of provision of life insurance (-);
- reinsurers' share in change of other technical provisions (-);
- commissions paid plus services bought (+);
- other expenses (+).

There are no resident reinsurance companies in Estonia, all reinsurance services are purchased from abroad.

The intermediate consumption of activities auxiliary to financial services, except insurance and pension funding, is the sum of commission expenses, administrative expenses except staff costs, operating expenses and other expenses; income in kind is excluded and FISIM is included.

4.1.7. Real estate activities

NACE: L

The total value added of real estate activities was mainly produced by non-financial corporations (35%) and households (62%), whereas the contributions of the general government and NPISH sectors were smaller (1% and 2%, respectively).

The estimates of imputed and actual rents are calculated for households. The output of actual rents is calculated by the reflation of the output at the prices of the previous year obtained by extrapolation. The extrapolation index is a housing area's growth. Intermediate consumption estimates are made on the basis of yearly calculation data using the intermediate consumption / output proportion.

The output of imputed rents is the sum of production costs (input method). The output value is estimated as the sum of intermediate consumption, consumption of fixed capital, other taxes on production and operating surplus. In this case, intermediate consumption is calculated using the extrapolation index of a housing area's growth. When calculating operating surplus, the indicator is the trend in consumption of fixed capital.

For real estate activities belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1

For real estate activities belonging to the general government sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for the general government sector described in section 4.1.9

For real estate activities belonging to the non-profit institutions serving households sector, the total output of non-market producers is valued at total production cost. The data on economic expenditures, compensation of employees and taxes on production come from the survey of non-profit institutions. The data from completed survey questionnaires are grossed up.

4.1.8. Business services

NACE: M Professional, scientific and technical activities

The value added of professional, scientific and technical activities was produced by the non-financial corporations (80%), general government (16%) and households (4%) sectors. For professional, scientific and technical activities belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

For professional, scientific and technical activities belonging to the general government sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for the general government sector described in section 4.1.9.

NACE: N Administrative and support service activities

The total value added of administrative and support service activities was mainly produced by the non-financial corporations sector.

For administrative and support service activities belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

4.1.9. **Public services, education and health**

NACE: O Public administration and defence; compulsory social security

In Estonia, only units of the general government sector are included in the activities of public administration, defence and social security (NACE Section O).

The estimation of general government output is based on the data from the information system of Public Sector Financial Statements (PSFS). The same data source makes it possible to use similar procedures for compiling the quarterly and annual estimations. The general government sector covers all institutional units considered as government non-market producer units.

The estimation of government output, intermediate consumption and value added is uniform for all activities; thus, there are no special methods used for individual NACE activities.

The total output of non-market producers is valued at total production cost. The output value 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. The main items of expenditure used for output estimation are the labour costs and operating expenses of units.

The main components of general government intermediate consumption are operating expenses, excluding daily allowances, insurance premiums, accounts treated as gross fixed capital formation, etc. FISIM is calculated separately and then added to the estimation.

For the general government sector, value added is estimated as the sum of compensation of employees, consumption of fixed capital, and other taxes on production. A detailed description of compensation of employees, including the components (wages and salaries and employers' social contributions), is provided in section 6.1. Other taxes on production include land tax, business and professional licenses, pollution charges, fees for the special use of water, etc. Consumption of fixed capital is estimated separately.

The output of the general government at previous year's prices is calculated as the sum of production costs (input method), where inputs are deflated at the product level or extrapolated by volume indicators. The intermediate consumption is deflated at the product level, using corresponding indices like the consumer, producer or import price index. The detailed product breakdown is derived from PSFS. The total value added (excluding consumption of fixed capital) at previous year's prices is estimated for each general government NACE activity by using the volume indices of changes in the number of full-time employees. Data concerning

changes in the number of employees are available from labour force statistics. Value added is estimated in the same way for all NACE activities.

NACE: P Education

The total value added of education activities was mainly produced by the general government sector (92%). The contributions of the non-financial corporations and non-profit institutions serving households sectors were smaller (5% and 3%, respectively).

The education activities of the general government sector cover budgetary preschool child care institutions, basic schools, state and municipal secondary schools, schools for children with disabilities, sports, music and art schools, universities, etc. The units covered by the state budget or local government budget are invariably classified as government sector units. For other public sector units, the classification is based on the market/non-market test.

The data source and methodology used for estimating the value added of the education activities belonging to the general government sector are the same as for NACE section O.

For education activities belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

For education activities belonging to the non-profit institutions serving households sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-profit institutions serving household described in section 4.1.7

NACE: Q Human health and social work activities

The total value added of human health and social work activities was mainly produced by the general government sector (66%) and the non-financial corporations sector (30%). The contributions of the non-profit institutions serving households sector and households sector were smaller (3% and 1%, respectively).

The units covered by the state budget or local government budget are invariably classified as government sector units. Other public sector hospitals and social care facilities are classified into the government sector based solely on the nature of their activities without the market/non-market test. The previous analyses carried out for those units have proven that they are created directly to carry out public policies and are therefore considered to be government sector units.

The data source and methodology used for estimating the value added of the health and social work activities belonging to the general government sector are the same as for NACE section O.

For human health and social work activities belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

For education activities belonging to the non-profit institutions serving households sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-profit institutions serving household described in section 4.1.7

4.1.10. **Other services**

NACE: R Arts, entertainment and recreation

The total value added of arts, entertainment and recreation activities was mainly produced by the general government sector (53%) and the non-financial corporations sector (31%). The contributions of the households sector and the non-profit institutions serving households sector were smaller (1% and 15%, respectively).

The data source and methodology used for estimating the value added of the arts, entertainment and recreation activities belonging to the general government sector are the same as for NACE section O.

For arts, entertainment and recreation activities belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

NACE: S Other service activities

The total value added of other service activities was mainly produced by the non-profit institutions serving households sector (45%) and the non-financial corporations sector (42%). The contributions of the households and general government sectors were smaller (11% and 2%, respectively).

For other service activities belonging to the non-profit institutions serving households sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-profit institutions serving households sector described in section 4.1.7.

For other service activities belonging to the non-financial corporations sector, the calculations of output, intermediate consumption and value added are carried out according to the procedure for non-financial corporations described in section 4.1.

NACE: T Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use

In the activities of households as employers, only the households sector is involved.

The value of total output at current prices is calculated on the use side on the basis of HBS or the respective models (HBS data are derived using regression models), because it reflects the consumption of these services better than other data sources. As the calculations are done by the expenditure approach (all expenditures made are covered), we assume that all production activities are also covered.

No intermediate consumption is calculated. Value added is residual. Moreover, the same estimates are taken into account in the income approach as mixed income.

4.2. Financial intermediation services indirectly measured (FISIM)

4.2.1. Data sources

The data for FISIM calculations come from Eesti Pank and from the Commercial Register and include the following:

- data on commercial banks' assets (loans) and liabilities (deposits, loans); includes stocks and weighted average interest rates;
- data on commercial banks' long-term loans vis-à-vis households divided by purpose of loans; includes stocks and weighted average interest rates;
- 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 together with a breakdown by leasing object and by type of leasing;
- consolidated balance sheet of big leasing companies;
- data on mutual funds' deposits.

4.2.2. 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.125). Sub-sector S.122 consists of commercial banks and savings and loan associations. Commercial banks give more than 99% of all the loans and deposits of S.122; therefore, the most detailed data are available for commercial banks. Big leasing companies that have joined the Estonian Leasing Association dominate in S.125. Big leasing companies give about 95% of loans granted to resident non-financial intermediaries in S.125. The other part of S.125 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. The interest rates used for both S.122 and S.125 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. The internal reference rates used in FISIM calculations are calculated as stipulated in Commission Regulation (EC) No 1889/2002.

On the loans side, FISIM calculated by institutional sector is allocated among industries using the NACE Rev.2 A68 aggregation level (68 activities), proportionally to the stocks of loans for each industry if relevant. Allocation of FISIM among industries at the NACE 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.125), financial auxiliaries (S.127), insurance corporations and pension funds (S.129) and general government (S.13).

4.3. Taxes less subsidies on products

4.3.1. Data sources

The main sources of data for the compilation of estimates on taxes and subsidies on products are the monthly reports on the execution of the state and local government budgets provided by the Ministry of Finance. There are also special reports from the Tax and Customs Board comprising detailed information on goods subject to customs duties or local package excise duties, and some statistics produced by other units within Statistics Estonia used for the calculation of volume indices. The data source for subsidies on agricultural products is the reports on executed national aid schemes from the Estonian Agricultural Registers and Information Board, the government institution subordinated to the Ministry of Rural Affairs. For subsidies on transportation, data from the Ministry of Finance are used.

4.3.2. Calculation of taxes less subsidies on products at current prices

Taxes and subsidies on products are defined in line with the ESA 2010 classification. All the data on taxes and subsidies at current prices are obtained from a direct source: monthly reports on the execution of the state and local government budgets. Table 5 shows a detailed overview of the classification of taxes on products.

Table 5. Detailed overview of the classification of taxes on products

D21	**Taxes on products**	**Description**
D211	Value added tax	In central government accounting, VAT includes also VAT to the EU.
D2121	Customs duties	Customs duties relate to the value of imported goods, released for free circulation. The value of a customs duty is calculated by applying the duty rate (a certain percentage) to the value of the imported goods.
D2122C	Excise duties	
D2122C	Alcohol excise	The data are based on the information
D2122C	Tobacco excise	contained in the customs declarations of the
D2122C	Fuel excise	Tax and Customs Board, except for the fee for

D2122C	Package excise	liquid fuel stocks – these data are obtained from the Estonian Oil Stockpiling Agency.
D2122C	Energy excise	
D2122C	Liquid fuel stockpiling fee	
D214A	Package excise (domestic)	Excise tax paid by domestic producers.
D214D	Car registration fee	Part of the state duty accrued to the state budget.
D214F	Gambling tax	It is charged on gambling tables and machines used for games of chance located on licensed premises.
D214H	Postal service payment	Payment made by a postal service provider with a financing obligation, in order to compensate for the costs specified in the Postal Act.
D214I	Local sales tax	Relates to goods and services sold to final consumers.

Taxes and subsidies on products are time-adjusted as stated in Regulation (EC) No 2516/2000[5], according to which cash receipts are time-adjusted so that the cash is attributed when the activity took place to generate the tax liability (or when the amount of tax was determined, in the case of some income taxes). Time adjustment of one month is used for VAT and for taxes on imports.

Subsidies on products are subsidies payable per unit of good 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 two groups – agricultural subsidies and subsidies on transport.
Agricultural subsidies classified as subsidies on products are paid for crop (specified in EU legislation), for maintaining suckler cows and for raising ewes. The preliminary quarterly expenditures of agricultural subsidies are based on an estimation of the annual amount of subsidy, which is divided equally between quarters. In the first revision of annual figures, data on actual accrual expenditures are used and the division between quarters is found based on quarterly output.

Subsidies on transport are divided into four subcategories – road, rail, air and water transportation. The amounts of subsidies are based on accrual data while compiling quarterly accounts and revised later during the revisions. There are no large differences between quarterly and revised data.

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[5] 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

4.3.3. Calculation of taxes less subsidies on products at previous year's prices

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

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

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

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

Subsidies on passenger transport and on certain postal services are diverged at previous year's prices 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 EAA are compiled. Therefore, the estimates at previous year's prices are based on the data of the previous periods.

4.4. Estimation of exhaustiveness

Adjustments for exhaustiveness are made for the inclusion of 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). The overall adjustment for exhaustiveness encompasses adjustments for:
- non-registered underground economy (N1);
- illegal activities (N2);
- misreporting of economic indicators (N6);
- other GDP under-coverage (N7).

- *Adjustments for non-registered underground economy (N1)*
The estimations for S.11 and S.14 in QNA calculations are made on the basis of yearly calculation data using the development trends of production.

The yearly estimation of non-registered underground economy refers to the production of intentionally non-registered productive units. One source that helps to determine non-registered workers is the Labour Force Survey (LFS). From that survey, it is possible to distinguish also the number of employees operating in the hidden economy. Those are persons who work under an oral contract (i.e. without any formal written contract). This type of work usually means

moonlighting, which is not officially registered and for which often no taxes are paid. Sole proprietors or individuals who provide services or goods but who are not officially registered are also captured by the LFS. It must be considered that the LFS concerns only domestic employees, but there exists a number of foreign workers who stay illegally in Estonia without a permission to work. The size of the illegal migrant workforce is estimated to be between 3 and 10 thousand people.

After the number of non-registered workers is established, the data of the SBS survey of small units (1–9 employees) about production, intermediate consumption and wages and salaries per employee are used for N1 calculations, assuming that the economic indicators characterising hidden employment are similar to the indicators of small enterprises. The average figures per person employed are multiplied by the number of non-registered workers, and the output, intermediate consumption and wages and salaries of hidden employment are received.

- *Adjustments for illegal activities (N2)*
The calculations of illegal activities cover prostitution and the smuggling of tobacco, alcohol, motor fuel and sugar in S.11, and the production and distribution of narcotics and the smuggling of medicines in S.14. The data inputs used are quite similar to the ones used for annual estimates. More specifically, the data are obtained from the Police and Border Guard Board, the Estonian Forensic Science Institute, the Estonian Tax and Customs Board, foreign trade statistics produced by Statistics Estonia, and the media. Annual figures are usually obtained by summing up the corresponding quarterly figures, except in cases where some additional information becomes available after the quarterly figures have been compiled.

- *Adjustments for misreporting of economic indicators (N6)*
The underreporting of wages and salaries (or so-called envelope wages) refers to wages that are actually paid to employees but not reported officially by enterprises in the business accounts and tax statements. For an employer, the main aim of the underreporting of wages in the accounts is to evade the payment of social security contributions.

The estimations for S.11 and S.14 in QNA calculations for so-called envelope wages are made on the basis of yearly calculation data using the development trends of wages and salaries.

For the yearly estimation of envelope wages and profits, grossed-up data from the SBS are used: number of persons employed, number of employees, wages and salaries, and profits and losses.

For the estimation of underreporting of wages and salaries, first, the average monthly wages and salaries per employee are calculated by activity and by county. Next, the corresponding data of enterprises are compared to the average monthly wages and salaries of the same activity and county. If the results are lower than one third of the corresponding average, the payment of envelope wages could be estimated. It is assumed that if the wages and salaries are too low, an enterprise cannot find workforce. If an enterprise does not show employees, profit per person employed is calculated and the underreporting of profits estimated.

The estimations of VAT fraud are made using the latest available SUT data and currently received and time-adjusted VAT data.

- *Adjustments for other GDP under-coverage (N7)*
Estimates for income in kind are made 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; the use of

HBS data without extrapolation is impossible due to the poor quality of the survey that targets a very small percentage of the population.

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 on legal output structure and overall run of taxi drivers.

PYP calculations for exhaustiveness are done using consumer price and producer price indices.

5. GDP COMPONENTS: THE EXPENDITURE APPROACH

5.1. Household final consumption

The estimates of household final consumption expenditure (HFCE) are broken down by 116 commodity groups according to the COICOP (at the 4-digit level).

HFCE estimates are prepared in accordance with the tabular approach. The tabular approach, developed by Eurostat, presents a set of analytical tables where estimates are obtained in a systematic way and all steps from raw data until the final figures are clearly identified. For HFCE estimates, a bottom-up approach is used. The systematic tabular approach is used for quarterly and also for annual estimates. This makes it possible to use the same framework for all HFCE estimates and ensures the quality of the results used in NA.

The main data sources for quarterly estimates of HFCE are:

- HBS – a sample survey which provides detailed information about the purchases of goods and services per person. It was conducted regularly every year until 2008. Starting from 2008, the survey is carried out at an interval, i.e. there are data for 2010, 2011, 2012, 2015, 2016 and 2019. Meanwhile, instead of HBS data, estimates of regression models developed by the Population and Social Statistics Department are used. Forecasts of expenditures are provided for every quarter at the 4-digit COICOP level.

- Sales of goods and services from the STS – a quarterly sample survey about economic activity carried out by Statistics Estonia. Data about the retail sales of goods are derived from the STS which distinguishes the following groups: foodstuffs; alcoholic beverages; tobacco products; clothing, woven materials, footwear; motor vehicles, spare parts and fuels; other goods. The raw data of the HBS are used to allocate these commodities (NACE 45, 46 and 47) and the sales data of services to COICOP groups.

- BOP – data on the expenditures of non-residents in Estonia and residents abroad are obtained from the BOP compiled by Eesti Pank, which uses the results of the Foreign Visitors Survey for non-residents and the Tourism Survey for residents (these surveys are carried out by Statistics Estonia).

- Data from administrative sources, information from big suppliers and other sources are used, e.g. PSFS, insurance statistics, energy statistics, the aggregated income statement of credit institutions, statistics from the Estonian Road Administration, transport statistics, population statistics, consumer and producer price indices, etc.

- Data from the production approach are used for the calculation of HFCE estimates, e.g. actual and imputed rentals, adjustments for the consumption of households' own production (fishing and forestry), output of restaurants and hotels, tips for taxis, restaurants and hotels, illegally produced/imported goods and services (narcotics, prostitution, and smuggling of alcohol, tobacco, sugar, medicines and motor fuel), adjustments for enterprises that are not covered by the statistical profile used for the survey, income in kind, FISIM.

Due to insufficient information, some special estimations for the quarterly calculations (e.g. maintenance and repair of the dwelling, water supply, refuse and sewerage collection, other services relating to the dwelling, electricity, gas, liquid fuels, heat energy, motor cars, motor cycles, combined passenger transport, games of chance, other financial services) are made using HFCE estimates of the year t-2 (based on SBS information) and disaggregated changes in the CPI.

The individual consumption expenditure includes both purchased goods and services for own consumption (agriculture, fishing, forestry). Adjustments are made for wages and salaries in kind, purchases and sales outside the retail trade system, consumption of occasional and temporary activities, intentionally non-registered units, sole proprietorships and illegal activities. Additionally, adjustments are made to take into account the consumption of people living in institutions, imputed rentals, and tips.

HFCE may take place in the domestic territory or abroad. Therefore, two different HFCE figures are calculated: HFCE according to the domestic concept (all expenditures made in the economic territory by residents and non-residents) and HFCE according to the national concept (all expenditures made by residents in the economic territory and in the rest of the world).

HBS data follow the national concept and in order to arrive at HFCE according to the domestic concept, the expenditures of resident households incurred abroad have to be deducted and non-residents' expenditures in the economic territory have to be added.

Unlike the HBS, the STS provides raw data according to the domestic concept. Therefore, in order to arrive at HFCE according to the national concept, the expenditures of resident households incurred abroad have to be added and the expenditures of non-residents in the economic territory have to be deducted.

Data on the expenditures of non-residents in Estonia and residents abroad are obtained from the BOP compiled by Eesti Pank.

In most cases, at least two independent estimates are obtained for each COICOP group; in some cases there are three estimates from which the best estimate is chosen. In general, the best estimate for food, non-alcoholic beverages and different services is derived from HBS-based calculations. At the same time, retail trade statistics are used as the best source to estimate purchases of different goods, e.g. alcoholic beverages, tobacco, clothing and footwear, furnishings and household equipment, etc. Results based on other sources are considered to be the best estimate in the case of special estimates (e.g. rentals, miscellaneous goods and services related to housing, purchases of motor cars and motorcycles, combined passenger transport, games of chance, other financial services, narcotics, prostitution, FISIM).

All HFCE estimates and adjustments are in line with ESA 2010. HFCE is valued at purchaser's prices including VAT.

In Estonia, HFCE estimates based on the HBS are recorded at purchaser's prices including non-deductible VAT. Retail sales data and data on the sales of services from the STS do not include VAT, which is consequently added in by the NA team. Households' own-account production of goods is valued at basic prices. Wages and salaries in kind are estimated at purchaser's prices in the case of goods and services financed by the employer and provided to employees.

HFCE is calculated at the 4th level of COICOP groups and the same commodity detail is used for deflation. For deflation, the CPIs and PPIs are used (the latter are used for the deflation of the consumption of households' own production). For narcotics and prostitution, values are received directly from the Police and Border Guard Board. For the expenditures of resident households in the rest of the world, the weighted CPI for the main destination countries for tourism is used. For non-residents' expenditures in the economic territory, the same CPIs are used as for the expenditures of households living in Estonia.

5.2. Government final consumption, including split individual/collective consumption

Most of the government final consumption expenditure consists of free of charge non-market output directly produced by government units. The government final consumption expenditure is estimated on the basis of total output value, from which own-account capital formation and income from the sales of goods and services are excluded and social transfers in kind of market goods and services are added.

The main data source is the PSFS system. All general government units are covered in the system. For own-account R&D, data from the Research and Development Survey are used. These data are checked against the data from PSFS.

The methodology for estimating output in the general government sector is described in detail in Section 4.1. For most of the government sales income, the estimation is based on the PSFS account set "Sale of goods and services". The main categories of sales include state fees and revenue from educational and health care activities.

Social transfers in kind of market goods and services cover general government expenditure on products supplied to households via market producers. They are mainly financed from the budget of the Health Insurance Fund. The main categories of social transfers include expenditure on health services and medicines, which are recorded in the PSFS system in the accounts "Health insurance allowances".

The borderline between individual and collective final consumption is drawn on the basis of COFOG level 2. The classification of the functions of government used for dividing government output and then government final consumption expenditure is based on the 1999 version of COFOG. COFOG expenditure data are measured for the general government sector with a breakdown by sub-sector. The codes for functions used in the PSFS system are based on the COFOG classification. The PSFS code for a function is a five-digit code where the first three digits correspond to COFOG level 2.

For the estimation of the final consumption expenditure of the general government at previous year's prices, output, sales, output for own final use, and social transfers in kind are deflated separately. The output estimation methods are described in Section 4.1. Social transfers in kind and sales of general government are deflated at the level of product using the appropriate price index. The detailed product breakdown is derived from the PSFS system. FISIM is deflated separately and then added to the estimation.

5.3. NPISH final consumption

The final consumption expenditure of the NPISH sector at current prices is estimated on the basis of total output value (the sum of intermediate consumption, compensation of employees, consumption of fixed capital and other taxes on production) from which market output, output for own final use, research and development produced for own final use, own-account software and income in kind are subtracted, and final consumption expenditure is received.

The sources for the final consumption estimations of NPISH are the same as for the production approach. The figures of sales of goods and services are derived on the basis of the data from the latest available survey of non-profit institutions using output and product structures and development trends.

Final consumption expenditure at previous year's prices (PYP) is derived as the difference of NPISH output at previous year's prices and PYP values of market output, output for own final use, research and development produced for own final use, own-account software and income in kind. The market output figures are deflated by products using consumer price indices and producer price indices for services. In the case of NPISH, the main part of the sales of services consists of sporting services, adult education services, social welfare services and renting.

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's prices are made by five institutional sectors, by activity using NACE Rev. 2 A64 aggregation, and by type of fixed assets. A breakdown into 17 types is used for fixed assets: dwellings (AN.111), buildings other than dwellings (AN.1121), roads and bridges (AN.11221), other infrastructure and structures (AN.11222), land improvements (AN.1123), cost of ownership transfers (AN.11231), transport equipment (AN.1131), computer hardware (AN.11321), ICT equipment (AN.11322), other machinery and equipment (AN.1139), weapons systems (AN.114), animal resources yielding repeat products (AN.1151), tree, crop and plant resources yielding repeat products (AN.1152), research and development (AN.1171), mineral exploration (AN.1172), computer software and databases (AN.1173), entertainment, literary or artistic originals (AN.1174).

As the asset breakdown required for the perpetual inventory method (PIM) used for calculating the consumption of fixed capital is often more detailed than the asset breakdown in the data sources, structures based on annual data are used to obtain the 17 types of fixed assets described previously.

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 (at 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.

- *Dwellings (AN.111)*

The gross fixed capital formation in dwellings includes investments in new dwellings, the rebuilding of existing dwellings, brokerage and notary commissions, and state fees. Information about new construction and major repairs comes from the Register of Buildings. In case of brokerage and notary commissions, data on approved purchase-sale contracts of real estate are used. Data on state fees are available from the general government account data.

- *Other buildings and structures (AN.112) and Machinery and equipment (AN.113 + AN.114)*

The estimates for other buildings and structures and machinery and equipment are mainly based on the quarterly questionnaire "Economic activity" and the Public Sector Financial Statements (PSFS). Both sources include direct data on both the investments in buildings and structures and in machinery and equipment.

- *Cultivated biological resources (AN.115)*

Cultivated biological resources are estimated using direct data from the questionnaire "Economic activity". Also, investments made by sole proprietors are added. These are based on annual estimates and the growth rate of investments made by small non-financial enterprises (enterprises with less than 9 employees).

- *Intellectual property products (AN.117)*

Research and development (AN.1171) and mineral exploration (AN.1172) are extrapolated from the annual estimates using trends. Own-account software is extrapolated from the annual estimates using the growth of output in computer services as an indicator.

- *Acquisitions less disposals of valuables (P.53)*

Quarterly data on valuables are only available for the general government sector from PSFS.

a. GFCF calculations at previous year's prices

GFCF price indices do not differ by institutional sector or by economic activity. All the indices used are described in Table 6 below.

Table 6. GFCF price indices

Type of fixed assets	Price index	Comments
Dwellings (AN.111), Buildings and structures (AN.1121, AN.11221, AN.11222, AN.1123)	Construction price index, with additional costs included	It can be considered an output index because in addition to the price changes of basic inputs (labour force, building materials and machines), which are taken into consideration in the common construction price index, also the changes of other costs and profit margins of construction enterprises are taken into account. Therefore, it expresses more realistically the changes of the market prices for clients (there is no own-

		account construction in the general government sector; services are purchased from construction enterprises). Since Statistics Estonia cannot calculate this index by type of building, the same index is applied to all buildings and structures.
Transport equipment (AN.1131)	Import price indices on the level of 2-digit NACE codes	0.8 * import price index + 0.2 * producer price index of NACE C29
Computer hardware (AN.11321), ICT equipment (AN.11322))	USA's PPI of electronic computers and computer equipment, adjusted to take into account the effects of fluctuations in exchange rates	Since USA is a substantial producer and exporter of computers and has a relevant impact on the prices of the global sectorial market, the PPI of USA is considered the most appropriate.
Other machinery and equipment (AN.1139)	Import price indices on the level of 2-digit NACE codes	0.8 * import price index + 0.2 producer price index of NACE C26, C27, C28, C32
Weapons systems (AN.114)	Deflator of S.13, NACE O84	
Animal resources yielding repeat products (AN.1151)	Consumer price index of COICOP 01.1.2 (Live animals, meat and other parts of slaughtered land animals)	
Tree, crop and plant resources yielding repeat products (AN.1152)	Total producer price index	
Intangible fixed assets		
Research & development (AN.1171)	Consumer price index for all services in the institutional sectors S.11, S.12, S.15 Output deflator in S.13	
Mineral exploration (AN.1172)	Producer price index of CPA M71	
Computer software and databases (AN.1173)	USA's PPI of software publishers, adjusted with exchange rate changes	Used for the same reasons as those stated in case of computers and computer systems.

Entertainment, literary or artistic originals (AN. 1174)	Deflators of NACE J58, J59, J60, R90	

b. Changes in inventories (P52)

Data sources and coverage

Changes in inventories cover the value of additions to and withdrawals from inventories (including "normal" losses) in accordance with ESA 2010. Changes in inventories are estimated by economic activity, by product, by institutional sector and by type of inventories.

- *Agriculture, forestry and fishing*

The information for inventories is derived from the "Financial statistics of enterprises (quarterly)" survey conducted by the Enterprise and Agricultural Statistics Department. Standing timber is also a part of changes in inventories. There are no quarterly data sources; as a result, extrapolations are made from annual data. The volume data required for estimates come from the Estonian Environment Agency (KAUR) and data on prices from the State Forest Management Centre (RMK).

- *Industry, construction, trade and services*

Quarterly data on inventories are collected with the survey "Financial statistics of enterprises (quarterly)" conducted by the Enterprise and Agricultural Statistics Department. Since 2016, the statistical activities "Quarterly economic indicators of service enterprises", "Quarterly economic indicators of industrial enterprises", "Quarterly economic indicators of construction enterprises", "Quarterly accounts of information and communication technology sector", "Quarterly economic indicators of trade enterprises", "Quarterly economic indicators of transport enterprises" and "Quarterly economic indicators of tourism and accommodation" are merged with the activity "Financial statistics of enterprises (quarterly)".

The data collected by the sample survey are expanded to the whole population of enterprises. The sample is generated from the Business Register for Statistical Purposes. This survey provides information on the book value of inventory at the beginning and at the end of the accounting period by four types of inventories: materials and supplies (P.521), work-in-progress (P.522), finished products (P.523), goods for resale (P.524). It also provides information on other indicators that are used for calculating changes in inventories – these are turnover, total expenses, labour expenses and purchases of goods and services for resale. For changes in inventories, the data are aggregated mainly by 2-digit NACE level and by number of employees. For energy, transport, real estate activities and trade, 3-, 4- or 6-digit NACE levels are applied.

For economic activities that are related to the public sector (health care, public administration, education etc.), additional quarterly information is obtained from the Public Sector Financial Statements (PSFS).

- *Financial and insurance activities*

Quarterly data on inventories are collected with the survey "Financial intermediation and auxiliary services" conducted by the Enterprise and Agricultural Statistics Department. The

information is collected from all enterprises. Information about credit institutions, big leasing companies and pension funds is obtained from Eesti Pank.

There is no direct information available on inventories by product and the commodity composition of stock for quarterly calculations. The structure of inventories by product is estimated by annual (two years before the current year) output, cost and turnover.

Method for measuring changes in inventories and holding gains

In national accounts, according to ESA 2010, inventories of materials and goods (P.521) and goods for resale (P.524) should be valued at purchaser's prices, while inventories of finished products (P.523) and work-in-progress (P.522) should be valued at basic prices. As enterprises value inventories of finished products (P.523) and inventories of work-in-progress (P.522) at production cost that consists of direct and indirect costs related to production, adjustments need to be made to the source data on inventories of finished goods (P.523) and work-in progress (P.522) for valuation at basic prices, through making up the production costs by operating surplus. Operating surplus is calculated using the ratio of production costs to sales of the reporting period by activity.

According to ESA 2010, entries and withdrawals of inventory are valued at the time of entering the inventories or of withdrawal from the inventories. On the other hand, enterprises use the historic cost method in inventory accounting by recording entries of inventories at current prices at the time of transactions, and withdrawals of inventories at prices at the time of acquisition, not withdrawal. For the transition from business accounting and administrative concepts to ESA 2010 concepts, the book values of inventories at the beginning and end of the accounting period are converted into constant prices of the base year 2015 with appropriate deflators.

The difference between the constant price values of the stock of inventories at the beginning and end of the accounting period provides an estimate of volume changes in the stock of inventories at base period prices. In principle, this notion is equivalent to the change in the 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 the average price index for the current reporting period to convert changes in inventories to the average current prices of the accounting period. The changes in inventories at average current prices of the accounting period are further converted to previous year's prices by PYP indices.

Holding gains arise from changes in prices during the period held in inventory. Changes due to the lag between the times the items are produced/acquired and disposed of / used must be excluded. Holding gains/losses are eliminated from stocks. Holding gains are estimated as the difference between changes in inventories at historical prices and estimated changes in inventories at the average current prices of a period. Historical prices used in accounting are transformed to current prices.

For standing timber, the annual net growth of standing forest is calculated by different tree species and ownership from timber growth data. The value of standing timber for every tree species and timber assortment is obtained by multiplying the net growth of standing forest by the corresponding stumpage prices. The stumpage prices are derived by deducting felling costs from the average roadside prices. The value of the total net growth of standing forest in Estonia is obtained by summing up previous values of standing timber. Quarterly estimations of

standing timber are based on annual data, by dividing the yearly net value of standing timber between the second and third quarter.

Derivation of deflators for book values

The prices at which enterprises value the stocks of inventories and inventory withdrawals in their balance sheets depend on the inventory valuation method used by enterprises. The Estonian accounting regulations allow the use of three types of historic cost methods: specific identification method, first-in-first-out (FIFO) method, weighted-average cost method. For the construction of deflators, the FIFO, quarterly weighted average and monthly weighted average methods are used to calculate indices both at the beginning and at the end of the accounting period. In order to determine which method is used in each activity, a supplementary question about inventory accounting methods was included in the SBS survey of 2003. This information will be updated, as the same question was added to the form of the 2019 SBS survey.

The derivation 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 business inventory accounting. However, an approximation is made, using data on the stock holding period, calculated independently for opening and closing stocks.

The stock holding periods need to be calculated on the product level as changes in inventories and holding gains are both classified by product. For distributing the stocks at the beginning and at the end of each accounting period among products, the structure of intermediate consumption that is based on supply and use table data is used for materials and supplies, while the structure of production that is based on SBS data is used for work-in-progress as well as for finished goods, and the structure of SUT 2008 is used for goods for resale. The classification of products for inventories varies from the 2-digit to the 6-digit level of CPA 2008.

Stock holding periods are estimated in months based on the level of inventories at the end of the period compared to the revenue for the accounting period for inventories of work-in-progress (P.522), finished goods (P.523) and goods for resale (P.524). For the inventories of materials and supplies (P.521), inventories at the end of the period are compared to the amount of intermediate goods used for production. Stock holding periods are estimated by product for each type of inventory from the source data on inventories and sales or input costs, according to the following formula:

Inventory turnover period (stock holding period) in months = Level of inventories at the end of a period /Sales or materials expenses of a period * Number of months in a period.

The turnover of work-in-progress, finished goods, and goods for resale is calculated using the sales of a period. The turnover of materials and supplies is calculated using the materials expenses of a period. The value of the inventory turnover period determines the appropriate weights for the last 15 periods.

Specific price indices are assigned to each product, depending also on the type of inventory concerned. The price indices used to construct the deflators for book-value inventories are producer price indices at the 2- to 3-digit NACE level for revaluations of the stocks of materials and supplies (P.521), work-in-progress (P.522) and finished goods (P.523), whereas consumer

price indices at the 6-digit COICOP level are applied for revaluations of the stocks of goods for resale (P.524). Where possible, indices are weighted using the age structure of inventories by groups of products.

Because 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.

a) FIFO method

The FIFO valuation of inventories implies that prices used for the valuation of the inventories at any given point of time are prices of the latest acquisitions. In this case, the deflators used for the conversion of inventories into constant prices should reflect the price changes of goods acquired at different moments of time. Assumptions are made about stock holding periods and the age structure of inventories.

Deflators are derived according to the IMF recommendations of the age structure of inventories for various stock turnover periods. The corresponding monthly price indices are weighted by the assumed age structure of inventories defined in accordance with estimated stock holding periods. The indices at the beginning of the period and at the end of the period are the sums of the weighted monthly price indices for the periods going back 15 months.

b) Quarterly weighted-average cost method

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

The indices at the beginning of the period and at the end of the period are the quarterly weighted averages. The formulas for calculating indices at the beginning and at the end of a period n, i.e. quarter, as quarterly weighted averages are the following:

$$IDX\_beginning_n = \frac{IDX_{n-1}^2 \cdot 3}{ITP_{n-1} \cdot IDX_{n-1} - ITP_{n-1} \cdot IDX_{n-2} + IDX_{n-1} \cdot 3}$$

$$IDX\_end_n = \frac{IDX_n^2 \cdot 3}{ITP_n \cdot IDX_n - ITP_n \cdot IDX_{n-1} + IDX_n \cdot 3}$$

Where ITP stands for the inventory turnover period and IDX for the quarterly average price index, for the quarter n, n − 1 or n − 2, respectively.

c) Monthly weighted-average cost method

The formulas for calculating indices at the beginning and at the end of a period as monthly weighted averages are the following:

$$IDX\_beginning_n =$$
$$= \frac{IDX_{n-1} \cdot (ITP_{n-1}^2 \cdot PI_{n-1,1} + ITP_{n-1} \cdot (ITP_{n-1} + 1) \cdot PI_{n-1,2} + (ITP_{n-1} + 1)^2 \cdot PI_{n-1,3})}{(ITP_{n-1} + 1)^3 \cdot IDX_{n-1} - ITP_{n-1}^3 \cdot IDX_{n-2}}$$

$$IDX\_end_n = \frac{IDX_n \cdot (ITP_n^2 \cdot PI_{n,1} + ITP_n \cdot (ITP_n + 1) \cdot PI_{n,2} + (ITP_n + 1)^2 \cdot PI_{n,3})}{(ITP_n + 1)^3 \cdot IDX_n - ITP_n^3 \cdot IDX_{n-1}}$$

Where ITP stands for the inventory turnover period and IDX for the average price index for the quarter n, n – 1 or n – 2, respectively. PI corresponds to the price index for the first, second or third month in the quarter n, n – 1 or n – 2, respectively.

5.5. Exports and imports

5.5.1. 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 BOP. BOP is compiled by Eesti Pank. The methodological basis for the compilation of BOP is the 6th edition of IMF's Balance of Payments and International Investment Position Manual (BPM6).

Foreign trade statistics are compiled at Statistics Estonia and are based on two parallel data collection systems: Intrastat and Extrastat. Intrastat collects data about the exchange of goods with EU Member States. Statistics Estonia collects data directly from enterprises using the Intrastat system. Statistical surveys are used for goods which are not subject to customs clearance (e.g. exports of electrical energy, or fish caught in foreign waters). Extrastat covers the exports and imports of goods with non-members of the EU. Extrastat data are fixed in customs declarations and enterprises in Estonia do not have to report to Statistics Estonia in case of exchange of goods with non-members of the EU.

The estimates of the exports of goods are based on the special trade system of official foreign trade statistics produced by Statistics Estonia, and complemented by adjustments made by Eesti Pank to reflect the BOP concepts. The quarterly survey of enterprises conducted by Eesti Pank is the main data source for adjustments in exports.

In national accounts, the estimates of both exports and imports of goods follow the same concepts as the BOP. Exports include normal exports of goods that are produced in Estonia and change ownership between Estonian residents and non-residents, re-exports of goods after inward processing, and supplies for foreign vessels and aircrafts stores. Re-export from customs warehouses is excluded. Imports include normal imports of goods imported for domestic consumption which are paid for 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 the 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 codes of the 2-digit level of CPA.

Data on the exports and imports of services are derived from the BOP statistics compiled by Eesti Pank and distinguished according to categories of the BOP. Services in the BOP reflect services sold to and purchased from non-residents by Estonian residents. Transactions are recorded at market prices on an accrual basis, i.e. at the time the transaction was concluded

between the parties, regardless of money not having actually been received or paid. Thus, exports and imports of services taken from the BOP and FISIM are added by Statistics Estonia.

Exports of goods are valued at Free On Board (FOB) prices that include the value of goods and the cost of insurance and transportation to the border of the exporting country. The FOB value is equivalent to the purchaser's price. In foreign trade statistics, imports of goods are valued at Cost, Insurance and Freight (CIF) prices which include the value of goods and the transportation and insurance costs up to the importing country. The CIF values correspond to the basic prices as import duties and excise taxes on imports are not included in the values. For the imports of goods, a correction for CIF/FOB is made, whereas Statistics Estonia publishes exports and imports data at FOB prices as national accounts follow the same concept as the BOP.

5.5.2. **Calculation at previous year's prices**

Firstly, exports and imports at current prices are deflated to estimate them at previous year's prices. FISIM that is calculated at previous year's prices by Statistics Estonia is added to the exports and imports of services at previous year's prices. Then, chain-linked volume measures in the reference year are compiled by using chain-linked indices.

Both exports and imports of general merchandise goods are deflated on the 2-digit level of CPA codes. This results in a more detailed and accurate deflation. For goods, mainly the specific export and import price indices are used for deflation. If there is no relevant export or import index available, the most relevant producer price index (PPI) or consumer price index (CPI) is used.

Exports of services are deflated by the groups of BOP that are formed by modes of transport and content of the services. Exports of services are deflated by using mainly domestic CPIs or PPIs. For some services, the deflator is formed by calculating the average of corresponding CPIs or PPIs. For example, the export of maintenance and repair services is deflated by the repairs on goods index which is calculated as the average of the following four CPIs: repair of dwellings, maintenance and repair of transport equipment, maintenance and repair of household appliances, and repair of audio, video, photographic and information processing equipment. Operational leasing services are deflated by using the average of the PPIs for the manufacture of machinery and equipment, manufacture of electrical and optical equipment, and manufacture of motor vehicles, trailers and semi-trailers. For royalties and fees, the consumer price index used corresponds to the CPIs for motion picture, video and television programme production, sound recording and music publishing services, and programming and broadcasting services.

Imports of services are deflated by using the 'consumer price index of the most important trade partners'. The index is calculated quarterly as the sum of weighted import shares of Estonia's trade partners by predetermined countries and country groups, such as the European Union. The shares of imports of services are adjusted by a coefficient that takes into account the growth of the consumer price index and changes in the trade partner's currency exchange rate. The share of a country's or country group's imports in total imports of services is calculated by using the data from the BOP. The shares of imports for the reporting period are calculated based on imports in the same period of the previous year. When the revised BOP is obtained from Eesti Pank, the shares of imports of the previous year are replaced by shares of imports of the reporting year.

5.5.3. Geographical split for the EU/euro area

Data on the exports and imports of all items of goods and services are collected with a full breakdown by country, so that statistics can be compiled on any composition of country groups, including intra-EU and extra-EU countries. Foreign trade statistics publish export and import data by country. The estimations of export and import data for the Member States of the European Union (which consist of members and non-members of the Economic and Monetary Union), institutions of the EU, third countries and international organisations are based on the BOP. FISIM at current prices, which is included in exports and imports of services, is calculated by Eesti Pank and available by country.

Exports and imports at PYP and chain-linked prices are compiled by the same categories as exports and imports at current prices. Exports and imports at PYP and chain-linked prices are obtained by using the shares of previously divided exports and imports from total exports and imports at current prices. Using these shares, total exports as well as total imports both at PYP and chain-linked prices are divided among Member States of the European Union, members and non-members of the Economic and Monetary Union, institutions of the EU and third countries and international organisations.

6. GDP COMPONENTS: THE INCOME APPROACH

6.1. Compensation of employees

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 the surveys and administrative sources involved. 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 an employment contract for a fixed or unfixed period (including contracts of seasonal work), persons with a service contract and employees working under the Civil 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 obtaining formal education, and payments in kind. Compensation of employees is estimated by institutional sector and by activity.

The income approach calculates GDP as the sum of wages and salaries, social contributions, other taxes less subsidies on production, plus depreciation and surplus, which is calculated by subtracting all the previously mentioned items from gross value added (which in turn is calculated as total output minus intermediate consumption).

Data sources
Good-quality administrative data on wages and salaries and social contributions in the financial corporations sector are obtained from the Tax and Customs Board on a regular and timely basis. The rest of the data are gathered from quarterly statistical surveys carried out by Statistics Estonia.

For the general government sector, the data on the compensation of employees are derived from the PSFS system (for more information, see Section 4) and from the Tax and Customs Board. The breakdown of labour costs in PSFS allows estimating the main categories of the compensation of employees as wages and salaries in cash, wages and salaries in kind and employers' social contributions (actual and imputed).

Wages and salaries in cash are mainly recorded in the PSFS account set "Salaries". Wages and salaries in kind include fringe benefits and foreign service allowance expenses. This estimation is based on the accounting information available in PSFS.

Employers' actual social contributions include social tax (health and pension insurance) and unemployment insurance premium (unemployment insurance). In PSFS, employers' actual social contributions are mainly recorded under the account set "Taxes related with labour costs".

Employers' imputed pension contributions cover special pensions and other social allowances for civil servants. Special pensions include superannuated pension, state pensions by special acts, and state pension under favourable conditions (paid to the President, members of Parliament, Auditor General, Chief Justice, judges, Chancellor of Justice, police officers and members of the Defence Forces).

Employers' imputed non-pension contributions consist of sickness benefits and redundancy payments to employees. For these, the main data sources are declarations of income and social tax received from the Tax and Customs Board.

The estimations at previous year's prices for general government are described in Section 4.1.

For the households sector, the compensation of employees represents a small part of value added, as it is calculated only for sole proprietors with employees. Declarations on the business income of sole proprietors received from an administrative source (Tax and Customs Board) are the data source used for estimating wages and salaries and social tax. Sole proprietors have to report the amount of wages and salaries paid to employees, fringe benefits granted to employees, social tax paid on behalf of employees and social tax paid on business income. The Tax and Customs Board data covering all sole proprietors are usually available 30 days after the end of the period.

The income approach for NPISH
For the non-profit institutions serving households sector (S.15), the income approach uses the same sources as the production approach.

The components of value added of the NPISH sector by the income approach are
- compensation of employees;
- other taxes on production (D.29);
- consumption of fixed capital (CFC).

For the NPISH sector, compensation of employees constitutes approximately 90% of value added. The data are received from the Tax and Customs Board and from the survey of non-profit institutions.

Compensation of employees includes wages and salaries (D.11) and employers' social contributions (D.12).

Wages and salaries include wages and salaries in cash (D.110) and daily allowances (D.111) and wages and salaries in kind, i.e. fringe benefits (D.117).

Wages and salaries are calculated mainly on the basis of the Tax and Customs Board's data on payments subject to social tax. Additionally, a part of payments for business trips is treated as wages and salaries. The part of payments for business trips is added to the calculations on the basis of the latest available annual survey data corrected with the development trend. Based on HBS and the Tax and Customs Board's data, wages and salaries in kind are added to wages and salaries too.

Employers' social contributions include 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 the state health insurance fund and pension insurance fund and unemployment insurance premiums payable to the Unemployment Insurance Fund. Unemployment insurance is a type of compulsory insurance. It is paid by insured persons and by employers.

In case of NPISH, employers' imputed social contributions (D.122) cover sickness benefits paid by employers, redundancy payments and compensation in connection with an accident at work or an occupational disease.

Data on actual and imputed social contributions are received from the Tax and Customs Board.

6.2. Taxes less subsidies on production

Other taxes on production (D.29) include taxes on land and on pollution resulting from production activities, fee for the special use of water, 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) consist mainly of support payments from national aid schemes for various agricultural activities. Other subsidies on production are valued pursuant to the accrual principle.

6.3. Gross operating surplus and mixed income

In Estonia, the income approach is not an independent method. Gross operating surplus is calculated by activity as a residual item between gross value added from the production approach and the components of value added according to the income approach.

Mixed income is generated in the activities of the households sector, where the distinction between wages and profits as an entrepreneur is most difficult to make. Mixed income contains both payments for work and entrepreneurship. This income is based on labour input, but it cannot be separated from the profit of self-employed persons and therefore it is called mixed income. Any wages and salaries that self-employed persons pay themselves are wages and salaries and not mixed income. The imputed income obtainable from living in an owner-occupied dwelling is operating surplus and not mixed income.

7. POPULATION AND EMPLOYMENT

As of 1 January 2021, the methodology of the Estonian Labour Force Survey (ELFS) is going to be changed, in accordance with Regulation (EU) 2019/1700 of the European Parliament and of the Council which ensures harmonisation between various social statistics of the European Union Member States.

Starting from 2021, the definition of employment in the survey is changed to include:

1. International Labour Organization (ILO) criteria: (a) reference week; (b) for pay or profit; (c) at least 1 hour;
2. persons aged 15–89;
3. family workers;
4. persons not at work during the reference week but with a job attachment: (a) persons not at work due to holidays, working time arrangements, sick leave, maternity/paternity leave, job-related training; (b) persons on parental leave; (c) seasonal workers; (d) persons temporarily not at work for other reasons; (e) other;
5. persons producing agricultural goods whose main part is intended for sale/barter;
6. persons in own-use production work, voluntary workers, unpaid trainees and persons in other forms of work.

Also, the working hours module is going to be changed.

7.1. **Population**

The primary data source is the ELFS which is carried out by Statistics Estonia and provides detailed data regarding persons employed, hours worked and jobs inhabited. The scope of the ELFS is the resident population. A person belongs to the resident population of a given country if they are staying, or intend to stay, in the economic territory of that country for a period of one year or more. The basis for examining the economic activity of the population is the working-age / labour-age population. The working-age population is the population aged 15–74 in the reference week.

Further information regarding residents working abroad and non-residents employed in Estonia is acquired from various ministries.

The expansion of the data of the ELFS is based on the estimated population as of 1 January of the reference year. The expansion coefficients are calculated according to county, sex and 5-year age groups. All the data presented are estimates of actual parameters. The estimates that are based on fewer than 20 persons of the sample have not been published, as they are not sufficiently reliable.

7.2. Employment: employed persons

The number of employed persons is based on the ELFS (national concept). According to ESA 2010, it includes people who are employees or self-employed. An employee is defined as a person who during the reference period: worked and was paid as a wage earner, entrepreneur or freelancer; worked without direct payment in a family enterprise or on his/her own farm; was temporarily absent from work.

7.3. Employment: total hours worked

The hours worked is an aggregated number of hours actually worked as an employee or as a self-employed person during the reference period. It is also based on the ELFS. Based on hours worked, the employed can be divided into full- and part-time employees. Part-time employees are those employed persons whose overall working time per week is less than 35 hours. An exception is made for occupations or age groups where a shortened working time is prescribed by law.

8. FLASH ESTIMATES

8.1. Flash GDP estimate

There is no flash estimate of GDP.

8.2. Flash employment estimate

Statistics Estonia does not produce flash employment estimates.

8.3. Other existing flash estimate, if any

There are no other flash estimates.

9. MAIN DATA SOURCES USED

Table 7 gives an overview of the main data sources for the national accounts. Most data for the compilation of GDP are obtained from statistical surveys and administrative sources.

Table 7 List of sources used for Estonian national accounts

Name of survey	Periodicity	Provision of the results	Key characteristics for the quarterly accounts
Structural Business Statistics	annual	T+13 months	Output structure by product, mark-up for stocks of finished products and work-in-progress to basic prices
Short-term Statistics	quarterly	T+48 days	Net turnover by NACE activities, products and services; inventories by inventory class
Economic indicators of agriculture, forestry and fishing enterprises	quarterly	No later than 60 days after the end of the reporting quarter	Selling volumes
Energy and fuels statistics	monthly/quarterly	T+30 days	Electricity and heat production and consumption
Statistical survey for non-profit institutions	annual	T+10 months	Income and expenditures of non-profit institutions. Data is mainly used for extrapolating of intermediate consumption and market output of NPISH
Labour Force Survey	quarterly/annual	T+2 months	Inactive persons; unemployed persons/unemployment rate; employed persons
Tax declarations on business income of sole proprietors	annual	T+10 months	Income and expenditures of sole proprietors. Annual data is used for extrapolation of quarterly market output and intermediate consumption

Name of survey	Periodicity	Provision of the results	Key characteristics for the quarterly accounts
Tax declarations on customs duties and import taxes (excise on alcohol, tobacco, motor fuel and vehicles)	monthly/quarterly	T+1 months / T+3 months	Data is used for calculating taxes less subsidies on products at previous year prices
Statistics on registration of vehicles	monthly	T+25 days	Data on first registrations of vehicles by type and indicator
Public Sector Financial Statements	monthly for S.13 accounting units / quarterly for other public sector units	T+30 days	Public sector accounting data
Monthly detailed report on tax accrual	monthly	T+1 months	Data is used for calculating taxes less subsidies on products.
Financial intermediation and auxiliary services survey	quarterly	T+25 days	Financial sector enterprises accounting data. Data is used for quarterly calculations of output, intermediate consumption and value added
Insurance statistics	monthly/quarterly	T+25 days	Insurance enterprises data on gross premiums and claims by insurance type; insurance enterprises accounting data. Data is used for quarterly calculations of output, intermediate consumption and value added
Financial statements of Eesti Pank	quarterly	T+15 days	Accounting data. Data is used for quarterly calculations of output, intermediate consumption and value added
Financial corporations sector statistics	quarterly	T+40 days	Financial sector enterprises accounting data. Data is used for quarterly calculations of output, intermediate consumption and value added

Name of survey	Periodicity	Provision of the results	Key characteristics for the quarterly accounts
Financial statements of Estonian Financial Supervisory Authority	quarterly	T+25 days	Financial sector enterprises accounting data. Data is used for quarterly calculations of output, intermediate consumption and value added
Leasing sector statistics	quarterly	T+25 days	Financial sector enterprises accounting data. Data is used for quarterly calculations of output, intermediate consumption and value added
Declaration of payments of income, social tax and mandatory funded pension and unemployment insurance premium	monthly/quarterly	T+30 days	Data is used for calculating of wages and salaries, social contributions and income in kind
Household Budget Survey	quarterly	T+43 days	Data on average expenditure per household member by COICOP
Foreign trade statistics: Intrastat	monthly/quarterly	T+45 days	Data on exports and imports of products
Foreign trade statistics: Extrastat	monthly/quarterly	T+45 days	Data on exports and imports of products
Balance of payments	quarterly	T+50 days	Data on exports and imports of services
Building register	quarterly	T+25 days	Area of permitted for use newly built dwellings and renovated dwellings
Land register	quarterly	T+25 days	Value of real estate transactions, average prices by type of housing
Population statistics	monthly/annual	T+25 days	Preliminary data of births and deaths; population at 1 January
Consumer Price Indices	monthly/quarterly	T+30 days	Indices
Producer Price Indices	monthly/quarterly	T+50 days	Indices

Name of survey	Periodicity	Provision of the results	Key characteristics for the quarterly accounts
Construction Price Indices	quarterly	T+50 days	Indices
Export Price Indices	monthly/quarterly	T+40 days	Indices
Import Price Indices	monthly/quarterly	T+40 days	Indices
Milk Statistics	quarterly	T+1 month	Production volumes
Animal Production Statistics	quarterly	T+40 days	Production volumes
Crop Production Statistics	annual	Preliminary Sept T, final data T+1 month	Production volumes
Agricultural Price Indices	quarterly	T+1 month	Price indices
Data about subsidies from Ministry of Rural Affairs	annual	Preliminary data March T	Subsidies on products
Subsidies on products	quarterly/annual	T+3 months	Public sector accounting data

10. ABBREVIATIONS

Abbreviation	Full name
ANA	Annual National Accounts
BOP	Balance of payments
CFC	Consumption of fixed capital
CIF	Cost, insurance and freight
COFOG	Classification of the functions of the government
COICOP	Classification of individual consumption by purpose
CPA	Statistical classification of products by activity in the European economic community
CPI	Consumer price index
EAA	Economic Accounts for Agriculture
EDP	Excessive deficit procedure
EFSA	Financial statements of Estonian Financial Supervisory Authority
ELFS	Estonian Labour Force Survey
ESMS	EURO-SDMX metadata structure
FIFO	First-in-first-out
FISIM	Financial intermediation services indirectly measured
FOB	Free on board
GDP	Gross domestic product
GFCF	Gross fixed capital formation
GFS	Government finance statistics
GNI	Gross national income
HBS	Household Budget Survey
HERP	Harmonized European revision policy
HFCE	Household final consumption expenditure
LFS	Labour Force Survey
NA	National Accounts
NACE	Statistical classification of Economic activities in the European Community
NFSA	Non-financial sector accounts
NPISH	Non-profit institutions serving households
PIM	Perpetual inventory method
PPI	Producer price index
PRODCOM	Industrial production statistics
PSFS	Public sector financial statements
PYP	Previous year`s prices
QNA	Quarterly National Accounts
ROW	Rest of the World
SBS	Structural business statistics
SNA	System of National Accounts of the United Nations
SPPI	Service producer price index
SSSC	State Shared Service Centre
STS	Short-term Statistics
SUT	Supply-use tables