

## REVISION OF THE GROSS DOMESTIC PRODUCT IN 2011–2012

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Pursuant to the European Commission Regulation No 715/2010 of 10 August 2010, the EU Member States have to go over to the new classification of economic activities NACE Rev. 2 (EMTAK 2008 in Estonia) in national accounts – the time series from 2000 onwards had to be revised by September 2011, and the revised time series for the years 1995–1999 have to be published in September 2012 the latest.

In autumn 2011, Statistics Estonia released the Gross Domestic Product (GDP) time series data since 2000 that comprised the following revisions:

- 1) The GDP time series were revised pursuant to the new classification of economic activities (EMTAK 2008, which corresponds to NACE Rev. 2), and the new version of Statistical Classification of Products by Activity in the European Economic Community 2008 (CPA 2008); and the real GDP by production approach was recalculated by the double deflation (irregular major revisions);
- 2) 2007 annual and quarterly GDP was revised according to the Supply and Use Tables (SUT) and the 2009 GDP was revised according to the Structural Business Survey (in Estonian – EKOMAR) (regular revisions).

Also, the reference year was shifted from 2000 to 2005 when chain-linking the GDP figures.

On 3 April 2012, Statistics Estonia released the GDP time series data for 1995–1999, which have been revised according to the new classification of economic activities EMTAK 2008, which corresponds to NACE Rev. 2.

### **1. Transition to the new classification and revisions at current prices in calculations**

#### **1.1. Non-financial corporations sector**

The transition to the EMTAK 2008 was performed on the level of enterprises sector source data, where the transition table from EMTAK 2003 to EMTAK 2008 was used for every indicator. The transition table is a cross-table where the relations of economic activities' codes were shown according to EMTAK 2003 and EMTAK 2008.

Reclassification influenced the most the economic activities (according to EMTAK 2003) where the units which were formerly classified in one economic activity were transferred to several different activities:

22. Publishing, printing and reproduction of recorded media
29. Manufacture of machinery and equipment n.e.c.
31. Manufacture of electrical machinery and apparatus n.e.c.

- 33. Manufacture of medical, precision and optical instruments, watches and clocks
- 35. Manufacture of other transport equipment
- 70. Real estate activities
- 72. Computer and related activities
- 74. Other business activities
- 90. Sewage and refuse disposal, sanitation and similar activities
- 92. Recreational, cultural and sporting activities

The transactions of the years and quarters of 2000–2007 have been divided according to EMTAK 2008, using the proportions of the respective year's transition table. Since 2008 the transition table was not used any more, as the source data were already coded according to EMTAK 2008.

### **1.2. Financial institutions sector**

With the reclassification of economic activities, the holding companies which previously were classified to non-financial institutions sector were moved to financial institutions sector starting from 2000. The influence of reclassification of holding companies was annually 0.2–1.5 million euros. With the reclassification of holding companies the consumption of fixed capital was changed. In annual and quarterly accounts of 2008–2010, own account software, income in kind and output of financial intermediation services indirectly measured (FISIM) and intermediate consumption were updated.

The 2009 calculations of financial institutions sector at current prices increased mainly as a result of revising the source data of FISIM, of financial and insurance companies and service charge premiums of currency exchange. The 2010 account has been revised with the more exact data of central bank's output and intermediate consumption.

### **1.3. General government sector**

The transition to EMTAK 2008 was accomplished on the level of the source data of costs of general government sector (wages and salaries, employers' social contributions, other production taxes and intermediate consumption). On the basis of the source data a transition table from EMTAK 2003 to EMTAK 2008 was compiled for each transaction. The transactions of quarters of the years 2000–2003 have been divided by EMTAK 2008, using the weights of the transition table of the respective year. Since 2004, the weights were not used any more in quarterly accounts, as in the database of the general government accounts the source data of quarters were already coded by EMTAK 2008.

### **1.4. Households sector**

For the transition of accounts for 2000–2007 of households sector from EMTAK 2003 to EMTAK 2008, the Supply and Use Tables for 2000–2007 serve as a basis, on the basis of which transition tables with the division into 73 economic activities have been compiled. The received figures have been coded into economic activities according to the transition table if the economic activity was reclassified one-to-one. If the economic activity was divided between two classifications into different economic activities, the respective transition tables as well as Tax and Customs Board data of the sole proprietors were used.

A new calculation has been made for the years 2008–2010. For revising the accounts for the year 2008, the accounts of the sole proprietors made for SUT have been used, to which the data of agriculture, forestry, fishing, construction for own use, actual and imputed rent and agricultural associations and unions have been added. In the 2009 accounts, the data of the Tax and Customs Board of the income received from the business activity of resident sole proprietors to which the aforementioned data have been added. The indicators for 2010 and 2011 have been calculated according to the 2008 structure.

### **1.5. Non-profit institutions serving households sector**

While transferring from EMTAK 2003 to EMTAK 2008, in the non-profit institutions serving households accounts for 2000–2007, the Tax and Customs Board data of social contributions have been used. On the basis of the received source data, transition tables on all aforementioned years and quarters have been

compiled. According to the matrix tables, the value added components as well as intermediate consumption have been recalculated from EMTAK 2003 to EMTAK 2008.

For the years 2008–2011, the transition tables have not been used, but a new calculation has been made.

### **1.6. Net taxes on products**

The accounts of net taxes on products and subsidies for 2000–2007 at current prices were not changed, as they were based on SUT and reclassifications of economic activities did not influence them.

### **1.7. Household final consumption expenditure**

The 2000–2007 account has been made on the basis of SUT and 2008–2010 account on the basis of Classification of Individual Consumption by Purpose (COICOP) and on the basis of the transition table of CPA 2003 and CPA 2008. The structure made on the basis of transition tables has been revised on the basis of SUT 2007 (the last published version so far). The 2009 accounts have been updated according to revised annual accounts.

In SUTs the household final consumption expenditure accounts on products level at current prices have been made in a more detailed way than at the previous year prices. That is the reason why index of the aggregate level of products has been used while deflating the household final consumption expenditure.

### **1.8. Gross fixed capital formation**

The 2000–2007 calculations were based on SUT data. For reclassification of gross fixed capital formation of enterprise sector by economic activities according to EMTAK 2008, the same transition table was used as in case of enterprise sector's transactions. For reclassification of gross fixed capital formation of non-profit institutions serving households, the reclassification tables of the respective sectors' transactions were used. For general government gross fixed capital formation of 2000–2004, structure of the general government accounts of 2004 was used (the general government accounts were coded since 2004). The transactions of the quarters of 2000–2003 were distributed according to EMTAK 2008, using the proportions of the respective year's transition table. Since 2004, the proportions are not used any more in general government quarterly accounts, as the source data of quarters have already been coded according to EMTAK 2008. Financial institutions data changed as holding companies were added to this sector.

Calculation of for the enterprise sector of 2008–2009 has been made on the basis of EKOMAR data. Since 2008, quarterly and annual accounts of general government sector have been made according to the classification CPA 2008.

Consumption of fixed capital of financial institutions' sector changed due to the reclassification of holding companies and consumption of fixed capital of enterprise sector changed in addition to the fact that in the calculations of consumption of fixed capital of enterprise sector different economic activities and types of fixed assets have different rate of depreciation, which could not be reclassified precisely.

The data for 2010 have been calculated according to the quarterly data of EMTAK 2008. General government calculations have been made on the basis of general government accounts. Between the 1st and 2nd quarter of 2010, a correction was made in the calculations of fixed assets for defence purposes.

### **1.9. Change in inventories**

The change in inventories in 2000–2007 has been calculated according to SUT. Transition tables were used in reclassifying according to EMTAK 2008.

In 2008–2010 calculations a new methodology has been used, which enables to calculate the change in inventories and holding gains and losses based on products instead of activity-based distribution that was used earlier. Activity-based data of enterprise sector have been received from EKOMAR classified according to EMTAK 2008. These data have been divided product-based according to the type of inventories either based on intermediate consumption or on output structure. The data on financial institutions' inventories have been received from financial institutions' reports and general government data from general government accounts.

## 1.10. Exports and imports of goods and services

Exports and imports calculations for 2000–2007 were based on SUT data. Transition tables based on 2008 foreign trade data were used for transition to EMTAK 2008 version. In 2008–2010 calculations the data classified according to foreign trade EMTAK 2008 and CPA 2008 and Balance of Payments data were used.

## 2. Double deflation of the GDP

Previously, the GDP at previous year prices by production method was calculated by single deflation. For instance, output of an economic activity was deflated and the value added at constant prices was calculated at the previous year ( $t-1$ ) current prices with the share of value added. The intermediate consumption at constant prices was found as a residual. According to ESA 95 (European System of National Accounts) the best method for calculating the value added at constant prices is double deflation, i.e., output and intermediate consumption are separately deflated and value added is found as a difference. Double deflation enables to calculate the value added at previous year prices more precisely.

The time series of the GDP for 2001–2007, which was published in autumn 2011, has been revised according to the annually compiled and double deflated SUT and according to the deflators used in it. SUT was classified according to the EMTAK 2003. While deflating the GDP according to EMTAK 2008 with double deflation, the weighed deflators of SUT economic activities were used (according to products' structure). Deflators used in SUTs were divided into quarters according to the GDP regular annual and quarterly accounts calculated at the previous year's prices.

According to ESA 95, SUT serve as a basis for the calculations of all tables of national accounts. The SUT time series for 2001–2007 at previous year prices was published for the first time in 2010. SUTs at the previous year prices have been compiled on the level of 110 product groups, which is more aggregated level than SUT at current prices (400 product groups).

As the last published SUT is for the year 2007, **preliminary supply and use tables** were elaborated for 2008 and 2009 for the calculations on the 144 product group level. The intermediate consumption for 2010 at previous year prices was mostly made on the basis of the 2009 structure. If in SUT the supply and use are balanced on the total economy level as well as on products level, then in the preliminary SUT the supply and use of products and total economy are not fully balanced. But the preliminary SUT enables to minimize the differences between supply and use on product level and ensures better balance between total economy and supply and use at current prices.

The double deflation process of **market output** has been divided into two: separate deflation of output and intermediate consumption. According to the methodological recommendations of the Eurostat Handbook<sup>a</sup> and legal acts of the Commission of the European Communities<sup>b</sup>, the deflation of market output and intermediate consumption is carried out on product level. While calculating the output, the domestic market output and output for exports, and while calculating intermediate consumption domestic products and imported products have been deflated separately. In distribution of enterprise sector output into exported and domestic output, information of industrial output (PRODCOM) and foreign trade have been used. Reference year's tax rates of product taxes, trade margins and transport margins have been calculated on the basis of preliminary SUT. Imported intermediate consumption has also been calculated on the basis of preliminary SUT. As there are no actual price indices for intermediate consumption, intermediate consumption is deflated by the output and import price indices of the same product.

In national accounts the following price indices are used for deflating the output: producer price indices of domestic and export markets by economic activity, services producer price indices (on certain types of business services), consumer price indices by commodity group, construction price index and agricultural output price indices. If a suitable producer price index is missing, other approximate indicators are used, e.g. consumer price indices or output volume indicators.

**Non-market output** is calculated in general government sector and in non-profit institutions serving households sector. Total output is found by summing up the compensations to employees, consumption of fixed capital, other production taxes and intermediate consumption. Non-market output at previous year

<sup>a</sup> Handbook on price and volume measures in national accounts. (2001). Luxembourg: Office for Official Publications of the European Communities

<sup>b</sup> European Commission Decision of 30 November 1998 (98/715/EC) and of 17 December 2002 (2002/990/EC), clarifying the principles for measuring prices and volumes in national accounts.

prices is calculated as total output minus market output. In general government sector, the change in the number of employees is used for extrapolating the compensations to employees and production taxes, as volume index of the reference year indicators. The accounts of market output of the general government sector for 2001–2007 at previous year prices was made based on SUT. Since 2008, the market output is deflated on product level with the respective producer or consumer price index. Previously in case of market output the total output deflator was used. In non-profit institutions sector serving households, compensations to employees and net production taxes are deflated with the consumer price index.

**Intermediate consumption** is first deflated at basic prices, using the detailed distribution of products, and the intermediate consumption of domestic and imported products is deflated separately:

- the intermediate consumption of domestic products is deflated with the producer price indices of domestic market industrial output, consumer price indices and agricultural output and service producer price indices;
- in case of imported products for intermediate consumption, import price indices or with regard to services the weighed deflator (CPI) of the main trading partners is used for deflating goods;
- product taxes, trade margins and transport margins at previous year prices are calculated, adjusting the tax rates of the reference year for the intermediate consumption of the current year at constant prices.

Before revision, the change in the number of employees was used for deflating the components of the current values of general government sector and intermediate consumption (excl. consumption of fixed assets). By introduction of double deflation the accounting methodology of intermediate consumption was revised: instead of the change in the number of employees the producer and consumer price indices were taken into use.

In calculation of financial intermediation activity at previous year prices, the output and intermediate consumption were deflated separately. In the course of the current revision only the indices of products were specified.

The calculation of GDP by expenditure approach (final consumption expenditures, gross fixed capital formation and valuables, change in inventories and exports and imports) at previous year prices has been revised for 2002–2007 just as in case of production approach according to SUT at previous year prices..

### **3. Transfer of reference year from 2000 to 2005**

After the aforementioned revisions the GDP reference year calculated by chain-linking method was transferred from year 2000 to 2005. The transfer to the new reference year changed the chain-linked indices and chain-linked values, but the GDP and the growth of its components remained the same as in case of the previous reference year.

The need for transfer of the reference year resulted mainly from the non-additivity of components characteristic of chain-linking method, which means that the sum of single chain-linked absolute values does not equal with the same aggregate. Additivity is possible only in reference year and in the following year and the farther from the reference year, the more the non-additivity aggravates. The reason for this is that chain-linked values are found with separate chain-linking for the aggregate as well as for each component.

### **4. Impact of revisions on GDP time series**

As all the above mentioned revisions were performed simultaneously, their impact on GDP growth can be estimated only as an aggregate.

Reclassification of economic activities from EMTAK 2003 to EMTAK 2008 changed the distribution of economic units into economic activities. Changes occurred between economic activities and this did not change the GDP at current prices. Minor changes were made in some quarters of 1995–1997 due to the update of data. The GDP at current prices changed as a result of the revision of 2007 SUT and 2009 EKOMAR by -1.3% to +1.5%.

**Table 1. Impact of revisions on GDP at current prices, 1995–2010**

(million euros)

Year	Before revision	After revision	Difference, %
1995	2 766.3	2 767.4	0.0
1996	3 636.0	3 637.6	0.0
1997	4 481.7	4 480.7	0.0
1998	5 032.3	5 032.3	0.0
1999	5 358.5	5 358.5	0.0
2000	6 159.8	6 159.8	0.0
2001	6 970.9	6 970.9	0.0
2002	7 776.3	7 776.3	0.0
2003	8 718.9	8 718.9	0.0
2004	9 685.3	9 685.3	0.0
2005	11 181.7	11 181.7	0.0
2006	13 390.8	13 390.8	0.0
2007	15 827.5	16 069.4	1.5
2008	16 106.7	16 304.2	1.2
2009	13 860.8	13 839.6	-0.2
2010	14 500.9	14 305.3	-1.3

The real growth of GDP changed as a result of revisions by -1.4 to +1.4 percentage points. 65 quarters were revised in total – from the 1st quarter of 1995 until the 1st quarter of 2011. The majority (74%) of differences of GDP real growth remained below one percentage point. The growth differences over two percentage points occurred in two quarters – in the 3rd quarter of 2008 and in the 3rd quarter of 2009.

**Table 2. Impact of revisions on GDP real growth, 1996–2010**

(percentages)

Year	Before revision	After revision	Difference, percentage points
1996	5.7	5.9	0.2
1997	11.7	11.7	0.0
1998	6.7	6.8	0.1
1999	-0.3	-0.3	0.0
2000	10.0	9.7	-0.3
2001	7.5	6.3	-1.2
2002	7.9	6.6	-1.4
2003	7.6	7.8	0.2
2004	7.2	6.3	-0.9
2005	9.4	8.9	-0.6
2006	10.6	10.1	-0.5
2007	6.9	7.5	0.6
2008	-5.1	-3.7	1.4
2009	-13.9	-14.3	-0.4
2010	3.1	2.3	-0.8

According to SUT and EKOMAR revision, in 2007–2010 the domestic demand at current prices changed by -0.1 to 1.8%. The revisions in 1996 and 1999 resulted, respectively, from the update of the data of the government sector and household final consumption expenditures. The domestic demand changed the most in 2009 (1.8%), mainly due to the fact that the final consumption expenditures of households increased as a result of the revision.

The annual real growth of domestic demand changed as a result of revisions from -0.6 to +2.2 percentage points.

**Table 3. Impact of revisions on domestic demand at current prices, 1995–2010**

(million euros)

Year	Before revision	After revision	Difference, %
1995	2 991.5	2 991.5	0.0
1996	3 969.3	3 970.9	0.0
1997	4 905.8	4 905.8	0.0
1998	5 515.3	5 515.3	0.0
1999	5 590.0	5 596.6	0.1
2000	6 382.0	6 382.0	0.0
2001	7 143.4	7 143.4	0.0
2002	8 348.4	8 348.4	0.0
2003	9 371.9	9 371.9	0.0
2004	10 368.6	10 368.6	0.0
2005	11 908.5	11 908.5	0.0
2006	14 762.6	14 762.6	0.0
2007	17 570.4	17 552.6	-0.1
2008	16 778.8	16 949.8	1.0
2009	12 827.6	13 060.4	1.8
2010	13 080.9	13 233.8	1.2

**Table 4. Impact of revisions on real growth of domestic demand, 1996–2010**

(percentages)

Year	Before revision	After revision	Difference, percentage points
1996	10.5	10.5	0.0
1997	13.3	13.3	0.0
1998	6.7	6.9	0.2
1999	-3.9	-3.9	0.0
2000	10.1	10.1	0.0
2001	7.2	6.9	-0.3
2002	12.1	14.3	2.2
2003	9.7	10.3	0.6
2004	7.4	7.0	-0.4
2005	9.4	9.7	0.3
2006	16.2	16.1	-0.1
2007	9.6	9.2	-0.4
2008	-10.6	-9.5	1.1
2009	-22.1	-22.3	-0.2
2010	0.9	0.3	-0.6

## Sources

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