Finnish Quarterly National Accounts - methodological description

Chapter 1 Overview of the system of Quarterly National Accounts in Finland

1.1 Organisation

Quarterly National Accounts (hereafter referred to as QNA) are compiled at the National Accounts Unit of Statistics Finland's Economic Statistics Department. The compiling process involves one full-time person (team leader) and 6-8 other National Accounts experts (most of whom are also involved in compiling Annual National Accounts).

1.2 Publication timetable, revisions policy and dissemination

QNA are published at the lag of 70 days from the end of a quarter. A calendar showing all future release dates for the current year can be found on the web pages of Finnish National Accounts at: http://tilastokeskus.fi/til/ntp/tjulk_en.html

QNA data are subject to revisions after their first release so it is advisable to always retrieve the latest version from the QNA web pages when using time series. The revisions to QNA data that are caused by revisions in their quarterly and monthly source data take place within around twelve months from the initial release. Any revisions subsequent to this are usually due to revisions in annual National Accounts.

1.3 Compilation of QNA

QNA are calculated from several monthly and quarterly indicators. This is because unlike for annual accounts, exhaustive data on the values of different transactions are generally not available quarterly or monthly. QNA at current prices are mainly calculated by extrapolation with a indicator, i.e. QNA data on quarter 2007Q1 is multiplied by the change of indicator value (2008Q1/2007Q1) to yield QNA value for 2008Q1. For the majority of transactions, the final estimate is based on several indicators which are weighted according their strengths and weaknesses.

1.4 Balancing and benchmarking

Demand and supply are not fully balanced in QNA, the statistical discrepancy between them is shown separately. However, the statistical discrepancy is not allowed to become excessive and if necessary, demand and/or supply are adjusted to keep it reasonable.

Current priced QNA time series are benchmarked to annual accounts with the proportional Denton method. Volume series at previous year's prices are benchmarked to annual accounts with the pro rata method, that is, each quarter is raised or lowered in the same proportion.

1.5 Volume estimates

Volume data of QNA are published as chain-linked series at reference year 2000 prices. The chain-linking is performed with the annual overlap method in which volume estimates at the average prices of the previous year are used. The volumes at the average prices of the previous year are calculated by deflating the current prices data with the change(s) in price index/indices.

1.6 Seasonal adjustment and working day adjustment

Seasonal adjustment and working day adjustment are performed in QNA with the TRAMO/SEATS method and the Demetra software. In addition to the seasonally adjusted series, also trend series and working day adjusted series are published in QNA at both current and reference year 2000 prices. Seasonally adjusted aggregates at current prices are summed up from seasonally adjusted sub-series. All series at reference year 2000 prices, including aggregates, are adjusted individually. Seasonally adjusted, working day adjusted and trend time series are not benchmarked to annual accounts after adjustment.

Chapter 2 Publication timetable, revisions policy and dissemination

2.1 Release policy

QNA are published at the lag of 70 days from the end of a quarter. A calendar showing all future release dates for the current year can be found on the web pages of Finnish National Accounts at: http://tilastokeskus.fi/til/ntp/tjulk_en.html. A deviation from the release timetable is the slightly speeded up publication of data for the 4th quarter which takes place simultaneously with the release of preliminary annual accounts data at the turn of February/March.

QNA are not published in between the four regular publications even if revisions in other National Accounts statistics, such as annual accounts or statistics on general government revenue and expenditure, would occur. Such revisions will be included in the next regular publication of QNA.

QNA data become revised after their first release so it is advisable to always retrieve the latest version form the QNA web pages when using time series. The revisions can be divided into those arising from changes in the source data of QNA and revisions caused by benchmarking to annual accounts. The revisions of QNA data that arise from changes in their quarterly and monthly source data take place within fifteen months from the initial publication. For instance, the final re-calculation of quarterly data for 2007 was done for the publication of the 2nd quarter of 2008, when 15 months had lapsed from the initial publishing of 2007Q1. Any revisions after this are usually caused by revisions in annual accounts and benchmarking of QNA to them.

2.2 Contents published

The principal publication format of QNA is a free-of-charge release on the Internet. Also available is a charged package of tables in electronic format (PDF) or as paper printouts. The online release (http://tilastokeskus.fi/til/ntp/index_en.html) comprises a brief release text, a review text and time series accessible via the ”Tables” link. The tables of the online release contain the entire data content of QNA. The time series are divided into five tables in all of which series start from the 1st quarter of 1990:

1. Value added of industries quarterly (GDP production approach)

2. National balance of supply and demand quarterly (GDP expenditure approach)

3. GDP income approach quarterly

4. National income quarterly

5. Employment quarterly

Table 1 contains data on value added by activity at the accuracy of 12 industries (code of TOL2002/NACE industry classification in brackets):

- Agriculture (A, excl. Hunting, etc., 015)
- Forestry (B)
- Total industry (C, D, E)
- Manufacturing (D)
- Wood and paper industry (20-21)
- Metal industry (27-35)
- Other manufacturing (15-19, 22-26, 36-37)
- Construction (F)
- Trade (G)
- Transport, storage and communication (I)
- Real estate, renting and business activities (K)
- Other activities (H, J, L, M, N, O, P).

In addition, Table 1 contains data on taxes on products (D21), subsidies on products (D31) and gross domestic product.

Table 2 contains data on national balance of supply and demand, i.e. expenditure aggregates and imports. Exports and imports are separated into goods and services. Final consumption expenditure is broken down to government and private consumption expenditure in which household consumption expenditure is further itemised by five types of goods: durable, semi-durable, non-durable goods, services, and tourism expenditure as net. Investments are broken down into investments in buildings, machinery, equipment and transport equipment, and other investments. Investments are also broken down to public and private investments. Table 2 also contains data on changes in inventories, gross domestic product, total demand and statistical discrepancy.

Table 3 contains data on wages and salaries, and employers’ social contributions with the breakdown of seven industries. In addition, the table shows data on operating surplus/mixed income, consumption of fixed capital, taxes on production and imports less subsidies, and gross domesic product.

Table 4 shows data on the terms of trade effect, primary income from/to the rest of the world, gross national income, net national income, current transfers from/to the rest of the world, savings, capital transfers from/to the rest of the world and net lending.

Table 5 gives data on numbers of persons employed and hours worked with the breakdown of seven industries. Persons employed and hours worked are additionally broken down to employees and self-employed persons. Moreover, the table gives figures on total population and numbers of unemployed persons.

The data of tables 1, 2 and 4 are published at both current prices and as chain-linked volume series in which the reference year is 2000. In addition to the original series, all tables also contain seasonally adjusted, working day adjusted and trend series.

Change percentages from the respective quarter of the year before can also be seen from the tables. Change percentages from the previous quarter can additionally be seen from the seasonally adjusted and trend series.

2.3 Special transmissions

QNA times series benchmarked in connection with annual accounts publishing are produced in July for the FINSERIES time series database. These time series will not contain new QNA data but are the time series published in June with mechanical benchmarking to new Annual National Accounts.

A flash estimate, based on the Trend Indicator of Output and not separately published, is sent to Eurostat at the lag of 43 days from the end of a quarter.

2.4 Policy for metadata

A description of QNA is available on the web page of the publication at: http://tilastokeskus.fi/meta/til/ntp_en.html

Chapter 3 Overall QNA compilation approach

3.1 Overall compilation approach

3.1.1 General architecture of the QNA system

QNA are calculated from several monthly and quarterly indicators. Indicators refer to such quickly released statistics or other source data that are considered to correlate with a certain national accounts transaction. Indicators are utilised because unlike for annual accounts, exhaustive data on the values of different transactions are generally not available quarterly or monthly. Even if exhaustive data were available quarterly at some time lag, it would be very rare for them to be available in the timetable required by QNA, i.e. within 50 days from the end of a quarter.

Data at current prices are mainly calculated by extrapolation of indicator change, i.e. QNA data on a quarter from twelve months back are multiplied with year-on-year change in an indicator in the current month (Q/Q-4). When extrapolating a transaction, not just one but several indicators can be used with different weights attributed to them. Some indicators only function as comparison sources. In addition, consideration must also be given to accuracy of the used indicators, like e.g. constant upward or downward bias. The released QNA figure is based on a change percentage in which the strengths and weaknesses of different indicators are allowed for.

Example 1: Extrapolation Q/Q-4 with one indicator

Time period	Indicator	Value in QNA, EUR million	Extrapolated value in QNA
2006Q1	100.0	1,478	
2006Q2	101.4	1,499	
2006Q3	102.1	1,530	
2006Q4	103.9	1,590	
2007Q1	102.7		(102.7/100.0)*1,478 = 1,518
2007Q2	104.0		(104.0/101.4)*1,499 = 1,537
2007Q3	103.5		(103.5/102.1)*1,530 = 1,551
2007Q4	105.2		(105.2/103.9)*1,590 = 1,610

When value added is calculated, output and intermediate consumption are estimated separately (see Chapter 4). Reference year 2000 volumes are calculated by first deflating current price data with the change of price index from previous year's average price to obtain volumes at the average prices of the previous year. These volumes at previous year's prices are then chain-linked with the annual overlap method to obtain volumes at reference year 2000 prices (see 3.3).

3.2 Balancing and benchmarking

3.2.1 Balancing of demand and supply

Total demand (consumption, investments and exports) and total supply (production and imports) are not fully balanced in QNA but the statistical discrepancy between them is shown separately. However, a large statistical discrepancy signifies that some indicator of demand or supply contains an error or schedules among the quarters differently from other indicators. The most unreliable indicators in QNA are those used in the estimation of consumption of services, investments, changes in inventories, and imports and exports of services. The indicators for the consumption of services and indicators for investments have poor coverage. The problem with the indicators of exports and imports of services are large and unpredictable revisions. In addition to coverage problems, the timing and valuation of the indicators of change in inventories can differ from the indicators of turnover on the supply side. If a current priced statistical discrepancy in a quarter seems to grow excessively large, some of the aforementioned transactions are adjusted until total demand and supply are in (better) balance.

GDP calculated via income always balances with GDP calculated via supply because operating surplus is a residual transaction in QNA (see Chapter 6).

3.2.2 Benchmarking to annual accounts

Original QNA series are benchmarked to the latest annual accounts. After the benchmarking the sum of quarters in any one year equals the value of the annual accounts for that year. Time series are benchmarked before seasonal adjustment. Seasonally adjusted, trend and working day adjusted series are not re-benchmarked after adjustment, and therefore are not exactly equal to annual accounts.

Current priced QNA time series are benchmarked to annual accounts with the proportional Denton method[1] which is basically mechanical and just aims to maintain the original quarter-to-quarter development as closely as possible. If an observation in an original series at point in time t is denoted with i_t and an observation in the benchmarked series at point in time t with x_t, the sum of squares equals

[1] Denton, F.T. (1971), "Adjustment of monthly or quarterly series to annual totals: An approach based on quadratic minimization." Journal of the American Statistical Association, 82, pp. 99-102.

$$\sum_{t=2}^{T}\left[\frac{x_t}{i_t}-\frac{x_{t-1}}{i_{t-1}}\right]^2$$, where T denotes the last quarter of the time series,

and is minimised under the condition that the sum of all quarters of the year is the annual value obtained from annual accounts. Benchmark to indicator ratio BI_t will thus be estimated for every quarter of the year,

$$BI_t = \frac{x_t}{i_t},$$

which when the entire time series is considered deviates as little as possible from the BI ratio of the previous point in time.

There are also various benchmarking methods that are based on time series models and in which the original time series is used as the external regressor. A simple example of this is Chow-Lin[2] and, if suitably formulated, the Denton method can also be regarded as a special case of this kind of a model. With the exception of particularly problematic series, the Denton method and methods based on simple time series modelling produce in practice the same benchmarked series and no reasons for changing the method have emerged from made examinations. In addition, the proportional version of the Denton method is recommended by the IMF[3]. More complex models would make it possible to study interesting connections to e.g. seasonal adjustment but then the benchmarking proper would not necessarily succeed equally reliably.

Volume series at previous year’s prices are benchmarked to annual accounts with the pro rata method, that is, each quarter is raised or lowered in equal proportion. Different benchmarking methods are used because the series at the previous year’s prices have a point of discontinuation at each turn of the year. The Denton method aims to retain the changes between quarters of the original series, so like the current priced series the original series must be coherent. However, in series at previous year’s prices the quarters of different years are always deflated, as the name indicates, to the previous year’s prices so the change percentages at year turns (e.g. 2007Q1/2006Q4) are not comparable with the changes that occur within the year (e.g. 2006Q4/2006Q3). The pro rata method, again, is not recommended for the benchmarking of continuous series because it creates points of discontinuity at year turns even in coherent series. The comparability of year turns with other points of time is then also lost. However, the pro rata method is in this case a suitable benchmarking method because step-like points of discontinuity at year turns are characteristic of volume series at previous year’s prices.

Chain-linked volume series (at reference year 2000 prices) become automatically benchmarked to annual accounts due to the features of the annual overlap method as long as the current priced series and the series at

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[2] Chow, G.C. – 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) pp. 372–375.

[3] http://www.imf.org/external/pubs/ft/qna/2000/Textbook/ch6.pdf

previous year's prices used in the chain-linking have first been benchmarked.

3.2.3 Estimation in preliminary data

The compilation of QNA is based on indicators, because with the exception of Balance of Payments data, exhaustive source data for national accounts transactions are not available quarterly. However, monthly and quarterly statistics that can serve as indicators are quite well available in Finland which is why right from the very first publication approximately 90 per cent of QNA is based on indicators derived from source statistics. In the first publication some of the used source data are incomplete so that the extrapolation is based on data of only one or two months of the latest quarter. This is done in the cases of e.g. taxes on products and data on turnover in the Tax Administration's payment control data.

Statistical forecasting models are not used in the calculation of original series with the exception of the estimation of intermediate consumption (see Section 4.1). Statistical models are naturally used in seasonal adjustment of times series.

3.3 Volume estimates

3.3.1 General volume policy

QNA volume data are published as chain-linked series at reference year 2000 prices. The chain-linking is done with the annual overlap method[4]. The calculation of volume data starts with deflation in which time series at current prices are converted to volume series at the average prices of the previous year by dividing current priced quarterly figures with a deflator. The simplest deflator is the ratio between a price index value for one calculation quarter and the previous year's average value of the price index. The deflator then expresses the price level of the calculation quarter relative to the average price level of the previous year.

In QNA, several price indices which receive their weights from current priced data are used in the deflation of one published series. QNA volume data at previous year's prices are not published but are available upon request.

Example 2: Deflation with one price index (NB the average price index for 2006 is 103.8)

Time period	Value in QNA at current prices	Price index	Deflator	Volume in QMA at previous year's average prices

[4] For additional information on chain-linking methods, read Chapter 9 in IMF Quarterly National Accounts Manual (http://www.imf.org/external/pubs/ft/qna/2000/Textbook/ch9.pdf). An example of annual overlap method can be found from page 159.

2006Q1	1,478	103.4		
2006Q2	1,499	103.1		
2006Q3	1,530	104.0		
2006Q4	1,590	104.5		
2007Q1	1,518	104.4	104.4 / 103.8 = 1.006	1,518 / 1.006 = 1.509
2007Q2	1,537	104.8	104.8 / 103.8 = 1.010	1,537 / 1.010 = 1.522
2007Q3	1,551	105.2	105.2 / 103.8 = 1.014	1,551 / 1.014 = 1.530
2007Q4	1,610	105.9	105.9 / 103.8 = 1.021	1,610 / 1.021 = 1.577

When volumes have been calculated at the average prices of the previous year they are chain-linked into volumes at reference year 2000 prices by using chain-linked volumes of annual accounts as the yearly links. The chain-linking is done by first calculating change in the volume (at previous year's average prices) of each quarter from the current price average of the previous year. Previous year's volume, obtained from the respective chain-linked volume series of annual accounts, is multiplied with this volume change in a quarter so that a chain-linked quarterly volume series is obtained. In chain-linked series the volumes are expressed relative to the current price level of the reference year. The weights of prices change annually in chain-linked series, unlike in the older fixed base year volume series, in which price weights were constant. The drawback of chain-linked series is loss of additivity, in other words, the series cannot be summed up with each other. Thus, for instance, a chain-linked volume of GDP is not equal to the sum of its components.

3.3.2 Chain-linking and benchmarking

Volumes at previous year's prices are benchmarked to annual accounts with the pro rata method, that is, each quarter is raised or lowered in equal proportion. If the volume at previous year's prices in annual accounts is 2% higher than the sum of the same year's quarterly volumes in QNA, each quarter of the year is multiplied by 1.02. The chain-linking is performed after this using benchmarked figures at previous year's prices and benchmarked figures at current prices. Because of the properties of annual overlap chain-linking method, the chain-linked quarterly volumes will automatically be equal to chain-linked annual accounts if series at previous year's prices and series at current prices have first been benchmarked.

3.3.3 Chain-linking and seasonal adjustment

Chain-linked volume series are seasonally adjusted with the TRAMO/SEATS method using the Demetra software. Each chain-linked volume series is adjusted separately (so-called direct approach) because chain-linked series cannot be summed up together. Besides seasonally adjusted series, series adjusted for working days and trend series are calculated from chain-linked time series. Seasonally adjusted volume series are not benchmarked again to annual accounts, so their annual sums are not exactly equal to annual accounts in reference year 2000 prices.

3.4 Seasonal adjustment and adjustment for working days

Time series of quarterly national accounts (QNA) show strong variations between the observation periods of a year, which is typical of time series on economic trends. This is known as seasonal variation. The reasons for this variation could be changes caused in the observed phenomena by seasons of the year that make them favourable for the sales of certain products, and timings of transactions. In addition to the variation between winter and summer months, consumption over the Christmas and Easter seasons, payments of tax refunds and back taxes that in Finland fall due in December, as well as companies' payments of dividends in spring after closing of accounts are examples of causes of seasonal variation in quarterly series.

Seasonal variation in a trend series makes the detection of turning points relative to the previous observation difficult. The direction and shape of development in the longer term are also difficult to see from an original series. Indeed, in a time series containing observations at intervals shorter than one year seasonal variation is often seen as a nuisance which has very little to do with the picture of development over a longer time period. The conclusion must not be drawn from this that seasonal adjustment would be standard or deterministic, and that its modelling or adjustment would be a triviality in the way of bigger things.

When quarterly national accounts time series are analysed, in addition to the calculation of change from the quarter 12 months back (Q/Q-4), comparison should also be made to the previous observation. Turning points in the examined variable can be observed by comparing development since the previous observation. To be able to do this, a time series must be broken down to its components and seasonal variation within the year evened out.

It is often suggested that time series on economic trends that contain more frequent than annual observations should be broken down to four components: trend (development over an extended time period), business cycle (medium-term variation caused by economic trends), seasonal variation (variation within one year) and irregular variation. The last one of these is presumed to be random white noise with no information that would be useful to the analysis of the series. Because making an unambiguous and clear distinction between the trend and the business cycle is difficult, these components are usually estimated together, referring to this combination as the trendcycle. When the concept of trend is used in this methodological description it refers to the trendcycle as is typical in analyses of time series on economic trends. When seasonal variation is evened out, a seasonally adjusted series is obtained which contains the trendcycle and irregular variation.

The ARIMA model-based TRAMO/SEATS method recommended by Eurostat is used in seasonal adjustments of quarterly national accounts series. The ARIMA model-based (ARIMA Model Based (AMB)) seasonal adjustment starts by modelling of the variation in the observation series by means of an ARIMA model. The obtained ARIMA model is utilised in breaking down the variation in the time series into its trend, seasonal and irregular components. The division into the components is done so that the obtained components can be presented with an ARIMA model. The most significant difference from the ad hoc approach (e.g. methods X11/X12, Dainties, Sabl, BV4) is that in TRAMO/SEATS, own, specific filter formulas are built for each time series for the adjustment of the data.

The method also contains an efficient means for making adjustments for working and trading days and for identifying outlying observations. TRAMO/SEATS also makes it possible to calculate forecasts, standard errors and confidence intervals by component. The program and the method were created by Maravall and Gomez[5].

Whenever a time series is being adjusted, the autocorrelation structure of the original series is interfered with. If the used filter (be it a general ad hoc filter or one based on a wrong model) fails to screen out expressly and only the seasonal adjustment frequencies of a time series, or trend frequencies when trend is being estimated, the autocorrelation structure of the original time series becomes skewed with the temporally repeated characteristics of the original phenomenon.

The ARIMA model-based seasonal adjustment and the TRAMO/SEATS method offer one analytical solution to this problem. In the TRAMO part, the original series is pre-adjusted for e.g. outlying observations and variations in numbers of working and trading days so that the pre-adjusted series can be ARIMA modelled. This modelling of the autocorrelation structure of the entire pre-adjusted series is utilised when variation in the time series at different frequencies is broken down to its components in the SEATS part.

The point of departure in the decomposition is that each component should only describe the precise part of the autocorrelation structure of the whole series and the variation that relates to it, i.e. the components are mutually orthogonal. Interpretationally this means that the reasons that cause seasonal variation (such as time of the year) in a time series are uncorrelated with the reasons behind a long term trend, such as investments or R&D activity. In addition, it is presumed that a time series is made up of components that are realisations of linear stochastic processes. Then each component (with the exception of the irregular term) can be described with an ARIMA model.

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[5] See e.g. 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.

Both the pre-adjusted series and its components are ARIMA modelled while respecting the dynamic, temporally recurring characteristics of the original series. Finally, the deterministic factors, outlying observations and variation caused by working or trading days that are observed in the pre-adjustment are assigned to the components as follows: extreme observations of level change (level shift (LS)) to *trend*, variation caused by numbers of working days and trading days (working day/trading day effects (WD/TD)) to *seasonal variation,* and individual outlying observations (additive outliers (AO)) and momentary outlying observations lasting for the duration of several observations (transitory outliers (TC)) to *random variation.* Thus the variation in the entire original time series becomes distributed to the components of final trendcycle, final seasonal variation and final irregular variations.

Because the said components are initially unobservable in the original time series they can be formed in many ways. In the TRAMO/SEATS method a solution is sought in the decomposition of a pre-adjusted time series where the variance of random variation is maximised. This solution is known as canonical decomposition and it produces an unambiguous decomposition of a time series.

When comparing the variance of the random variation factor (and the component of irregular variation) produced by means of canonical decomposition with other methods, such as the other model-based method, STAMP, and the aforementioned ad hoc methods, it is good to bear in mind that:

1. The modelling of a pre-adjusted series is made with diverse (pdq)*(PDQ) models[6] of the seasonal ARIMA model family which produce quite small, but proven random variance of random variation.

2. The identification of a seasonal ARIMA model for a pre-adjusted series is based on the Bayesian Information Criterion (BIC)[7] according to which the selection of the model is determined by as small variance as possible in random variation achieved with as small number of estimated parameters as possible.

Thus when a series pre-adjusted in the SEATS phase is divided into its components the variance of random variation (residual of ARIMA model) produced by the seasonal ARIMA model fitted to a time series is relatively small. This minimising of the random variation of an entire series in other components of the SEATS phase, and the assignment of most of it expressly to the variance of the random variation component cannot be assumed to lead to any greater variance of the random variation component (and the irregular components) than in the mentioned other methods in which the whole time series is not first modelled with a model of the seasonal ARIMA

[6] Notations p, d, q refer to the basic ARIMA part of the models and PDQ to the seasonal ARIMA part where p (or P) is the number of ar parameters, d (D) the number of differentiations, q (Q) the number of ma parameters. The model selection of TRAMO/SEATS is based on the following maximum limitations p=3,d=2,q=2; P=1,D=1,Q=1

[7] Min BIC (p, q) = $\log \sigma^2 + \log(p+q)T^{-1} \log T$, where p and q are the numbers of ar and ma parameters in the model and T the number of observations in the time series. When T approaches infinity BIC finds the model produced by the time part on the basis of simulations.

model family. By contrast, the combination of the deterministic modelling of working and trading day variation often leads to a greater variance of the seasonal component in TRAMO/SEATS. The stochastic modelling strategy of seasonal variation also works well on seasonal variation that transforms in time, which helps not only the capture of seasonal variation but also that of working and trading day effects.

In order to reduce the revision of the latest adjusted observations a projection a few observations forward must be produced in all seasonal adjustment methods. It is usually done basing on an ARIMA model, such as X11-/X12 ARIMA, even if the seasonal adjustment filter were not connected with the model concerned in any way. One logical justification of ARIMA model-based seasonal adjustment is that the filter used in the adjustment of a series is based on the same series-specific ARIMA model with which the forward projection is made. In all eventualities, the latest 1 to 3 adjusted observations will become revised against new statistical observations in all methods.

With standard regression and ARIMA model symbols, the phased TRAMO/SEATS method can be presented as follows:

Tramo (**I**) / Seats (**II**):

I) $$y_t = x_t{}'\beta + z_t$$

Pre-adjustment regressions - working/trading day effects (WD/TD)
- outlying observations (LS, AO, TC)

II) $$z_t = p_t + s_t + u_t$$

$$\Rightarrow \frac{\theta(B)}{\phi(B)} z_t = \frac{\theta_p(B)}{\phi_p(B)} a_{pt} + \frac{\theta_s(B)}{\phi_s(B)} a_{st} + u_t$$

Residual of ARIMA modelling, random (WN)

(pre-adjusted = (initial) trend + (initial) seasonal + random
series component….variation)

Finally, the deterministic factors of part I and the stochastic factors of part II are combined and the original series divides into its final components:

$$y_t = p_t(+LS) + s_t(+WD/TD) + u_t(+AO,TC)$$

Final irregular

observation = trend series	+ seasonal component	irregular component

The above final decomposition shows that when the seasonal component is being removed calendar effects are also eliminated in seasonal adjustment.

3.4.1 Policy for seasonal adjustment

Seasonally adjusted time series are published both at current prices and as chain-linked volume series at reference year 2000 prices. Unadjusted, or original, series benchmarked to annual national accounts are also published both at current prices and as chain-linked volume series at reference year 2000 prices. The chain-linked time series at the reference year prices are adjusted with a direct adjustment method and the time series at current prices with an indirect adjustment method. In the direct method all time series, inclusive of aggregates, are adjusted separately. The indirect method means that seasonally adjusted aggregates at current prices are formed by summing up adjusted sub-series. The randomness of the residual of the aggregate series that is formed by summing up the residuals of the ARIMA models of the sub-series is then tested. Apart from this methodological description that is publicly available the users also receive information about the implementation of seasonal adjustment on courses organised by Statistics Finland and simply by asking about it. The policies adopted in describing the modelling of time series are openness and information sharing.

The governing principle in seasonal adjustments is to make the modellings carefully once a year and keep both the deterministic pre-adjustment factors and the identified ARIMA model fixed between annual reviews of the modelling, yet so that the parameter values are re-estimated on each calculation round. An exception to this are outlying observations mid-way through the year, such as a labour dispute, for example. With regard to the main aggregate series, the model of a certain series might be adjusted if the modelling no longer fits the data due to new observations. The main principle is to keep the adjustment filters formed with the identified model for a series (apart from the estimation of parameter values) unchanged so that the adoption of filters does not cause revisions to the history of a seasonally adjusted series on every round. The aim in the updating of parameter values is to produce forward projections with as full information as possible on the past on every calculation round. The objective in this is to reduce revisions to the latest observations in adjusted series when new observations become available.

3.4.2 Policy for working day adjustment

Working day adjusted (more generally calendar adjusted) time series are published both at current prices and as chain-linked volume series at reference year 2000 prices. In principle, the working or trading day adjustment (inclusive of adjustments for leap years, Easter and national public holidays) is based on the testing of statistical significance during several modelling rounds by using monthly data from the sources used for QNA whenever possible.

Working or trading day adjustment factors (inclusive of omission of working day adjustment of a series) are not changed mid-way through the year between modelling rounds. In the best case, basing on experiences from modelling examinations from several years over an extended time period efforts are made to find at least for the main series a stable, series-specific solution with meaningful contents by also using in the testing the monthly indicators for the phenomenon concerned.

For the series that are not working or trading day adjusted original series are presented in place of series adjusted for working days. The original series are naturally also published so the congruence of the said series shows that no adjustment for working days has been done to the data describing the phenomenon concerned. In a case like this, the seasonally adjusted series is of course not calendar adjusted, either.

Chapter 4 GDP and components: the production approach

4.1 Gross value added by industry

In QNA gross value added is calculated at the accuracy of 130 industry/sector combinations. 2-digit level of NACE 2002 is used for the majority of industries, although for a few industries the calculation is done at the 3-digit level. Sector classification is 2-digit level with the exception that in the general government sector central government (S.1311), local government (S.1313) and compulsory social insurance (S.1314) form sectors of their own. An estimate of change in the value and prices of output and intermediate consumption is calculated for each industry/sector combination and value added is then obtained as the difference between output and intermediate consumption.

The calculation sets out from output; basing on a source indicator an estimate of change in the value of output from the respective quarter 12 months back (Q/Q-4) is calculated for each industry/sector combination. In addition, a deflator, in other words estimated change in the prices of output from previous year's average prices, is calculated for each industry/sector combination. Change in the prices of intermediate consumption is obtained by weighting the change in the prices of output with each industry/sector combination's structure of input use, obtained from the latest supply and use tables.

When changes in the value of output and in the prices of output and intermediate consumption have been calculated, a quarterly time series is formed of output at current prices. This is done by dividing the industry/sector outputs of the latest annual accounts between the quarters with the help of output indicators and by then applying the value changes previously calculated from the same output indicators to these euro-denominated quarterly outputs of the "reference year". The results is a euro-denominated time series on output starting from the 1st quarter of 2000, i.e. the year since when exhaustive indicators are available.

Intermediate consumption at current prices is calculated by using the intermediate consumption/output ratios of annual accounts for the years for which annual accounts have been finalised. The starting point for the latest quarter is the current priced intermediate consumption/output ratio of the latest, usually the previous year's, annual accounts. This ratio is adjusted with the relative change in the price of intermediate consumption compared to output so that majority of the relative change in the price of intermediate consumption is absorbed into the intermediate consumption/output ratio[8].

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[8] Example: The intermediate consumption/output ratio in the previous year's annual accounts is 0.6. The change in the price of output is + 2%, i.e. 1.02. The change in the price of intermediate consumption is +6%, i.e. 1.06. The relative change in the price of intermediate consumption is then 1.06/1.02 = 1.039 = +3.9%. If all of this is transferred to the value of intermediate

The proportion of the relative change in the price of intermediate consumption that is transferred to the value of intermediate consumption is defined for each industry by means of a regression analysis using annual national accounts data. In practice, the proportion varies between 50 and 100 per cent. Intermediate consumption at current prices is obtained for the latest quarters by multiplying the current price output of the quarter by the adjusted intermediate consumption/output ratio.

Value added at current prices is obtained by deducting intermediate consumption from output. Output and intermediate consumption at previous year's prices are obtained by deflating industry/sector-specific figures at current prices. Value added at previous year prices then is the difference between volume of output at previous year prices and the volume of intermediate consumption at previous year prices.

Agriculture (A)

The data sources are the dairy and egg production, and slaughterhouse statistics (monthly statistics), the yield estimates (four annual revisions), and the horticultural indicator of the information centre (TIKE) of the Ministry of Agriculture and Forestry. Price data on intermediate consumption are derived from Statistics Finland's Index of Purchase Prices of Means of Agricultural Production.

The value of output is obtained by multiplying the volume of output by the basic price, which comprises the producer price and subsidies on products. The volume of output is obtained by multiplying the volume of output by previous year's average price. Data on agricultural services are added in the third quarter of the year when the first annual estimate becomes available. Efforts are also made to estimate intermediate consumption separately from data on the consumption of feed, fertilisers and energy, so that value added is received as the difference between output and intermediate consumption. The method deviates from the one used in other industries for which intermediate consumption is modelled with a common formula.

Forestry (A)

The sources are the monthly data on market fellings and stumpage prices obtained from the Metinfo forest information service of the Finnish Forest Research Institute. Change in the value of output is estimated by multiplying change (Q/Q-4) in the volume, i.e. in market fellings, by price change (Q/Q-4). The formula for the deflator is: (average of monthly stumpage prices in quarter)/(average of previous year's stumpage prices).

Fishing (B)

The source data are those on the value of fish production and its price development calculated by the Finnish Game and Fisheries Research Institute.

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consumption, we get 0.6 * 1.039 = 0.623 as the adjusted intermediate consumption/output ratio.

Manufacturing (C, D, E)

The data sources for the sector of non-financial corporations (S.11) are Statistics Finland's (monthly) Indices of Turnover in Industry[9], (monthly) Volume Index of Industrial Output[10] and Producer Price Indices for Manufactured Goods[11]. For industries 35 (Manufacture of other transport equipment), 40 (Electricity, gas, steam and hot water supply) and 41 (Collection, purification and distribution of water) the value of output is calculated by multiplying change (Q/Q-4) in the Volume Index of Industrial Output by change (Q/Q-4) in the Producer Price Index. For all other industries in sector S.11 change in the value of output is obtained from change in the Index of Turnover (Q/Q-4).

The data source for the sector of households (S.14) is the "turnover" variable in the Tax Administration's payment control data, from which change in the value of output is obtained as (Q/Q-4). Tax Administration's payment control data is a monthly registry used for controlling Value Added Tax payments and employers' statutory social security contributions. The latest quarter is calculated with only two months of the payment control data. For example, only data on January and February are used in initial calculations concerning Q1, because the data on turnover in the payment control file accumulates slowly.

For both sectors deflators are formed from producer price indices with the following formula: (average of point figures for the calculation month)/(average of previous year's point figures). This formula is used for calculating deflators for all industries unless later otherwise stated. The deflator of industry 32 (Manufacture of radio, television and communication equipment and apparatus) has to be adjusted because the weights used for goods and services in the calculation of the Producer Price Index do not correspond with the structure of output in national accounts in this industry.

Construction (F)

The data sources for building construction are Statistics Finland's (monthly) Volume Index of Newbuilding[12], (annual) Statistics on Renovation Building and a price index of building construction calculated by a consulting company (Haahtela Group). The data sources for civil engineering are the sales value and volume indices of Statistics Finland's Index of Turnover of Construction[13]. Change in the output of building construction is obtained by multiplying change in the Volume Index of Newbuilding by change in Haahtela's price index, and then adding a rough estimate of change in the output of renovation building. The deflator for building construction is derived from Haahtela's index. Change in the output of civil engineering is obtained from change in the Index of Turnover of Construction. The deflator is calculated from the implicit price index of volume indices of turnover and sales. The same estimate of change in value and prices is used for all sectors.

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[9] http://tilastokeskus.fi/til/tlv/index_en.html
[10] http://tilastokeskus.fi/til/ttvi/index_en.html
[11] http://tilastokeskus.fi/til/thi/index_en.html
[12] http://tilastokeskus.fi/til/urvoli/index_en.html
[13] http://tilastokeskus.fi/til/rlv/index_en.html

Trade (G)

The data sources are monthly value and volume indices for wholesale, retail and motor vehicle trade from Statistics Finland's Index of Turnover of Trade[14]. An estimate of change in the value of output is calculated from change (Q/Q-4) in turnover. The deflator is calculated from the implicit price index of the turnover and volume indices. Output and value added are calculated separately for wholesale trade (TOL 51), retail trade (TOL 52) and motor vehicle trade (TOL 50). According to ESA 95, output for this industry is calculated from sales margin (turnover less bought merchandise). In QNA turnover has to be used as the indicator of output because quarterly data are not available on the development of the margin.

Hotels and restaurants (H)

The data sources are Statistics Finland's Index of Turnover of Services[15], Producer Price Index for Services[16] and Consumer Price Index[17]. Change in the value of output is obtained from change in the Index of Turnover. The deflator is calculated using a weighted index in which the price index for hotels is the Producer Price Index and that for restaurants the Consumer Price Index.

Transport, storage and communication (I)

The data sources are Statistics Finland's Index of Turnover of Services and Producer Price Index for Services. Change in the value of output is obtained from change in the Index of Turnover. Deflators are derived from the Producer Price Index.

Financial and insurance intermediation (J)

The data sources for financial intermediation (TOL 65) and activities auxiliary to financial intermediation (TOL 67) are Statistics Finland's Statistics on Credit Institutions[18], Consumer Price Index and Index of Wage and Salary Earnings[19]. Change in the value of the output of financial intermediation is comprised of two elements: market output and FISIM. Change in market output is obtained from change (Q/Q-4) in the commission income of credit institutions in the Statistics on Credit Institutions. FISIM are calculated quarterly in national accounts in euros and change in their prices is calculated at the same time. The deflators for market output are the sub-index of banking services in the Consumer Price Index (weight 70%) and the Index of Wage and Salary Earnings for industry 65 (30%).

Change in the value of the output of activities auxiliary to financial intermediation is obtained from change in the commission income of investment service companies, which is found in the Statistics on Credit

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[14] http://tilastokeskus.fi/til/klv/index_en.html
[15] http://tilastokeskus.fi/til/plv/index_en.html
[16] http://tilastokeskus.fi/til/pthi/index_en.html
[17] http://tilastokeskus.fi/til/khi/index_en.html
[18] http://tilastokeskus.fi/til/llai/index_en.html
[19] http://tilastokeskus.fi/til/ati/index_en.html

Institutions. The deflator is the sub-index of bank services in the Consumer Price Index.

No reliable method has been found for calculating quarterly data on the output/value added of insurance funding, so long-term growth trend is used as the estimate for the latest quarters.

Real estate, renting and business activities (K)

The data sources for industry 70, Real estate activities, are the Tax Administration's payment control data and Statistics Finland's (quarterly) Statistics on Rents of Dwellings[20]. The data sources for industries 71, 72, 73 and 74 are Statistics Finland's Index of Turnover of Services and Producer Price Indices. Output for industry 70 is calculated through four sub-industries. For Real estate activities with own property (TOL 701), Letting of own property (TOL 7022) and Real estate activities on a fee or contract basis (TOL 703) change is calculated from change in turnover in the Tax Administration's payment control data. The deflators for these industries are formed from the Producer Price Index for industry 70. Change in the value of the output of Letting of dwellings (TOL 7021) is obtained by multiplying change in the volume (annual data only) by change in the quarterly index of rents in the Statistics on Rents of Dwellings. The deflator is formed from the index of the Statistics on Rents of Dwellings. Change in the value of output for industries 71-74 is obtained from change in the Index of Turnover. The deflators for the output are obtained from Producer Price Indices.

Public administration and defence; compulsory social security; Education; Health and social work (L, M, N)

Industries 75, 80 and 85 are in Finland mainly activities of the public sector. The data sources for the public sector are the Tax Administration's payment control data, central government's book-keeping, and the Index of Wage and Salary Earnings. Change in the value of output is primarily calculated from change in the sum of wages and salaries (variable stpalkat) in the payment control data. Deflators are formed from indices of wage and salary earnings. For the central government sector (S.1311) the data on wages and salaries in central government's book-keeping are used as comparison data to the payment control data. With regard to the local government sector (S.1313) the problem with the payment control data is that each municipality has only one business ID code in the data so that in practice all wages and salaries paid by municipalities show under industry 75 (Public administration). In the local government sector, only joint municipal boards with their own business ID codes show in the payment control data in the industries of Education, and Health and social work.

Change in the value of the output of the non-financial corporations sector's educational and health and social services is obtained from change in turnover in the payment control data. The deflators are derived from indices of wage and salary earnings.

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[20] http://tilastokeskus.fi/til/asvu/index_en.html

Change in the prices and value of the output of the sector Non-profit institutions serving households (S.15) is calculated in the same way as for the public sector, i.e. by using the sum of wages and salaries in the payment control data and indices of wage and salary earnings.

Other community, social and personal service activities (O)

The data sources are Statistics Finland's indices of turnover (industries TOL 90-93), the payment control data, the Index of Wage and Salary Earnings and the Consumer Price Index. Change in the value of the output of the sector of non-financial corporations is obtained from change in turnover indices, and deflators from indices of wage and salary earnings (TOL 90, 91, 93) and the Consumer Price Index (TOL 92, 95). Change in the value of the output of the public sector is obtained from the sums of wages and salaries in the payment control data, and deflators from indices of wage and salary earnings. Change in the value of the output of the sector of households is obtained from turnover in the payment control data and deflators in the same way as for the sector of non-financial corporations. Change in the value of the output of sector S.15 is obtained from the sums of wages and salaries in the payment control data, and deflators from indices of wage and salary earning.

4.2 FISIM - Financial intermediation services indirectly measured

Financial intermediation services indirectly measured are calculated quarterly in the same way as in annual accounts. All the balance and profit and loss account data of domestic credit institutions that are needed in the calculations for FISIM are available quarterly from Statistics Finland's Statistics on Credit Institutions. The only item of FISIM that cannot be estimated quarterly is imports.

The results from the calculations for FISIM are utilised in QNA in calculating value added for financial corporations (see Section 4.1). Allocation of FISIM to user sectors/industries is not done quarterly.

4.3 Taxes on products and subsidies on products

Taxes on products are estimated from cash based monthly data in central government's book-keeping. Depending on the type of tax, a timing adjustment of one to two months is made to the cash based taxation data in order to bring them closer to accrual basis. Because of this value added tax for the latest quarter has to be estimated from the data on the first two months of a quarter and from change from 12 months back.

No data are available quarterly on subsidies on products.

Chapter 5 GDP and components: the demand approach

5.1 Household final consumption

Household final consumption is calculated by extrapolating quarterly values benchmarked to annual accounts by changes in indicators. The changes in the indicators are weighted according to the consumption account of the latest annual accounts. The most important indicators that are used are: Turnover Index of Retail Trade (by type of commodity) of Statistics Finland's Index of Turnover of Sales, Statistics Finland's Statistics on Rents of Dwellings, the Finnish Vehicle Administration's data on first registrations of passenger cars, the Finnish Oil and Gas Federation's data on petrol sales, and data on the number of package tours in Statistics Finland's Tourism Statistics. In addition, the following supply indicators are used for estimating the consumption of services: transport, communication, hotel and restaurant, and recreational, cultural and sports services are calculated using change in the index of turnover for the respective industry. In respect of FISIM, the consumption of financial services is based on the FISIM account and in respect of other financial services on data describing the development of commission income in Statistics Finland's Statistics on Credit Institutions.

Volumes at previous year's average prices are obtained by deflating values at current prices with changes in the sub-items of the Consumer Price Index (deflators = CPI Q_t / CPI Y_{t-1}).

5.2 Government final consumption

Government final consumption at current prices is obtained from data in Statistics Finland's Statistics on General Government Revenue and Expenditure[21] (STPFS). The data in the STPFS are mainly based on quarterly statistics on the finances of municipalities and joint municipal boards, and on central government's bookkeeping. The volume of government final consumption is obtained by deflating value at current prices by the deflator for the output of public sector industries (see 4.1) which is mainly formed from indices of wage and salary earnings.

5.3 NPISH final consumption

The final consumption of Non-Profit Institutions Serving Households at current prices is estimated by extrapolating values from previous year's corresponding quarter benchmarked to annual accounts with change in the output of industries in sector S.15, which is calculated in connection with value added calculations (see 4.1). Volume is obtained by deflating value at current prices with the deflator of output for sector S.15, which is also formed in connection with value added calculations, mainly from indices of wage and salary earnings.

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[21] http://tilastokeskus.fi/til/jtume/index_en.html

5.4 Gross capital formation

Gross fixed capital formation, i.e. investments

Gross fixed capital formation in construction is mainly calculated by using the same sources and methods as in the calculation of value added in construction (4.1). Data from Statistics Finland's inquiry about enterprises' investments are used as the comparison data.

The main data source for gross fixed capital formation in machinery and equipment is Statistics Finland's inquiry about enterprises' investments which is conducted quarterly and covers approximately 2,000 largest enterprises in the non-financial corporations sector. The calculation at current prices is performed by extrapolating values benchmarked to annual accounts with change in investments in machinery and equipment obtained from the inquiry about investments. Comparison data for the inquiry about investments are calculated with the so-called goods flow method in which exports are deducted from and imports added to domestic production of investment goods in machinery and equipment. Change in the volume of domestic production is calculated by weighting changes for industries DK, DL and DM in the Volume Index of Industrial Output with outputs at current prices in annual accounts. The data for exports and imports of investment goods are mainly derived from the monthly foreign trade statistics of the Board of Customs. The sub-index of investment goods of the Wholesale Price Index is used in the deflation of investments in machinery and equipment.

Other investments are mostly comprised of investments in computer software, for which the main data source is Statistics Finland's inquiry about enterprises' investments. The calculation at current prices is performed by extrapolating values benchmarked to annual accounts with change in investments in software obtained from the inquiry about investments. Change in the index of turnover of industry 72 is used as the comparison data. The deflator is the index of producer prices for industry 72.

5.5 Imports and exports

The principal source of data for exports and imports is the Current Account[22] compiled by the Bank of Finland. Monthly data of the Board of Customs[23] are used as comparison data for the exports and imports of goods. Statistics Finland's Statistics on International Trade in Services[24], on which the data of the Current Account are also based, are used as the comparison data for the exports and imports of services. The share of construction services is deducted from and the imports and exports of FISIM added to/deducted from the imports and exports of services in the Current Account. For the calculation of volumes separate deflators are formed for the exports and imports of goods and services by weighting import and export price indices

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[22] http://www.suomenpankki.fi/fi/tilastot/maksutase/index.htm
[23] http://www.tulli.fi/fi/05_Ulkomaankauppatilastot/05_Tilastokatsaukset/01_Ennakot/index.jsp
[24] http://tilastokeskus.fi/til/pul/index_en.html

with weights according to the latest data on imports and exports in the statistics of the Board of Customs and in the Current Account.

Chapter 6 GDP and components: the income approach

6.1 Compensation of employees

Compensation of employees is comprised of wages and salaries and employer’s social contributions. The main data sources for estimations of wages and salaries are Statistics Finland’s Wage and Salary Indices. The comparison data are the Social Insurance institution’s estimate of wages and salaries sum, and the Tax Administration’s payment control data. These data are all produced monthly. In addition, a growth per cent is calculated as comparison data from the number of hours worked in the Labour Force Survey and change in the Index of Wage and Salary Earnings. An estimate of change in the wages and salaries sum for the whole economy is obtained by weighting the change percentages in the quoted data sources. Euro-denominated value is obtained by extrapolating the corresponding quarter twelve months back with the change in the source data. Wages and salaries by industry are calculated from changes in wage and salary indices because the data of the Social Insurance Institution only contains an estimate for the whole economy.

Employers’ social contributions are estimated by applying to the wage and salary estimates the implicit social contribution percentage of the latest annual accounts, i.e. employers’ social contributions relative to wages and salaries. If it is known that changes have taken place in the employers’ social contribution percentage since the latest annual accounts, the estimated social contribution percentage is changed accordingly.

6.2 Taxes and subsidies on production

Taxes on production principally comprise taxes on products (see 4.3). Estimation of taxes on products and other taxes on production is based on calculations of the Statistics on General Government Revenue and Expenditure (STPFS) which exploit central government’s bookkeeping data. Data on subsidies on production are not available quarterly.

6.3 Gross operating surplus and mixed income

Source data on gross operating surplus and mixed income are not available quarterly so they are calculated as a residual item by deducting compensation of employees, taxes on production and consumption of fixed capital from GDP calculated via output.

Chapter 7 Population and employment

7.1 Population, unemployed

The data source for the size of population is Statistics Finland’s preliminary Population Statistics. The data source for the number of unemployed persons is Statistics Finland’s Labour Force Survey. The data from these sources are used as they are. Data from both sources are released at the accuracy of 100 persons.

7.2 Employment: persons employed

Number of employed persons is published in QNA in hundreds of persons. The data source is Statistics Finland’s Labour Force Survey from which changes in the numbers of persons employed are obtained by industry. Changes calculated from the Labour Force Survey data (Q/Q-4) are used to extrapolate quarterly data from twelve months back benchmarked to annual accounts, which produces initial estimates for numbers of persons employed by industry for the latest quarters.

Because the Labour Force Survey is sample-based, the change percentages for the numbers of persons employed in the smallest industries can be highly volatile. Hence, the initial estimates for changes in the numbers of employed persons obtained from the Labour Force Survey are compared with data on wages and salaries (see 6.1) and hours worked. The final estimates for the numbers of employed persons are formed based on this examination. The total number of employed persons is obtained by summing up the estimates by industry.

7.3 Employment: hours worked

The same source data and calculation method are used as for the number of persons employed. The final estimate of the number of hours worked is formed by comparing the change percentages calculated from the Labour Force Survey to data on wage and salary sums (see 6.1) and employment data. The data on wage and salary sums, persons employed and hours worked are fitted together so that their development appears logical. The total number of hours worked is obtained by summing up the estimates by industry. The data are published at the accuracy of 100,000 hours.

Chapter 8 From GDP to net lending/borrowing

8.1 Primary income from/to the rest of the world, gross national income

Primary income from/to the rest of the world is comprised of compensations employees received from/paid to the rest of the world (D.1), taxes on production and products (D.2), subsidies (D.3) and property income (D.4). The data sources for compensations of employees and property income are the factor returns (compensations of employees and returns on equity) included in the Current Account. Exhaustive quarterly data are not available on taxes and subsidies on products paid to/received from the rest of the world so these items must be estimated from the latest annual accounts data.

Gross national income is obtained when primary income received from the rest of the world is added to and, respectively, primary income paid to the rest of the world deducted from GDP.

8.2 Consumption of fixed capital, net national income, acquisition less disposal of non-financial non-produced assets

The development in the volume of consumption of fixed capital (K.1) is quite congruent with that of the volume of fixed capital stock, i.e. very stable. The volume of consumption of fixed capital at previous year's average price is estimated by first dividing the average of the previous year's current priced consumption by four. If the volume of investments has changed strongly in a calculation quarter and/or the quarters preceding it, this is taken into consideration by raising or lowering the estimated volume of consumption slightly. However, one quarter's investments only have a minor impact on the stock of capital and consequently on its consumption. Consumption at current prices is obtained by inflating previous year's consumption at average price by change in the prices of investments.

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

No quarterly data are available on acquisitions less disposal of non-financial non-produced assets (K.2). Zero is used as the estimate for the latest quarter, because a net figure is concerned the final benchmarked value of which can be either positive or negative.

8.3 Current transfers from/to the rest of the world, net national disposable income

Current transfers are comprised of taxes on income and wealth (D.5), social contributions (D. 61), social security benefits in cash (D. 62) and other current transfers (D.7). The data are derived from current transfers in the Current Account. The Current Account item of current transfers from the rest of the world (income) contains subsidies (D.3) which are deducted by using the latest annual accounts data on the sector rest of the world. The Current Account item of current transfers to the rest of the world (expenditure) contains taxes on production and imports (D.2) which are deducted by using the latest annual accounts data on the sector rest of the world.

Net national disposable income is obtained by adding current transfers from the rest of the world to net national income and deducting from it current transfers to the rest of the world.

8.4 Adjustment for the change in net equity of households in pension fund reserves, net saving

Net saving of the national economy is calculated by deducting all consumption expenditure (P.3, inclusive of general government consumption expenditure and private consumption expenditure) from net national disposable income. Adjustment for the change in net equity of households in pension fund reserves is not calculated in QNA because definitionally it nets to zero at the level of the whole economy and thus does not affect net saving.

8.5 Capital transfers, net lending/borrowing

The data source for capital transfers (D.9) is the capital account in the Current Account compiled by the Bank of Finland. Net lending/borrowing (B.9) of the national economy is obtained with the following formula: Net saving of national economy (B.8n) + Capital transfers from the rest of the world (D.9) - Capital transfers to the rest of the world (D.9) + Consumption of fixed capital (K.1) - Gross capital formation (P.5) - Acquisition less disposal of non-financial non-produced assets (K.2) - Statistical discrepancy.

Chapter 9 Flash estimates

9.1 Quarterly flash estimate of GDP

A quarterly flash estimate of gross domestic product is calculated as Trend Indicator of Output. The flash estimate is not published but produced for Eurostat only.

The same data sources as in QNA are utilised as exhaustively as possible in the calculation of the flash estimate. Due to the fast release timetable, fully equivalent data cannot be used, and industries are not split into different sectors. Intermediate consumption, and taxes and subsidies on products are not estimated in the compilation of the flash estimate, but quarterly GDP is carried forward with an annual change that is based on indicators of output.

Apart from the aforementioned exceptions, the same methods are used in the calculation of the flash estimate as in the calculation QNA. Development in the value and prices of output is mainly estimated basing on data describing turnover and indices of produce prices, or data on wage and salary sums and indices of wage and salary earnings. The calculation is performed monthly with the annual overlap method. Except for the currently calculated quarter, chain-linked time series are benchmarked to correspond to quarterly and annual accounts. Monthly series are summed up to quarterly series. Quarterly series are seasonally adjusted with the TRAMO/SEATS method.