Statistical Service of Cyprus

QUARTERLY NATIONAL ACCOUNTS

INVENTORY

Nicosia
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Chapter 1: Overview of the system

1.1 Organisation and institutional arrangements

The Statistical Service of Cyprus is the authority responsible for the compilation and the publication of most of the official statistical data in Cyprus. The information of the users is achieved via the website, various printed publications, statements for the media and informative bulletins.

The Statistical Service of Cyprus was set up in 1950 as a small administrative unit while its real function started after Cyprus became independent, in 1960.

The Statistical Service of Cyprus is organised by subject matter on the basis of 8 main Divisions and 4 supporting Sections.

The main statistical Divisions are:

- National Accounts and Foreign Trade
- Industry, Construction, Energy, Environment, Science and Technology
- Labour force, Prices, Wages and Salaries
- Public Finance, Services
- Demography, Social Statistics, Tourism
- Harmonized Index of Consumer Prices, Wholesale and Retail Trade
- Agricultural Statistics
- Transport Statistics

The supporting sections pertain to the following:

- Statistical information and ICT surveys
- Data processing and technical support
- Registry
- Accounts

The Statistical Service of Cyprus currently employs 145 permanent staff. A number of casual staff is also employed to assist in the various censuses and sample surveys, primarily at the data collection phase.

The following units of the National Accounts section are involved in the production of the national accounting data and the number of person involved in each unit is given in brackets. Furthermore it should be noted that out of the total 16 persons, 12 persons are permanent staff and the remaining are employed on a contractual basis.

Compilation of National accounts, the unit (6) has the responsibility for the preparation of the annual National Accounts both at current and constant prices.

Quarterly accounts, the unit (1) has the responsibility for the preparation of the quarterly National Accounts. The person responsible for the compilation of QNA is Maria Constantinou *(email: mconstantinou@cystat.mof.gov.cy).*

Short term economic indicators, the unit (2) has the responsibility for collection and the preparation of short term indicators.

Business accounts, the unit (2) has the responsibility for conducting annual economic surveys such as the Real Estate activities survey, the Financial Intermediation survey and the Local Authorities survey.

Financial accounts, the unit (2) has the responsibility for the preparation of the Financial Accounts.

Institutional sector accounts, the unit (1) has the responsibility for the preparation of the Institutional sector Accounts and the Rest of the World account.

Supply and Use tables and Own resources, the unit (2) has the responsibility for the preparation of Supply and Use tables, as well as the satellite accounts for Health and Tourism. In addition, it provides data for the calculation of VAT Own Resources.

1.2 Publication timetable, revisions policy and dissemination of QNA

1.2.1 Publication timetable and dissemination of QNA

The Statistical Service of Cyprus rendered its website as the main source of statistical information, without this entailing the suppression of other printed means of dissemination as publications, bulletins and statements via the press.

The Statistical Service publishes on its website two types of release calendar: The quarterly release calendar which contains the dates of the Press Release and announcements of the Statistical Service, which are preliminary scheduled to be released during the current trimester and the weekly release calendar, which contains the dates scheduled to be released in the following week.

The various statistical data are categorised in the web pages under 10 "Statistical Themes" and 27 sub-themes. The "Statistical Themes" are:

-Economy

-Prices and Inflation

-Population and Social Conditions

-Labour

-External Trade

-Agriculture

-Industry and Construction

-Energy and Environment

-Transport, Tourism, Trade, Other services

-Other

Quarterly national accounts are disseminated at the same time for all, national and external users which is the rule for all dissemination data in the web site address *(http://www.mof.gov.cy/cystat)* in the Statistical theme "Economy"

The Statistical Service of Cyprus set up its first effort in compiling Quarterly National Accounts at the beginning of 2001. Cyprus, among the member states of the European Union, was obliged to produce QNA. Assistance in setting up the system of Quarterly Accounts in Cyprus was provided by the Italian

experts, Giovanni Savio and Marco Marini, who are thanked warmly for their help. The expert reports were of a great value and were used as an important ingredient for the preparation of this inventory.

The first transmission to Eurostat took place at the beginning of 2002. At the early beginning, only the GDP growth was transmitted to Eurostat, but since then, an effort has been made to achieve a full set of data transmission. Nowadays, the questionnaires tables 101, 102, 103, 104, 105, 112 are regularly transmitted at t+70, in raw, working day and working day/seasonally adjusted form.

In addition, a flash estimate of GDP is calculated at t+45 and transmitted to Eurostat since 2007.

Concerning the length of the series, Cyprus being a new Member State, has a responsibility for transmission of QNA data as from 1995Q1.

As already mentioned, the Quarterly national accounts are disseminated at the same time for all, national and external users. Due to this fact the directive concerning the publication timetable of the Statistical Service is driven by the coordinated release dates of quarterly national accounts of Eurostat. Consequently, the Statistical Service disseminates its QNA at t+45 and at t+70.

1.2.2 Revisions policy

The revision routine policy of QNA is closely related to that of ANA. A full set of Annual data is available from 1995 onwards while the last two years are preliminary estimates till the results of the annual surveys are adopted. When new annual data are available, new annual econometric relationships are estimated, the Chow-Lin quarterly disaggregation procedure is run with new estimated coefficients and thus, the quarters may be revised. In addition, occasional revisions of ANA and subsequently of QNA may be carried out irregularly according to particular needs.

Generally it has been noticed that causes of routine revisions in QNA essentially include:

a) Revisions due to changes in annual accounts;

b) Revisions due to seasonal adjustment;

c) Revisions due to the quarterly disaggregation and then to changes in the estimated coefficients;

d) Revisions due to changes/revisions in the short-term indicators used;

e) Revisions due to the availability of indicators and the replacement of forecasts, with actual data;

f) Revisions due to punching errors.

1.3 QNA compilation approach.

On the basis of the guidelines of Eurostat, the Statistical Service decided to adopt an indirect approach in estimating QNA (instead of relying on direct estimates based on quarterly ad hoc surveys).

The lack of the same sources used at annual level does not permit to employ the same methodology also at quarterly level. The annual data is temporally disaggregated by means of related indicators observed at quarterly frequency. The Chow-Lin's approach (1971) is used to this purpose, a well-known temporal disaggregation technique.

According to this method, quarterly national accounts are generally constructed on the basis of short term indicators. Each account series is linked to one or more related quarterly series, available at the time of compilation of the account series themselves. Apart from the estimation of single series, statistical methods are also used in order to achieve the accounting relationships.

For seasonal adjustment, the model-based approach in the estimation of quarterly national accounts is also adopted.

It is important to stress that the quality of the final results in the estimation of quarterly national accounts depends on a number of factors, the most important one being - for countries adopting an indirect approach - the quality of the indicators used. The ability of short-term indicators to give reliable and timely information on the evolution of the phenomena under study is an essential feature to be addressed at the very preliminary stage, as to get good estimates.

For the case of Cyprus, the GDP estimate is computed from the output-side. Table 1 and Table 2 show the classification of GDP by branches of economic activity, with the relative weights and with respect of the total GDP from 1995 to 2006. From this table the production structure of Cyprus economy is immediately recognised. The services sector accounts for about 76% of total GDP for the 1995-2006 period, while industry and agriculture contribute around 20% and 4% of total GDP respectively.

Table 1. Percentage Distribution of Gross Value Added by Economic Activity

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Primary (A + B)	5.0	4.6	4.0	4.2	4.0	3.6	3.8	3.7	3.4	3.0	2.8	2.6
Secondary (C+D+E+F)	22.5	22.2	21.3	20.6	19.6	19.1	18.7	19.3	19.4	19.7	19.5	19.1
Tertiary (G+H+I+J+K+L+M+N+O+P)	72.5	73.2	74.7	75.2	76.4	77.3	77.5	77.0	77.2	77.3	77.7	78.3
Total GVA	100	100	100	100	100	100	100	100	100	100	100	100

Table 2. Percentage Distribution of Gross Value Added by Economic Activity

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
AYA – Agriculture, hunting and forestry	4.8	4.3	3.8	3.9	3.7	3.4	3.6	3.5	3.3	2.8	2.6	2.4
AYB – Fishing	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
AYC – Mining and quarrying	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.4
AYD – Manufacturing	11.8	11.5	11.1	10.7	10.3	9.9	9.5	9.5	9.2	9.2	8.8	8.4
AYE – Electricity, gas and water supply	2.1	2.1	2.0	2.0	1.9	2.1	2.1	2.1	2.2	2.2	2.1	2.0
AYF – Construction	8.3	8.4	7.9	7.6	7.2	6.8	6.9	7.4	7.6	8.0	8.2	8.3
AYG – Wholesale and retail trade; repairs	13.5	13.2	12.9	13.1	12.6	12.7	12.5	12.6	11.9	12.5	12.5	12.6
AYH – Hotels and restaurants	9.2	8.6	8.8	8.8	9.2	9.5	9.7	8.7	7.9	7.5	7.3	7.1
AYI–Transport storage and communications	8.0	8.1	8.2	8.4	8.7	8.9	9.1	8.6	8.1	8.2	8.1	7.8
AYJ – Fin. Intermediation	5.4	5.8	6.3	6.5	7.7	7.7	7.1	6.3	6.2	6.6	6.9	7.3
AYK 1 – Real estate activities	2.1	2.2	2.2	2.2	2.1	2.3	2.2	2.6	3.1	3.1	3.5	3.9
AYK 2 – Renting of machinery and equipment	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4
AYK 3 – Other bus. Activities	13.1	13.4	13.6	13.7	13.6	13.4	14.1	14.6	14.4	14.4	14.5	14.8

AYL– Public administration and defence	8.9	9.0	9.2	8.8	9.0	9.1	8.8	9.3	10.7	10.3	10.3	10.3
AYM –Education	4.7	4.9	5.2	5.3	5.2	5.2	5.3	5.5	6.0	5.8	5.8	5.8
AYN –Health and social work	3.3	3.5	3.6	3.6	3.5	3.5	3.5	3.7	3.9	3.8	3.8	3.8
AYO –Other community, social and personal services	3.5	3.6	3.9	4.0	3.8	3.9	4.0	4.0	4.0	3.9	3.8	3.7
AYP –Private households with employed persons	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.8	0.8	0.8
Total GVA	100	100	100	100	100	100	100	100	100	100	100	100

1.4 Seasonal adjustment and working day adjustment

The model-based approach is used to seasonal adjust the time series. The process of seasonal adjustment is carried out on related indicators through the programs TRAMO-SEATS. The preferred indicators are seasonally adjusted and then, the SA indicators are used to obtain seasonal adjusted versions of the NA aggregates.

The working day adjustment is generally applied for three effects, associated to the calendar structure: working days, Easter and leap year. In the case of Cyprus only the two of them are taken into consideration, the working day and the leap year. The Easter effect for the case of Cyprus is not applicable as for the Orthodox countries, Easter is either in April or May which means that Easter is always during the 2nd quarter of the year. This means that at quarterly level, Easter is without meaning concerning the working day adjustment.

It is also important to mention that:

a) The working day adjustment is applied at the monthly indicators.

b) Monthly indicators are aggregated (eventually after forecasting the last missing observations) on a quarterly basis before being seasonally adjusted with the Tramo-Seats program;

c) From the early beginning, the problem of revision of seasonality was stated and it was suggested that the program Tramo-Seats should be run once per year and the model chosen by Tramo, should be kept fixed for one year while parameters should be let free to vary until the complete year become available (option model fixed-parameters free). When Tramo-Seats failed to find the optimal model the airline model was applied to corresponding time series.

In continuation to that, for practical issues, we proceed to concurrent adjustment, which means that at every period the optimal forecast is computed based on the best options of treatment. The adoption of this option leads of course to more revisions concerning the seasonal data.

1.5 Balancing, benchmarking and other reconciliation procedure

Quarterly raw and seasonally adjusted data is obtained via quarterly disaggregation of the same annual data with the raw and seasonally adjusted indicator.

1.6 Additional information

Cyprus started compiling QNA at the beginning of 2002. At that time, the GDP growth rate was the only figure published and transmitted to Eurostat.

From 2003Q1, data on Production and Expenditure side was compiled and transmitted, while from 2005Q3 onwards a full set of analysis is available for users, from the production, expenditure and

income side, in raw, working day and working day/seasonally adjusted form. From early 2007, the Statistical Service also started to produce and publish a flash estimate.

Apart from the aim of having the Statistical Service of Cyprus to fulfil the entire requirement concerning the coverage of the transmission questionnaire tables, the other important point was the fulfilment of the time requirement.

By the first transmission of data in 2006, the Statistical Service transmitted a full analysis of data at approximately t+60. As most of our indicators are available at t+70, revisions problems appeared in between consecutives quarters due to the forecasting of missing key-indicators. The revision problems relate to the difference between the initial and the revised figures and appeared to be more remarkable when QNA results are examined in greater detail (e.g. by economic activity). Consequently, these revision problems were taken into consideration in the assessment of this publication practice.

When the Statistical Service at early 2007, started to produce and publish a flash estimate at t+45, the publication policy changed. In order to avoid, having in only 10 days, extensive revisions at the detailed level, something that could unavoidably create confusion to the users, it was decided that the full analysis (tables 101, 102, 103, 104, 105, 112) would regularly be produced, sent to Eurostat and published in the web-side at t+70 in raw, working day and working day/seasonally adjusted form, which is in accordance with Eurostat regulation.

The change of the transmission date from approximately t+60 to t+70 is not in conflict with Eurostat regulation and it gives also the opportunity to reduce the revision problem as more key-indicators become available at t+70.

Quarterly National Accounts and Annual national accounts estimation are closely related and took advantages from each other. As the National Accounts Section is committed by its National Dissemination program to provide an annual first estimate for the current year, even well-before the compilation of the last quarter of the year, the capability to have analytical preliminary estimates from both the production and the expenditure side (flash estimates) becomes very useful. The preliminary estimate of the year is generally done by forecasting the missing information for each indicator with Tramo but also on the basis of other information.

Chapter 2: Publication timetable, revisions policy and dissemination of QNA

2.1 Release policy

There is a close relationship between annual and quarterly releases which is as follows:

1. A first preliminary estimate of annual data for year t is released at the end of June (t-6). This preliminary release contains no breakdown and gives only some overview of the economic development.

2. A second preliminary estimate is released at the end of September (t-3) and contains a revision of the year t-1. It contains basic analyses and breakdown of the production and expenditure accounts.

3. A third estimate of year t is released at early March of the successive year (t+3) with a "final" revision for year t-1. The analysis of year t is extended and the maximum level of detail is given.

According to this plan, the estimations which should be done without a priori knowledge of the annual total are the first, second and third quarter of each year.

The first annual estimate, published at the end of June (t-6), is in part based on the preliminary findings of the first quarter and the first estimate of the second, third and fourth quarter by forecasting the missing information for each indicator (purely with Tramo Seats) and by summing up the four quarters.

The second annual estimate which contains basic analyses and breakdown of the production and expenditure accounts, could take advantage from the results obtained from the estimates of the first, second and third quarter. The quarterly accounts give again their new estimation of the year by estimating the fourth quarter based again on forecasting estimation of the indicator. The forecast of the indicators this time is not only the result of a technical method (Tramo-Seats) but are also combined with other sources.

When publishing the fourth quarter the quarterly accounts are obliged to respect the annual constrains. Quarterly National Accounts and Annual national accounts estimations are closely related and take advantages from each other. When the fourth quarter is estimated, a simulation is made comparing the results obtained running the QNA program without and with the annual constrain. In the "final" revision of the year, the results coming out from the simulation procedure are taken into consideration but further information coming from the relevant activities are also taken into consideration.

Quarterly national accounts are disseminated at the same time for both national and external users. In that way the directive concerning the publication timetable of the Statistical Service is driven by the coordinated release dates of quarterly national accounts of Eurostat. The Statistical Service disseminates QNA at t+45 and at t+70. These dates are communicated to CYSTAT website users through the Quarterly Release Calendar.

2.2 Contents published

As already mentioned, the Statistical Service disseminates its QNA at t+45 and at t+70.

At t+45 a flash estimate is compiled and the aggregate of GDP in volume, is send to Eurostat, in raw, working day and working day/seasonally adjusted form. Eurostat calculates the quarterly growth rates for the member states based on seasonally adjusted data and publishes the growth rate compared to the previous quarter and compared to the same quarter of the previous year.

For the users of CYSTAT website *(http//www.mof.gov.cy/cystat)*, the GDP level is given for both raw and working day/seasonally adjusted data. As far as it concerns national users, the analysis in raw data still seems to be more important and more comprehensible and thus, the Statistical Service publishes in its website the growth rate of GDP in raw data compared to the same quarter of the previous year and in seasonally adjusted form compared to the previous quarter.

At t+70 the Statistical Service produces a full set of quarterly accounts which is sent to Eurostat and also published in its website: Questionnaire tables 't101cn', 't101cs', 't101cw', 't101kn', 't101ks', 't101kw', 't102cn', 't102cs', 't102cw', 't102kn', 't102ks', 't102kw', 't103cn', 't103cs', 't104cn', 't104cs', 't104kn', 't104ks', 't105cn' ,'t105cs', 't105cw', 't105kn', 't105ks', 't105kw', 't112cn', 't112cs'. The first four characters denote the reference table, while the latest two indicate the nature of the data (cn: current prices, raw; cs: current prices, seasonally adjusted; cw: current prices, working day adjusted; kn: constant prices, raw; ks: constant prices, seasonally adjusted; kw: constant prices, working day adjusted).

In another website page, a table with the growth rate of GDP in raw data compared to the same quarter of the previous year and the growth rate of seasonally adjusted data compared to the previous quarter is presented, assisted by a short list of the evolution of the main economic indicators during the current quarter.

2.3 Special transmissions

The data is only transmitted to Eurostat and published in the website of the Statistical Service of Cyprus. No privileged users exist.

2.4 Policy of metadata

So far, metadata is not available on the website for both Annual and Quarterly National Accounts. However, work is under way to produce metadata information on Annual and Quarterly National Accounts. According to current plans, it is expected that by the end of 2009, metadata information will be available on the website of the Statistical Service and it will be consistent with SDDS requirements.

Chapter 3: GDP components: the production approach

The compilation of quarterly national accounts requires both accuracy and timeliness. For the first requirement, it is obvious that the quality of the indicators used has a crucial role and so, at the very beginning, a great and important work has to be done in the analysis of the sources available and their statistical comparison. On the other side, timeliness requires not only the early availability of the indicators, but also the capacity to update them on a regular basis in a limited time of disposal, the capacity to perform a number of steps automatically (the seasonal adjustment of the indicators, the likely need to forecast those not available, the quarterly disaggregation of both raw and seasonally adjusted data, at current and constant prices) and the ability to economically and statistically validate under pressure the final results obtained. Given the limited time at disposal to perform the estimates – it has to be reminded that EU countries must transmit quarterly national accounts to Eurostat after 70 days from the end of the reference quarter – and the repetitive characteristic of some steps, the system on which the estimates are based must be solid and rapid.

The first step is to check for the existence of indicators (related time series observed at least on a quarterly basis) and analyse their reliability, timeliness and coherence with the sources generally used in estimating annual national accounts. Related time series, whenever available, should be preferred to the use of time trends or to the use of technical breakdowns, as these imply mechanical disaggregations with no informative economic-statistical contents. It was decided that it is better to use an indicator which is not "perfect" (example the case of Agricultural and Fishing where the volume index has been discontinue) instead of using a pure technical breakdown in the hope of having something better in the near future.

The attention was focused on indicators available at least on a quarterly basis and with a reasonable delay from the end of the quarter.

In some cases, the indicators considered as the more appropriate for quarterly disaggregation purposes are not directly available and need to be constructed. In most cases, alternative indicators are constructed for each aggregate and their relative ability in explaining the corresponding annual figures is exploited through standard econometric tests derived from the annual relationships, as obtained from the program.

Therefore, the ability of short-term indicators to give reliable and timely information on the evolution of the phenomena under study is an essential feature to be addressed at the very preliminary stage. It is important to stress that the quality of the final results in the estimation of quarterly national accounts depends on a number of factors, the most important one being – for countries adopting an indirect approach – the quality of the indicators used.

By quality we essentially mean the ability of the indicators to be good proxies of the information obtained from all those sources used at the annual level for estimating national accounts. In fact, annual data is generally estimated by considering sources generally not available (with the same level of the detail and accuracy) at the quarterly level. Annual sources are generally more exhaustive and complete than those observed and sampled at higher frequencies.

In some cases, different indications coming from annual sources and short-term indicators may be explained by referring to different definitions and classifications, different coverage or even the unfeasibility of some indicators to cover all the relevant phenomena under study (for example, the non-observed economy). In other cases, very divergent and unexplained paths could give rise to some doubts about the effective ability of the indicators to predict and interpret the real phenomena. In these cases, there is a scope for a reconciliation of different sources, where short-term and long-term statistical information and sources may be combined.

3.1 Gross value added, including industry breakdowns (but excluding FISIM)

The aim is to use volume indices for the compilation of the GVA from the production side and proceed to the compilation of the current prices at a second stage.

Table 3. Short-term indicators used for the quarterly disaggregation of annual accounts in current and constant prices: Output approach

Code for industries and denomination	Related indicators	Deflators
AYA – Agriculture, hunting and forestry	Volume index of agricultural production based on anticipated production according to yield	Consumer Price Index excluding VAT Local Commodities Agriculture
AYB – Fishing	Volume index of agricultural production based on anticipated production according to yield	Consumer Price Index excluding VAT Local Commodities Agriculture
AYC – Mining and quarrying	Volume index of mining and quarrying based on data on the production of minerals and quarrying materials	Composite index: Price index of construction materials (sand, gravel and road aggregate)
AYD – Manufacturing	Volume index of manufacturing production based on the quantities of the main manufacturing products.	Price index of Manufacturing Production
AYE – Electricity, gas and water supply	Production of electricity in 000's kwh	Consumption of Electricity (£ / kwh)
AYF – Construction	Building permits authorised	Price index of other Non-Metallic Mineral Products (Manufacturing)
AYG – Wholesale and retail trade; repairs	Turnover value index on wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	Composite index Implicit Retail Trade deflator Wholesale Price Index CPI: category of sales of vehicles
AYH – Hotels and restaurants	Composite index: Tourists Arrivals for Hotels Restaurant Index	Composite Index: Restaurants & Hotels
AYI – Transport, storage and communications	Composite weighted index: Volume index on air transport, telecommunications and postal services Turnover value index on land transport and auxiliaries services	Composite weighted index Communication, Transport

AYJ – Fin. Intermediation	Indicator of FISIM	Deflator resulting from the whole economy excluding FISIM
AYK 1 – Real estate activities	Lands and survey fees (at current prices)	Quarterly Index of Output Prices: Building Construction
AYK 2 – Renting of machinery and equipment	Employment: Real estate, renting and business activities	CPI
AYK 3 – Other bus. Activities	Time trend	CPI
AYL– Public administration and defence	Employment: Public administration and defence; Compulsory social security	CPI
AYM –Education	Employment: Education	CPI
AYN –Health and social work	Employment: Health and social work	CPI
AYO –Other community, social and personal services	Employment: Other community, social and personal services	CPI
AYP –Private households with employed persons	Employment: Private households with employed persons	100.0
Value added tax	Indicator at current prices recorded on a quarterly basis	Deflator resulting from the whole economy excluding FISIM
Import duties	Indicator at current prices recorded on a quarterly basis	Deflator resulting from the whole economy excluding FISIM

The choice of the appropriate short-term indicators for the following branches:

AYA – Agricultural

While a volume index based on data on the local sales and exports and covers crops and livestock production provided by the agricultural section, was produced by the agricultural section, the index was suspended in 2001. A new indicator on anticipated production according to yield is constructed but apparently the results are not very satisfying.

AYB- Fishing

The same indicator as for Agricultural is applied as no other quarterly information is available.

AYF - Construction

The indicator used for GVA of construction is the total number of building permits authorised. The relationship between building permits and construction GVA has proved to be satisfactory in the recent years. The large increases in claims for building permits started in 2001 and have always been followed by high rates of change of construction GVA. However, the effect is not coincidental since

people ask first for the permission to build something, but only months later building activities start to yield benefits.

To catch this sort of delayed effect, the building permits indicator with a lag of twelve months has been used so far as the quarterly proxy of construction GVA. What is really problematic with this variable is its excessive volatility, especially in the latest years. The quarterly estimates of construction GVA, derived using this indicator, give unacceptable results from an economic standpoint.

There exists another indicator for this sector, the turnover index (in volume) of construction activities. However, two reasons prevent the use of this series at the moment. First, CYSTAT publishes this statistic from the first quarter of 2000, so the length of the series is still too small. Second, the comparison with annual growth rates of construction GVA showed some discrepancies in the last years. The solution adopted was to smooth the series of building permits, by applying a moving average.

AYG – Wholesale and Retail trade

The retail sales index in volume, including sales of vehicles, machinery and spare parts, was the first indicator applied for the quarterly estimation of this sector. The compilation of this statistic has stopped to be produced.

The Statistical Service has started to publish an index of turnover (in volume) for retail sales from 2003. This survey does not include sales of vehicles and petrol stations: to have a comparable series with the old indicator we also need to take such activities into account. Therefore, we consider the registration of motor vehicles and derive a weighted average of the two indicators, with weights approximately equal to 0.71 (turnover index) and 0.29 (registration of motor vehicles). The short length of the turnover index does not allow us to use it directly in temporal disaggregation and then, we apply the quarterly growth rates of the new indicator from 2004 onwards to the previous retail sales index.

At the recent times, the Turnover Value index of Wholesale and Retail Trade, Repair of Motor Vehicles, Motorcycles and Personal and Households Goods is applied. As this indicator is a value indicator, it is deflated before use, by a composite weighed index formed by the implicit deflator of Retail Trade, the Wholesale price index and the consumer price index for the category of Vehicles.

AYH – Hotels and Restaurants

The number of arrivals of tourists replaced the more appropriate number of overnight stays whose production was suspended for several months.

The quarterly disaggregation of annual GVA of hotels and restaurants (in volume) is made through a composite indicator. This is derived by a weighted average of two variables, the number of arrivals of tourists (proxy for hotels activity) and a restaurant index. In this case the problem arises because a volume measure and a price index are merged together. As our target series is the constant prices GVA of the sector, we transform the restaurant index in a volume measure. The change has been done by deflating the restaurant index with an appropriate price index (the CPI for restaurants).

AYJ - Financial intermediation

An indicator based on (Interest Received – Interest Paid) + (Commissions + Credit Cards) was found satisfactory for the compilation of the value added of this activity

AYK1 – Real estate activities

The indicator used for this sector is the fees collected from land and surveys department (expressed at current prices). CYSTAT produces an index of building costs (materials, transports, labour costs but also fees of estate agencies) which serves to deflate the land and surveys fees.

AYK3 - Other business services

While it should be useful to separate this sector in two components, dwellings (70.2) and rents dummy (70.2) from one side, and computer (72), research (73) and other businesses (74) from the other side, due to the absence of a good indicator, we proceed to a technical disaggregation of this sector.

Output approach at current prices

The annual deflators for each branch of economic activity should be quarterly disaggregated using the appropriate indicators based on price indices. These price indices are mainly constructed from the consumer price indicators or, in a more appropriate way, from the corresponding wholesale and/or producer price indices. In any case, following as close as possible the practices followed in the compilation of annual national accounts.

The raw indicators are seasonally adjusted and the derived series are used in estimating through the program, the quarterly seasonally adjusted figures. The derived series are then multiplied by the estimated quarterly constant figures, and the results are further used as indicators to quarterly disaggregate the annual current values and to maintain the annual constraints.

The complete set of QNA aggregates is estimated by the Statistical Service through an indirect approach. This is a typical practice used by countries where information used to compile annual aggregates is not available at infra-annual periods. Temporal disaggregation techniques are thus applied to decompose the annual figures. The Chow-Lin's approach is employed by the Statistical Service, which disaggregates data on the basis of one or more related indicators observed at higher frequency (monthly or quarterly).

The quality of indicators for some sectors must be improved. In fact, some relationships between aggregates and indicators are shown to be poor while an indicator for sector AYK3 (other business activities) should be found to avoid the use of a time trend.

An important point to be addressed is the conduction of a simulation procedure: that is the ability of the estimated models to give reliable forecasts during the course of the year. The estimates of the quarters when the annual data for the last year are not yet available should not be too far apart from the annual data.

The annual models are estimated for the past years, leaving outside the current year. The Chow-Lin's quarterly disaggregation procedure is applied and the estimates of the four quarters of the current year are obtained by extrapolations considering the short-term paths of the pertinent related time series. A comparison between the results shows whether there is or not relevant divergence between the estimates obtained through annual and those derived from quarterly national accounts.

3.2 The treatment of FISIM

Another important issue in quarterly Accounts is the calculation of FISIM. Two approaches could be followed in QNA system based on an indirect approach:

- One option is to disaggregate the annual series including FISIM with the usual indicators,

- The other possibility is to consider the amount of FISIM separated from the rest of each series and estimate this part as an independent item.

The second option is for sure the most appropriate when information on quarterly FISIM is available and sufficiently reliable. Unfortunately, this is not the case of Cyprus. The information used to calculate and distribute FISIM to different economic agents at annual level is not available on a quarterly basis. For example, quarterly financial accounts are not produced in Cyprus yet and thus it is impossible to distinguish stocks of deposits and loans by institutional sector. Moreover, accrued interests are available only on annual basis. Given the lack of quarterly sources, the first approach is considered as the most feasible solution for the time being. The direct estimation of FISIM remains nevertheless an important issue of QNA, and it is going to be considered as a priority in the future activities of the Statistical Service.

Therefore, the adoption of the first approach enables the production of QNA with FISIM allocated and all QNA data is now consistent with the corresponding annual data in this respect.

3.3 Taxes less subsidies on products

Value Added Tax

The Value Added Tax is collected by the VAT Service of the Central Government. Data is provided on a quarterly basis at 12 days after the end of the reference quarter.

Custom duties & Taxes on Imports

Custom Duties: Is defined as the amount paid on goods of a particular type when they enter the economic territory.

Taxes on Imports: Taxes on Imports are defined as taxes on goods/services that become payable at the moment they cross the national or customs frontiers of the economic territory or when these services are delivered by non-resident producers to resident institutional units.

Data is collected from an administrative source (Financial Information Management Account System - FIMAS), on a quarterly basis at 70 days after the end of the reference quarter.

Chapter 4: GDP components: the expenditure approach

The appropriate indicators to be used for the estimation of the demand-side are given and briefly described below.

Table 4: Short-term indicators used for the quarterly disaggregation of annual accounts in current and constant prices: Demand approach

Code for industries and denomination	Related indicators	Deflators
Households consumption		
CP010 – Food and non-alcoholic beverages	Turnover Volume index of retail sales of the corresponding category	CPI of corresponding category
CP020 – Alcoholic beverages, tobacco and narcotics	Turnover Volume index of retail sales of the corresponding category	CPI of corresponding category
CP030 – Clothing and footwear	Turnover Volume index of retail sales of the corresponding category	CPI of corresponding category
CP040 – Housing, water, electricity, gas and other fuels	Time trend	CPI of corresponding category
CP050 – Furnishing, housing equipment and routine maintenance of house	Turnover Volume index of retail sales of the corresponding category	CPI of corresponding category
CP060 – Health	Composite weighted index: Turnover Volume Index of retail sales of the corresponding category + Number of employed persons on Health and Social Work	CPI of corresponding category
CP070 – Transports	Composite weighted index: Turnover value index of Air Transport + Turnover value index of sales of motor vehicles	CPI of corresponding category
CP080 – Communications	Composite weighted index: Volume index of output of postal and telecommunications services	CPI of corresponding category
CP090 – Recreation and culture	Employment in the corresponding activity	CPI of corresponding category
CP0100 – Education	Employment in the corresponding activity	CPI of corresponding category
CP0110 – Restaurants and hotels	Composite weighted index: Tourists arrivals + Restaurant value index	Composite Index: Restaurants & Hotels
CP0120 – Miscellaneous goods and services	Employment in the corresponding activity	CPI of corresponding category

TRP33 – Final consumption expenditures of resident households in the ROW	Return of Residents: All countries	Weighted index of consumer prices times exchange rates of Greece, UK and EU15
TRP34 – Final consumption expenditures of non resident households in Cyprus	Arrivals of Tourists: All countries	CPI
SES15 – Final consumption expenditure of NPISHs	Number of employed persons: Other Community, social and personal services	CPI
SES13 – Final consumption expenditure of general government	Government consumption expenditure	CPI
Exports and Imports		
TRP61 – Exports of goods	Exports of goods f.o.b.	Manufacturing price index for Exports
TRP62 – Exports of services (excl. TRP34)	Exports of services f.o.b.	CPI: Services
TRP71 – Imports of goods	Imports of goods f.o.b.	Wholesale price index for imported products
TRP72 – Imports of services (excl. TRP33)	Imports of services f.o.b.	Weighted index of consumer prices times exchange rates of Greece, UK and EU15
Gross Fixed Capital Formation		
Pi61–Agriculture, fishery and aquaculture	Imported goods (value cif + duty)	Wholesales price index for capital goods
Pi62-Metal products and machinery equipment	Imported goods (value cif + duty)	Wholesales price index for capital goods
Pi63-Transport equipment	Registrations of motor vehicles	Wholesales price index for capital goods
Pi64-Construction:Housing	Building permits for residential purposes	Composite index: Price index of labour cost in Construction / Price index of main construction materials in construction
Pi65-Construction:Other construction	Residual	Composite index: Price index of labour cost in Construction / Price index of main construction materials in construction
Pi66-Intagible assets	Divided by four	Trend

4.1 Household final consumption

Separate estimates of quarterly figures are obtained by using indicators available for the specific 12 COICOP functions, namely for Restaurants and hotels (i.e. indicators of activity of Restaurant and Hotels) and Transports (i.e. turnover value index for sales of vehicles and turnover of air transport) and/or the retail sales volume indices by category.

4.2 Government final consumption

Expenditure statistics for central and local government are used for the estimation of this aggregate provided by the Public Finance section.

4.3 NPISH final consumption

Due to the absence of a relevant indicator, an employment indicator giving the number of employed persons in Other community, Social and Personal Services is applied.

4.4 Gross capital formation

4.4.1 Gross fixed capital formation

The compilation is produced according to the Pi6 classification.

For Agricultural, fishery and aquaculture an indicator is used for imported goods for home consumption provided by the Foreign Trade Section.

For the category, Metal products and machinery equipment, the indicator used is also coming from Intrastat and is based on imported goods for home consumption concerning machinery and equipment for agricultural and other purposes.

For Transport equipment a weighted indicator is constructed based on registration of motor vehicles.

For construction the building permits for Residential purposes, is used after it has been proceed in the same way as the Total building permits, applied in the production approach.

For the category Other Construction, a number of indicators were applied with no admissible results and it was decided recently that this item would result as a residual item between the growth rate of the construction sector coming from the production side, and the item, Construction of Residential purposes coming from the corresponding category of GFCF.

For the last category, concerning Intangible Assets, due to lack of indicators the annual estimate is divided into four quarters.

4.4.2 Changes in inventories and valuables

They derive as a balance from the output-side GDP and the sum of other components of the demand-side.

4.5 Imports, exports

Exports/Imports of goods: An indicator based on external trade statistics is used. When data from Central Bank becomes available, the indicator is updated accordingly.

Exports/Imports of services: The estimation of services imported/exported is at the moment limited by the lack of balance of payments data on a quarterly basis. This data is transmitted by the Central bank on a quarterly basis since 2000.

Expenditure approach at current prices

Consumer price indices and wholesale price indices by economic destination are used for deflation of private consumption expenditures and gross fixed capital formation respectively. Exports/imports of goods are deflated by price indices of manufacturing production and an index that takes into account the international prices. For services imported, a wholesale price index for imported products is used. Services exported are deflated by the CPI deflator for services. Travels in Cyprus of non-residents are deflated using the internal consumer price index while travels abroad, by applying a weighted average of consumer indices abroad.

Chapter 5: GDP components: the income approach

The income approach to quarterly GDP requires as a first step, the estimation of quarterly employment figures. In particular, the ESA 95 questionnaire foresees the transmission of employment data in persons and full time equivalent (on a voluntary basis), both in terms of employees and self-employed. In addition, it requires as compulsory, the estimation of total compensation of employees and wages and salaries figures at the A6 level. Following the Action Plan's regulation, from 2002 onwards EU countries have to transmit quarterly data on hours-worked at the same detail level.

Employment figures are released by CYSTAT, together with average earnings data, on a monthly basis starting from 1995, but the monthly survey has been discontinued since mid-1999: after that date, the survey restarted in 2000 with a new code classification resulting to data not completely comparable with the old one. Therefore, there is a need for linking the two surveys while 'estimating missing values' for the second sub-sample and rendering the periodicity of the new survey at least quarterly.

The use of temporal disaggregation of annual data with quarterly indicators seems again to be the best solution for the estimation of the income aggregates. The procedure must assure the coherency of annual and quarterly series and this procedure can only be based on an indirect estimation of the aggregates, such as output and expenditure components, since the same sources on which the annual estimation is based are generally not available on quarterly frequencies. Therefore, the use of temporal disaggregation of annual data with quarterly indicators was the best solution for the estimation of the income aggregates.

The income approach calculates GDP from estimates of the components of the value added of industries, branches and sectors, through the identity:

GDP = Compensation of employees (CE) + Gross operating surplus/Mixed income (GOS) + Taxes on production and imports (T) - Subsidies on production and imports (S).

The quality of the sources for these variables is generally low compared to the information on output and, at lesser extend, to expenditure variables. This makes more reliable the estimation of GDP from the output approach. This means that in the previous identity, GDP must be considered as a fixed element, and the other components are constrained to sum up to this total.

Given the lack of data on Gross operating surplus/Mixed income, it was decided to estimate independently the Compensation of employees, the Taxes on production and imports and the Subsidies on production and imports, and derive the Gross operating surplus/Mixed income variable as the balance of the account.

The program transmission requires three quarterly tables for income aggregates. These are Table 0103 (GDP identity from the income-side), with taxes less subsidies on production and imports required as a single item, Table 0112 (Compensation of employees by industry, of which wages and salaries) and Table 0115 (Compensation of employees by industry in A17 breakdown), this last one, on a voluntary basis. The objective was concentrated on the compilation of Tables 0103 and 0112 in current prices.

It has also been noted that the average composition by sector and in time was approximately the same for Compensation of Employees and Wages and Salaries. The sections from L to P presented the largest proportion (around 37%), mostly attributable to the public sector. Both variables showed a decreasing share in time of the industrial sectors and an increasing share in service activities, while the agriculture sector remains fairly stable in the period.

5.1 Compensation of employees, including components (wages and salaries)

Compensation of employees is defined as the total remuneration, payable by an employer to an employee in return for the work done by the latter during the accounting period. It is composed by:

- Wages and salaries

- Employer's social contributions

Wages and salaries include basic wages and salaries payable at regular intervals, pay for overtime, weekends, official holidays, etc. They also include the values of any social contributions, income taxes, etc. payable by the employee.

The social contributions payable by employers need to be recorded under compensation of employees because this amount is needed to secure for their employees the entitlement to social benefits.

The quarterly disaggregation of the annual data, (Compensation of Employees and Wages & Salaries) requires the existence of good indicators for both variables. As the indicators of labour costs in Cyprus, are expressed in terms of per capita figures, it was decided to perform the temporal disaggregation of annual Compensation of Employees and Wages and Salaries per employee and use, where available, the relevant labour cost and the relevant wages and salaries per employee respectively. After the disaggregation of quarterly data per employee is performed, their multiplications by the relevant quarterly employees should produce the total amount of Compensation of Employees and Wages and Salaries respectively in CYP pounds.

The passage to per capita figures is not made for agriculture and private households, for which a quarterly labour cost indicator is not available. Given the lack of sources for some sectors, the following classification by 15 sectors is used for the quarterly disaggregation:

• AB Agriculture, Hunting and Fishing

• C Mining and quarrying

• D Manufacturing

• E Electricity, gas and water

• F Construction

• G Wholesale and Retail trade

• H Hotel and Restaurants

• I Transport and Communication

• J Financial Intermediation

• K Real estate and Other business activities

• L Public administration

• M Education

• N Health and Social work

• O Other Community and Social

• P Private Household

As the indicators series (labour cost index) are available from the first quarter of 2000 onwards this created a problem since the procedure required quarterly data from 1995. Useful information on income changes for the years 1995-1999 was the cost of living allowances. Wages and salaries are adjusted every six months by a certain percentage, called the COLA (cost-of-living allowance) index. This index was used to calculate backwards all the necessary observations up to 1995Q1 by applying these percentage changes (the same half-year rate is applied to the two corresponding quarters).

It is also important to take into account the distinction between market and non market services. While the proportion of non-market can be sometimes negligible, so that many sectors can be treated as being formed uniquely by private activities, there are some other sectors in which non-market production is prevalent or represents entirely the sector itself. This is the case for section L, while sections M and N have both a large share of public production generally (86% and 78% respectively).

In conclusion, it was decided that:

-for M (Education) and N (Heath and Social Work) weighted indicators should be constructed by the LCI index (private) and data selected from the government accounts (public).

-the estimation of sector L should be completely based on data from the government accounts,

-all the other sectors should be based on Labour Cost Index (LCI) and considered as private activities.

Procedure used

1. At a first step only the LCI and the Wages and Salaries Index (WSI) per employee are considered. As these indicators start from the first quarter of 2000, the COLA index was used to reconstruct series from 1995.

The quarterly number of employees is used to derive the Compensation and Wages and salaries in millions of CYP pounds and the Chow-Lin technique is used again to reconcile the resulting quarterly series with the annual totals.

2. Construction of a composite index for M (Education) and N (Health and social services).

LCI and WSI represent only partially sections M and N since the share of the private component is 14% and 22% respectively. Thus, from the Expenditure section of the "Consolidated Accounts of Central Government", the Wages and Salaries and the Social Security Payments are extracted, which form an indicator for the public activities. The sum of the two constitutes the total compensation for public employees. As data distinguished by section is not available, the same indicator must be used for both sectors M and N.

A composite index is constructed based on the weighted averages of this series (public activities) and LCI/WSI (private activities) representing the final indicators used for sections M and N. On the other hand, for section L the indicator extracted from the government account is directly used to disaggregate annual Compensation Employees and Wages and Salaries.

3. Quarterly sources for labour costs in agriculture and fishing (AB) and private households with employed persons (P) do not exist in the Cyprus statistical system. Different approaches have been followed for these sectors.

For Agriculture and Fishing it was decided that the same indicator already employed in the output approach to disaggregate the annual gross value added of the sector, should also be applied for the disaggregation of the section from the income account.

For section P, the number of employed persons in private households is used to disaggregate both compensation and wages and salaries.

4. Furthermore, it is useful to remember that the quarterly income accounts are also required in seasonally adjusted form. As for all other aggregates, seasonally adjusted compensation and wages and salaries series are derived as the disaggregation of the same annual totals using seasonally adjusted version of the chosen indicators, obtained by the application of the software TRAMO-SEATS.

5.2 Taxes less subsidies on production and imports

The other item of the income account which has to be estimated is the taxes less subsidies on production and imports.

The disaggregation of taxes less subsidies on production and imports is achieved by using the quarterly amount of other indirect taxes (extracted from the Consolidated Accounts of General Government). The seasonally adjusted indicator is obtained through the application of TRAMO-SEATS.

5.3 Gross operating surplus & mixed income

Given the lack of data on Gross operating surplus/Mixed income, it was decided to estimate independently Compensation of employees and Taxes on production and imports and Subsidies on production and imports and derive the Gross operating surplus/Mixed income variable as the balance of the account.

In table 5, the appropriate indicators that are used for the estimation of the demand-side are given and briefly described.

Table 5: Short-term indicators used disaggregate the annual Compensation of employees and wages and salaries

AB	Agriculture, Hunting and Fishing	Volume index of agricultural production it is based on anticipated production according to yield
C	C Mining and quarrying	LCI and WSI (per employee)
D	Manufacturing	LCI and WSI (per employee)
E	Electricity, gas and water	LCI and WSI (per employee)
F	Construction	LCI and WSI (per employee)

G	Wholesale and Retail trade	LCI and WSI (per employee)
H	Hotel and Restaurants	LCI and WSI (per employee)
I	Transport and Communication	LCI and WSI (per employee)
J	Financial Intermediation	LCI and WSI (per employee)
K	Real Estates and Other business activities	LCI and WSI (per employee)
L	Public administration	Government expenditure for compensation of employees (wages and salaries and social security payments)
M	Education	Weighted index : - LCI and WSI (per employee) - Government expenditure for compensation of employees
N	N Health and Social work	Weighted index : - LCI and WSI (per employee) - Government expenditure for compensation of employees
O	Other Community and Social	LCI and WSI (per employee)
P	Private Household	Number of employed persons on private Households

Chapter 6 : Constant price estimations

6.1 General constant price policy

Even if there is no legal requirement for chain-linking of quarterly data, reasons of consistency with annual data, require applying chain-linking to quarterly data as well.

The basic idea was to move away from the traditional fixed-base year constant price estimates to chain-linked volume measures.

Constant price estimates use the average prices of a particular year as the base year, to weight together the corresponding quantities. The users of constant price data have the advantage to use aggregates that their components are additive. The problem of this data is that the pattern of relative prices in the base year is becoming less representative of the economic conditions for the periods that are further away from the base year.

The move on to the chain-linking process results from the need to update the base year at a higher frequency while the links are chained together (cumulated) to express the full time series on a fixed reference period. In other words chain-linking means constructing volume measures by cumulating movements in short-term indices with different base periods.

Chain-linking of quarterly data is technically more complicated compared to the annual case. There are three well-known techniques for linking the quarterly elements of the chain: one quarter overlap, annual overlap and over-the-year.

The annual overlap technique has been used for chaining quarterly series of Cyprus QNA.

6.2 Estimation of GDP from output and from expenditure approach

6.2.1 Method currently in use

The calculation of QNA in Cyprus is performed according to an indirect approach. The quarterly pattern of national accounts' aggregates is derived on the basis of the temporal disaggregation technique proposed by Chow and Lin by making use of related indicators. Consistency between annual and quarterly aggregates is automatically achieved following this approach.

Theoretically, the disaggregation of annual chain-linked estimates should be based on quarterly chain-linked volume indicators. However, short-term economic statistics in Cyprus, as in many other European countries, are calculated with fixed weights and thus, the "optimal" approach cannot be followed. A more practical solution is to employ fixed-base volume indicators, provided that the base year is frequently updated and it is not too far from the current period. In this case, we can obtain a satisfactory approximation of the hypothetical chain-linked volume indices. Volume indices in Cyprus are now available in base 2000 and are employed to disaggregate annual chain-linked estimates with reference year 2000.

The most relevant problem with chain-linked estimates is the loss of additivity (except for the data relating to the reference year and the one following the reference year): the chained level of an aggregate is not equal to the sum of the chained components. This means, for example, that in the chained level series the components of GDP do not add up to GDP. Non-additivity arises for purely mathematical reasons.

Nevertheless, the annual national accounts at CYSTAT have decided to derive chain-linked annual aggregates as the sum of chain-linked component series. The reason for this temporary arrangement was practical in order to avoid possible confusion of users due to the discrepancies in the chain-linked estimates. This decision has been supported by the fact that differences are limited in the period 1995-

2005, because years are still close to the reference year 2000. Discrepancies are likely to be larger in the next years, and so, the approximation used can not be sustainable for a long time.

Consequently, the same approach had to be followed in quarterly accounts. Thus, any aggregate in chain-linked form is calculated as the sum of the chain-linked components estimates, exactly in the same way followed with fixed-base constant price estimates. For example, GDP in chained volumes is the sum of the chained estimates of value added by sector plus the chained estimate of indirect taxes less subsidies; household consumption as the sum of chained estimates of consumption functions; etc.

6.2.2 Non-additivity concept

The preparatory work needed in order to introduce the non-additivity concept in the appropriate time in the near future, as well as the technical arrangements in specialised software programming, are described below. In particular, for the case of an aggregate for which volume and price indices are available we follow the steps:

1. Temporal disaggregation of the annual chain-linked volume series with the volume indicator (unadjusted, adjusted for calendar effects and seasonally adjusted);

2. Temporal disaggregation of the annual deflator series with the price indicator (unadjusted and seasonally adjusted);

3. Calculate implicitly the quarterly series at current prices from the series obtained at steps 1 and 2;

4. Transform the quarterly chain-linked volume series in previous year's prices series, using the annual overlap technique;

5. Any aggregation of component series can be obtained by

       a) Adding up current and previous year's prices series and

       b) Applying the annual overlap technique to the resulting sums.

The work performed, resulted in the introduction of chain-linking in QNA with:

      - Value added calculated in A17 breakdown

      - Household consumption in 12 functions (COICOP)

      - Capital formation in 6 categories.

As mentioned earlier, the chained volumes aggregates of QNA are currently the summation of chained component series, as this is also the case for the annual data. However, all actions needed to introduce the non-additive concept are made and will eventually been applied as soon as the annual accounts moved to the non additivity concept.

6.3 Contributions to GDP growth

GDP can be obtained from the production side, as the sum of value added by sector and the net indirect taxes, while from the expenditure side, as the sum of final consumption, gross capital formation and net exports. In both cases, it is often useful to establish the amount of real growth of GDP which can be attributed to each component. The contribution to GDP growth is the portion of growth which is associated to the change of the component series in the period involved.

Considering the imposed additivity of chain-linked series produced by CYSTAT, the most appropriate approach was found to be the contributions from chain-linked series that is essentially the same used in an additive constant prices context. Having imposed additivity to the chained series the sum of contributions becomes equal to the GDP growth for any quarter.

Technical arrangements are made, and two types of results can be achieved: quarterly contribution with respect to the quarter of the previous period and with respect to the corresponding quarter of the previous year. They are calculated using only seasonal and chain linked series.

Consequently, the quarterly tables of 0101, 0102, 0104 and 0105 of the current ESA95 transmission programme can now be filled and be available for transmission.

Chapter 7: Population and employment

7.1 Population

Population is the quarterly average number of persons present in the economic territory of a country. By convention, the economic territory includes embassies, military bases and ships and aircraft abroad. On a given date, the total population of a country consists of all persons, national or foreign, who are permanently settled in the economic territory of the country, even if they are temporarily absent from it. In Cyprus, when we refer to population data we refer to data under the Government controlled area only and thus, the period covered should be mid-1974 to date.

Extrapolation between censuses: Population estimates are based on census figures, which are updated annually to take account of the components of change, births, deaths and net migration. Births are the registered events. Since registration of deaths is only 85% complete, estimates of deaths are obtained using the dual report method, whereby registered events are individually matched with data provided by priests of cemeteries. Estimates of net migration are presently obtained from the Passenger Survey carried out at the points of arrival and departure.

Backward revision of population: When new census results are available inter-censual population estimates are revised backwards to the previous census date. The most recent census was carried out in 2001 (reference date 1.10.2001) and the previous one in 1992 (1.10.1992). Population estimates have been revised backwards for the period 1993-2001. It was assumed that statistics on births and deaths are correct and that the difference between the population estimates and the census figure is due to underestimating net migration. The yearly net migration balance was revised to reflect the observed trend on the basis of data from various other sources (i.e. foreign workers, total arrivals and departures, year of arrival, etc).

Annual figures: For national account purposes, the average population is used, calculated as the average of the population as at 1st January of two successive years.

Compilation of quarterly population data: Monthly population estimates are also compiled, by using the component method. For national accounts purposes the quarterly population figure is taken as the average of the population as at the beginning and the end of each quarter (i.e. average of 1st January and 31st March).

7.2 Employment: persons

The original source for employment is the Labour Force Survey (LFS). It is believed that this survey gives the best estimate for the total number of persons employed. It has, however, some disadvantages which we tried to overcome using other sources, e.g. the Employment Survey on Establishments and the Social Insurance Registry.

The procedure to derive the employment data is the following: We get from the LFS the total number of employees (part-time and full-time) and after doing some coverage adjustments (i.e. for Turkish-Cypriot staff), we get the final estimation of the total number of employees. This estimation is a good one, although, the distribution between the economic activities (NACE A17) is not very satisfactory. To correct this, we use other sources, such as the Employment Survey on Establishments and the Social Insurance Registry. This is because the distribution between the sectors, as it comes from the Employment Survey, is the best for all Economic Activities, except for Agriculture (NACE A) and Fishing (NACE B). For these Activities we consider that the best estimate for the number of

employees is the one we get from the Social Insurance Registry. As far as the other sectors are concerned, we get the best estimate by using the total number of employees from the LFS and the distribution by economic activity from the Employment Survey.

For the case of self-employed we follow a similar procedure that is, we take the total number of self-employed from LFS and for the distribution of the self-employed by economic activity, we use the distribution as obtained from the Employment Survey. Social Insurance data are only used for Fishing (NACE B).

Labour Force Survey is conducted quarterly and covers people (not jobs) that live in a household or intend to live in a household in Cyprus, for at least a year. This data is corrected by using the following coverage adjustments to be consistent with the national accounts concepts:

a) Turkish-Cypriots who reside in Cyprus (in the areas not controlled by the Government) and come to the Government controlled areas for employment, are added

b) Foreign workers that work in farms on a short-term basis (less than a year) are added in NACE A

c) Foreign workers that work in the tourist industry on a short-term basis (less than a year) are added in NACE H.

d) Monks and nuns are added because they do not live in households

e) Conscripts in the National Guard are added to NACE L since they are not covered by the survey

f) People that work on ships that are owned by Cypriot companies with head quarters in Cyprus are added

LFS data does not provide the most accurate distribution by industry; therefore we use the distribution which we get from the Employment Survey. This survey covers all enterprises employing 30 or more employees and a sample of 1000 smaller enterprises. This Survey is a quarterly telephone survey on establishments which is supplemented by administrative data for persons employed by government (employing almost 15% of the persons employed). Annual data is derived from quarterly data as the average of the four quarters available.

7.3 Actual Hours worked

For hours worked by employees the procedure is the following:

We get the total number of persons employed (in full time equivalent) from the Employment Survey and using the ratio of employees to total employment for each economic activity as obtained from the LFS, we derive the number of employees. We then multiply these numbers in each section by the average number of hours worked (which differs between quarters). The average number of hours worked was estimated from the Labour Cost Survey and a special survey for the Labour Cost Index that was carried out in 2003.

For the case of self-employed we follow a different procedure:

An estimate for the average number of hours worked per self-employed person (full-time and part-time) per week for each economic activity is calculated from the LFS. This is then multiplied by the number of self-employed persons in each economic activity to arrive at the total hours worked per week for the self-employed and then multiplied by 13 to get actual hours worked for the quarter. The number of self-employed in each economic activity is estimated by using the ratio of self-employed to total persons employed from the LFS and applying this ratio to the total number of persons employed

by economic activity from the Employment Survey. The last step to complete the data is to add the number of hours worked by the persons that have a second job and that are self-employed in the economic activity.

As mentioned above the main source for the self-employed persons is the LFS and for employees it is a combination of three sources, namely: the LFS for the ratio of employees to total employed, the Labour Cost Survey and special Labour Cost Index Survey for average hours worked per quarter and the Employment Survey for the breakdown by activity.

We have taken into account teachers that give private lessons in the afternoon, these that are not registered but work as part-timers in the real estate sector and persons that basically work in non-agricultural sectors but who have some hours worked in agriculture. Persons that have a second job while they work as self-employed have been taken into account.

Chapter 8: From GDP to net lending/borrowing

From GDP to net lending/borrowing so far both the annual and the quarterly National Accounts have not made any attempt to estimate or calculate the net lending/borrowing of the Cyprus Economy.

Instead, CYSTAT asked for derogation for these tables which was awarded. It is expected that gradually through the Institutional Sector Accounts this weaknesses will be eliminated.

Chapter 9: Flash estimates

To satisfy the continuously increasing demand from both foreign and local users, CYSTAT needs to produce an earliest picture of the economy based on preliminary data as soon as possible after the end of the quarter, by using a more incomplete set of information than the one used in the regular QNA estimation. Therefore, the implementation of a preliminary estimate of GDP at 45 days aligns Cyprus with the other European statistical agencies in this field.

Flash estimates are considered important for at least two reasons:

a) They increase the timeliness in which QNA estimates are diffused to users, allowing CYSTAT to disseminate QNA even before the actual 70 days from the end of the reference period;

b) They have a solid basis for the estimation of the national accounts data for the current year even before its calendar closing;

9.1 Flash GDP estimate

Methodology used for producing the preliminary estimate should be as close as possible to the one used for regular QNA. Two reasons explain the suggested approach:

a) Reduction of costs (the same approach, the same programs, are used);

b) Less risks of different results when the complete release is estimated and perfect replication of the procedures used during regular estimates.

Given the use of an indirect approach to QNA estimation, forecasting is applied to related time series (reference indicators) for missing data. Once forecasts are obtained, they replace the missing values of the indicators and enter into the Chow-Lin's procedure.

Bearing in mind the relative importance of the sectors (see Chapter 1, Table 2), we examine the availability of the indicators within the fixed-lag of 45 days. Some of the indicators are monthly, while some others are quarterly; the aim of this analysis is to determine how many information (in terms of months or quarters) we could rely on after 45 days from the end of the reference quarter. Table 6 presents the volume indicators used for each sector (from the Output Side) along with some useful information on the time of availability of these indicators.

Table 6. Short-term indicators used for the quarterly disaggregation of annual accounts in current and constant prices: Flash Estimate

Code for industries and denomination	Related indicators	Frequency	Number of months available at 45 days (for quarterly indicators YES/NO)	Notes
AYA – Agriculture, hunting and forestry AYB – Fishing	Volume index of agricultural production based on anticipated production according to yield	Quarterly		There is no existence of a proper volume index
AYC – Mining and quarrying	Volume index of mining and quarrying: it is based on data on the production of minerals and quarrying materials	Monthly	2	

AYD – Manufacturing	Volume index of manufacturing production. It is based on the quantities of the main manufacturing products	Monthly	2	
AYE – Electricity, gas and water supply	Production of electricity in 000's Kwh	Monthly	3	
AYF – Construction	Building permits authorised	Monthly	1	This indicator is used with a time lead
AYG – Wholesale and retail trade; repairs	Turnover value index on whole sale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	Quarterly	NO	At 45 days, 2 months of the turnover volume index of retail sales are available, while a full information on car registrations is available both of which can give an indication on the performance of this indicator.
AYH – Hotels and restaurants	Composite index: Tourists Arrivals for Hotels / Restaurant Index	Monthly / Quarterly	3 / YES	
AYI – Transport, storage and communications	Composite weighted index: Volume index on air transport, telecommunications and postal services (volume index of output) / Turnover value index on land transport and auxiliaries services	Monthly / Quarterly	2 / NO	
AYJ – Fin. Intermediation	Indicator of FISIM	Quarterly	NO	
AYK 1 – Real estate activities	Lands and survey fees (at current prices)	Quarterly	NO	
AYK 2 – Renting of machinery and equipment	Employment: Real estate, renting and business activities	Monthly	NO	
AYK 3 – Other bus. Activities	Time trend	-	YES	
AYL – Public administration and defence	Employment: Public administration and defence; Compulsory social security	Monthly	NO	

AYM – Education	Employment: Education	Monthly	NO	
AYN – Health and social work	Employment: Health and social work	Monthly	NO	
AYO – Other community, social and personal services	Employment: Other community, social and personal services	Monthly	NO	
AYP – Private households with employed persons	Employment: Private households with employed persons	Monthly	NO	
Value added tax	Indicator at current prices recorded on a quarterly basis	Quarterly	YES	
Import duties	Indicator at current prices recorded on a quarterly basis	Quarterly	NO	

Since the indicators used for the annual deflators are all rapidly available, the preliminary estimate of GDP at current prices is generally not presenting a problem. For this reason, the whole effort is concentrated on the volume indicators.

A composite indicator is used for the agriculture sector. A preliminary estimate of the indicator is given by the time of producing the flash estimate. The production of minerals and quarrying materials (AYC sector) is published 60 days after the end of the reference month and thus, two months out of three are then available for the flash estimate. The same holds for the main manufacturing products index (AYD sector).

As far the electricity sector is concerned (AYE), the production electricity in 000's Kwh is published 30 days after the end of the reference month; in this case the information would be full within 45 days. The construction sector (AYF) is currently disaggregated by using the registration on building permits using a moving average procedure and considering as a lead indicator, no forecast is needed for the flash estimate.

Two months can be used for the retail sales index (AYG); full information is also given on the registration of motor vehicles; the turnover value index of wholesale, retail sale and sales/repair/maintenance of vehicle is available when producing the regular disaggregation.

The hotels and restaurants activities (AYH) are one of the most connected sectors with tourism. A weighted indicator is used for these branches. Tourists' arrivals (for hotels) are observed at monthly level after 37 days; the restaurant index is produced internally by the National Accounts section and is promptly available. Consequently, there are not substantial differences on the information used for the preliminary and regular estimates.

Five indicators are employed to disaggregate sector AYI; the volume index of air transport, telecommunications and postal services and the turnover value index of land transport and auxiliaries services. While two months could be available concerning the volume indices there is no information on the turnover value indices which are monthly indicators but available at a quarterly basis.

The financial intermediation sector (AYJ) is obtained by means of a quarterly proxy FISIM at current prices; the constant prices aggregate is obtained by using the deflator of the other sectors. Since the indicator is sent to NA section at 70 days, the whole quarter must be forecasted at 45 days.

The AYK sector is decomposed in three parts in the QNA. For real estate activities (AYK1) there is information on lands and survey fees, which are not available in 45 days. For AYK2 (rental cars index) and other business activities (AYK3) a time trend is used and so it is available during the time of flash estimation.

Value added for sectors AYL-AYP is computed by using employment statistics. This data is usually forecasted at 70 days for the regular estimate; this is done by Tramo Seats by the responsible person calculating the QNA and confronted with the estimates given by the person responsible in CYSTAT for Employment Statistics.

The indicators for the value added taxes are quarterly and available at 45 days. This is not the case for import duties which are transmitted to National Accounts section by the Public Finance section, but with some delay and are only used when producing the regular estimation and not the flash.

As mentioned already, the methodology used for producing the preliminary estimate is as close as possible to the one used for regular QNA.

Regular estimates are based on a greater amount of information. For some indicators, the same information can be used for preliminary and regular estimates. For others, only two out of three months are available for the current quarter or not even an indication is available for some quarterly series. Then, such missing information must be predicted by appropriate forecasting techniques.

Two possible ways can be followed for this purpose:

One is to use autoregressive integrated moving average models (ARIMA models), as implemented in the TRAMO/SEATS programme. Such routines are already being used in the QNA estimation for the seasonal adjustment of indicators.

A second approach is the use of autoregressive and distributed lag models (ADL models), which combine dynamics and interdependence with other observed variables.

The forecasting approach using ARIMA models as it is estimated by the TRAMO programme was finally adopted. Forecasts are made at monthly level only in case one or two months are available, otherwise the whole quarter is forecasted quarterly. It has to be noted that the technical forecasting results are checked with other available sources by that time and are adjusted accordingly.

The analysis of revision is the most important tool to validate the accuracy of preliminary estimates in quarterly accounts. Comparing the preliminary GDP estimate with the one obtained at 70 days permits to evaluate the reliability of sources and methods employed at 45 days.

To facilitate this analysis, two programmes are available: The first programme saves the result coming out from each compilation of GDP and value added for the six sectors of A6 classification (at constant prices, in raw and seasonal adjusted forms) and stores them for further analysis in the future.

The second programme aims to produce a tabulation of comparisons between the current estimate of GDP (and value added for A6) with the previous one. Again, if we are doing the regular estimate at t+70 of a specific quarter, the program could look for the preliminary estimate produced at t+45.

Chapter 10 Seasonal adjustment and working day correction

Annual totals based on the seasonally adjusted data are not equal to the corresponding annual totals based on the original unadjusted data. The number of working days, the impact of moving holidays, and other calendar related effects vary from year to year. Similarly, the seasonal effect may vary from year to year. Thus, for series with significant calendar related effects or moving seasonally, the annual totals of seasonally adjusted series should differ from the unadjusted series.

10.1 Policy for seasonal adjustment

The Task Force on seasonal adjustment in the field of national accounts has established common rules on the treatment of quarterly data in the European Community. Movements associated with seasonal factors are not considered of primary importance in the analysis of the business cycle and are generally removed because they obscure movements that are of key interest.

Due to periodicity at which they are recorded, quarterly series show short-term movements caused by the weather, habits, legislation, etc, which are usually defined as seasonal fluctuations. These movements tend to repeat themselves in the same period (monthly or quarter) each year. National Statistical Institutes are currently using various different packages to eliminate seasonally fluctuations from the time series. While two main groups of methods can be distinguished, the moving average based method and the model based method, Cyprus adopted the model based method and specifically the TRAMO/SEATS method.

Another decision that should be made in order to eliminate the seasonal effect is whether we will use the direct or the indirect method. The results of a seasonal adjustment might be different if the seasonal adjustment is done at the aggregated level of GDP or if the GDP is resulting from the sum of seasonally adjusted components, added up from branches or sectors.

It is also important to mention that the working day adjustment is applied at the monthly indicators. The series is first adjusted for working/trading-days and later for seasonal variations.

The following points were adopted:

a) Quarterly raw and seasonally adjusted data is obtained via quarterly disaggregation of the same annual data with the raw and seasonally adjusted indicators. As seasonal movements are assumed not to affect the yearly total, the purpose of the seasonal adjustment is to distribute the effects of seasonality within the year, resulting that the sum of the seasonal components during the year might be equal to zero.

b) Monthly indicators are aggregated (eventually after forecasting the last missing observations) on a quarterly basis before being seasonally adjusted with the Tramo-Seats program.

c) As new observations become available, revisions of seasonally adjusted data are inevitable, while revised indicators are also added to the seasonal revisions. Revising an estimate is optimal in terms of estimation, but unfortunately too many revisions are not welcomed by the users. Theoretically, the program TRAMO/SEATS should be run once per year and the model chosen by Tramo should be kept fixed while parameters are let free to vary until the complete year is available (option model fixed-parameters free). From the practical point of view the program is let free to proceed to concurrent adjustment. At every period, it computes the optimal forecast needed, and chooses the best options of

the treatment. This obviously leads to higher revisions on seasonally adjusted results but gives more optimal results.

d) The related indicators for each branch of economic activity at the A17 classification are seasonally adjusted using the automatic options given by Tramo-Seats. For series that an optimal model is not found, the airline model is imposed to these series.

10.2 Policy for working-day correction

Besides seasonal movements, economic measures might also be affected by the structure of the calendar. A different number of working days in a period (month, quarter or others) can cause a different level of activity, and the measures describing such phenomenon vary accordingly.

Concerning the working-day correction a number of matters have been decided.

i) Between proportional and regression approach preference was given to the regression approach that includes appropriate national regressors for special holidays in a country.

ii) All QNA aggregates for which there is a statistical evidence and economic rationale of calendar effects should be working/trading day adjusted.

iii) In order to obtain accurate seasonal factors, the trading-day adjustment should be performed prior to seasonal adjustment, on the indicator series and not on the target and, if possible, on a monthly basis, being the working/trading days effect more significant at higher frequencies.

iv) Country specific calendars should be used in the trading day adjustment to ensure more accurate results.

v) Working/trading days adjustment should also include corrections for both moving holidays and leap year effects.

There are mainly three effects associated to the calendar structure: working days, Easter and leap year. The level of activity can be negatively or positively affected by the different composition of periods of time. Firms in the manufacturing sector certainly produce more in periods with higher number of working days, while household consumption in hotels and restaurants exhibit an increase when families are on vacation. Such effects can be identified and estimated series by series through the help of regressors that count the number of each day or particular group of days.

As the methodology applied by CYSTAT for the working day adjustment of QNA series, is taking into proper account the specificity of the Cypriot calendar, a special attention has been given to this issue in accordance with the three effects mentioned above, associated to the calendar structure.

The working days effect is captured by separating the number of working days (Monday to Friday) from weekend days (Saturday and Sunday). The regressor in period t is computed as the difference between the number of working days and the number of weekend days, multiplied by 5/2. With the multiplication by the factor 5/2, the regressor is always zero on a weekly basis.

Particular attention should be given to national holidays. Fixed holidays, such as Christmas, New Year's Day or 15th August, can occur in different days of the week. If a holiday occurs between Monday and Friday (or Saturday for the trading days effect), the regressor is modified according to the corresponding expressions. The underlying assumption is to make the effect of a holiday equals to that of a Sunday.

The number of holidays falling in working days has been counted in each month from January 1995 onwards; these are eventually used to obtain the proper regressor.

The second calendar effect concerns the Easter holidays. While a fixed-holiday, always affects the same period, a moving holiday like Easter can occur in different months (March, April or May) or quarters (first or second) according to ecclesiastic rules. Such movements between periods can reduce the meaningfulness of certain inter-period comparisons (period to-period growth rates or comparison with the corresponding period of the previous year), disturbing the short-term analysis of the series. A special statistical treatment is therefore required to neutralize these shifts. However, there is an important difference between Catholic and Orthodox Easter suggesting the exclusion of this effect from our analysis. While in the former case, the Easter day can fall in March or April (thus affecting two different quarters), in the Orthodox calendar it always appears in the second quarter (April or May). This means that at the quarterly level the Easter effect disappears, and so there is no need to adjust QNA series for this sort of effect.

Nevertheless, it is necessary to know the dates of Orthodox Easter from 1995 onwards. This is because the adjustment of the regressor for national holidays requires the allocation of Good Friday and Easter Monday to April or May.

The third type of correction is the so-called leap year effect. The leap year is characterized by an extra day in February every four years; such a cyclical periodicity is generally estimated in a regression model through the dummy variable. The additional day of leap years is considered by the regressor when it falls in a working day, but when it coincides with a Sunday or any other national holiday it is not counted.

We also restrict our attention to some aggregates for which the adjustment for calendar effects can be considered reasonable from economic, statistical and practical point of views. When a calendar effect is supposed to be significant in a time series, it should be identified and estimated through appropriate statistical techniques. By subtracting the overall effect from the original time series we obtain a corrected series for calendar effects.

The approach followed by CYSTAT for the compilation of QNA is based on indicators, so it is natural to carry out the working day adjustment on such series. In this initial stage we decided to introduce the working day adjustment only to the production-side estimation of GDP. Two reasons support this decision. CYSTAT obtains the estimate of quarterly GDP from the production-side, as the sum of GVA in A17 breakdown. It is thus convenient to adjust each sector separately and derive by aggregation the working day adjustment of GDP; in this way we are also be able to discriminate the different impact of calendar effects on various sectors of the economy. Secondly, the statistical evidence of calendar effects is much more evident in series observed at monthly than quarterly frequency. Our experiments on quarterly data have confirmed this statement. Since monthly indicators are mostly available from the supply-side of the economy, we are compelled to focus our attention on such aggregates.

An empirical exercise was performed on the following monthly indicators:

-Production index of minerals and quarrying materials (AYC)

-Production index of manufacturing (AYD)

-Production of electricity in 000's Kwh (AYE)

-Composite weighted volume index of Wholesales and Retail sales and Sales and Repairs of Vehicles (AYG)

-Tourists arrivals (AYH, for Hotels)

-Composite weighted volume indices of output: air transport, telecommunications and postal services (AYI).

As the model-based approach is adopted, for each of these indicators, a regression model is estimated with two independent variables; the working day and leap year regressors.

The coefficient of working day regressor, is found to be highly significant for AYC, AYD, AYG and AYH; the composite weighted index for transport and communication sector (AYI) shows a weaker effect but still acceptable. However, the indicator for energy industries (AYE) does not seem to present a reliable coefficient for this effect. It is also important to mention that a positive sign of the coefficient is found for all sectors except for AYH. This is quite reasonable, since the other indicators are directly related to the number of working days, while the number of tourists' arrivals is likely to increase as a consequence of a higher number of holidays.

Regarding the leap year effect, the only sector where it is found to be statistically significant is AYH: its coefficient is positive and fairly stable over time.

Adjustments for calendar effects are therefore significant for five economic sectors. Once estimated the regression models, the adjusted indicators are computed by detaching the regression effects from the original series. The process of seasonal adjustment has thus to be performed on the working day (and leap year) adjusted indicators, as recommended by the joint Eurostat/ECB Task Force. As a result of this practice, three sets of data are now available for these sectors: i) raw, ii) calendar adjusted and iii) seasonal and calendar adjusted series.

The same annual aggregate is disaggregated on the basis of the three different versions of the same indicator; correspondingly, the quarterly NA aggregate is available in every form requested by Eurostat.

Chapter 11 Balancing, benchmarking and reconciliation procedures

When there are two or more independent measures of an item, inconsistencies inevitably arise. Reconciliation is the process of dealing with these issues.

11.1 Quarterly GDP balancing procedure

In the case of the QNA compilation, as the GDP is estimated independently by 3 different approaches, there are inconsistencies between the three measures of GDP.

The Statistical Service of Cyprus as already mentioned, estimates GDP from the production-side. A balancing method is needed to reconcile the production side with the expenditure and income side. As the there is no indicator available to capture the Changes in Inventories, the adjustment is applied to Changes in Inventories which is calculated as a residual item between the production and the expenditure side. For the income side the adjustment is made on the variable of operating surplus which is considered as not reliable, since it is estimated as a residual.

11.2 Benchmarking of QNA and ANA

Benchmarking deals with the problem of combining a series of high-frequency data (i.e. quarterly data) with a series of less frequent data (i.e. annual data) for a certain variable into a consistent time series.

Since quarterly accounts are part of the system of national accounts, they should be coherent with the annual accounts. For this reason, the sum of the four quarters should be consistent with the annual data.

As quarterly data sources often differ from those used in the corresponding annual estimates, the typical result is that annual and quarterly data sources show inconsistent annual movements.

In a few cases, the quarterly data may be considered as more reliable and may be used to replace the annual data. But more typically, there is a need to combine the information coming from both sides, as it is considered that annual source data is more reliable concerning the overall level and the long-term movements, while the quarterly source data provides explicit information on short-term movements.

The Benchmarking approach has to deal with the following aspects:

a) The quarterly disaggregation of annual data to construct time series of QNA estimates and

b) The revised preliminary QNA estimates to be aligned to the new annual data when it becomes available.

Two main objectives have to be taken into consideration when the Benchmarking is applied:

a) To preserve as much as possible the short-term movements in the source data under the restrictions provided by the annual data. This is important as the short-term movements in the series are the central interest of QNA, for which the indicator provides the only available explicit information.

b) To ensure, for forward series, that the sum of the four quarters of the current year is as close as possible to the unknown future annual data.

There are generally two main approaches of benchmarking the time series:

a) A purely numerical approach and

b) A statistical modelling approach.

The Chow-Lin method used for the compilation of our QNA is related to the statistical modelling approach to ensure the respect of constrains of accounting balancing.

The related quarterly indicators are used in a regression model to obtain the estimation of the aggregate quarterly series with respect to both the annual and quarterly accounting constrains.

The main problem arising in the balancing process is not that much for the past years but in the context of estimating the current quarters. It is a problem linked also to the revision process of quarterly figures. It is clear that when new annual data is available this also implies the revision of the quarterly data which should still remain coherent with the corresponding annual value.

Generally speaking the estimation of the first release of the annual value is based on the quarterly estimations. The National Accounts section faces the difficulty that the first annual estimate of the year must be provided before the estimation of the fourth quarter of the current year. Therefore, the annual estimate is largely based on the quarterly estimations fro the three first quarters, while the quarterly estimation for the 4th quarter is also largely determined on the annual estimate. In that way, Quarterly National Accounts and Annual national accounts estimations are closely related and take advantages from each other.

There is a close relationship between annual and quarterly releases which is as follows:

1. A first preliminary estimate of annual data for year t is released at the end of June (t-6 months). This preliminary release contains no breakdown and gives only some overview of the economic development.

2. A second preliminary estimate is released at the end of September (t-3 months) and contains a revision of the year t-1. It contains basic analysis and breakdown of the production and expenditure accounts.

3. A third estimate of year t is released at early March of the successive year (t+3 months) with a 'final' revision for year t-1. The analysis of year t is extended and the maximum level of detail is given.

According to this plan, the estimations which should be done without a-priori knowledge of the annual total are the first, second and third quarter of each year.

The first annual estimate, published at the end of June, (t-6 months) is partially based on the preliminary findings of the first quarter and the first estimate of the second, third and fourth quarters by forecasting the missing information for each indicator (purely with Tramo-Seats) and by summing up the four quarters.

The second annual estimate which contains basic analysis and breakdown of the production and expenditure accounts, takes advantage from the results obtained from the estimates of the first, second and third quarter. The quarterly accounts give again their new estimation of the year by estimating the fourth quarter based again on forecasting estimation of the indicator. The forecast of the indicators this time is not only the result of a technical method (Tramo-Seats) but are also combined with other sources.

When publishing the 4th quarter, the quarterly accounts are obliged to respect the annual constrains. Quarterly National Accounts and Annual national accounts estimation are closely related and take advantages from each other. When the fourth quarter is estimated, a simulation is made comparing the results obtained running the QNA program without and with the annual constrain. In the "final" revision of the year the results coming out from the simulation procedure are taken into consideration but further information coming from the relevant activities is taken into account.

Chapter 12 Main data sources used

12.1 Statistical data sources used for the production approach

Agriculture, hunting and forestry

Name of data source: Agricultural Statistics
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Volume index of agricultural production based on anticipated production according to yield
Further adjustments made to the data: No

Fishing

Name of data source: Agricultural Statistics
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Volume index of agricultural production based on anticipated production according to yield
Further adjustments made to the data: No

Mining and Quarrying

Name of data source: General Industrial Production Index
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Volume index of mining and quarrying
Further adjustments made to the data: No

Manufacturing

Name of data source: General Industrial Production Index
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Volume index of manufacturing production
Further adjustments made to the data: No

Electricity, gas and water supply

Name of data source: Energy Statistics
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Production of electricity in 000´ s Kwh
Further adjustments made to the data: No

Construction

Name of data source: Building permits authorised
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Total building permits authorised (Area m^2)
Further adjustments made to the data: Yes

Wholesale and Retail Trade; Repairs

Name of data source: Turnover Value Index
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly collection of data but available on a quarterly basis
Variables used for QNA: Turnover value index of Wholesale and Retail Trade; Repair of Motor Vehicles, Motorcycles and Personal and Household Goods.
Further adjustments made to the data: Yes

Hotels and Restaurants

Name of data source: Composite weighted index
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: The first variable is available on a Monthly basis   The second variable is available on a Quarterly basis
Variables used for QNA: Tourists arrivals   Restaurant value index
Further adjustments made to the data: Yes

Transport, storage and communications

Name of data source: Composite weighted index
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly collection of data but published on a quarterly basis

Variables used for QNA: Volume index of telecommunications
               Volume index of postal services
               Turnover value index of Land transport
               Turnover value index of Air transport
               Turnover value index of Supporting & Auxiliary Transport Activities

Further adjustments made to the data: Yes

Financial Intermediation

Name of data source: Indicator of proxy FISIM
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: (Interest Received – Interest Paid)+(Commissions + Credit Cards)
Further adjustments made to the data: No

Real Estates Activities

Name of data source: Administrative data (FIMAS)
Organisation collecting the data, and purposes for which it is collected: Statistical Service The data is collected for the purposes of Public Finance
Periodicity: Quarterly
Variables used for QNA: Land and Survey Fees
Further adjustments made to the data: No

Public Administration and Defence

Name of data source: Employment by Economic Activity
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Number of employed persons (full-time equivalent): Public administration and defence; Compulsory social security
Further adjustments made to the data: No

Education

Name of data source: Employment by Economic Activity
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Number of employed persons (full-time equivalent): Education
Further adjustments made to the data: No

Health and Social Work

Name of data source: Employment by Economic Activity
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Number of employed persons (full-time equivalent): Health and Social Work
Further adjustments made to the data: No

Other Community, Social and Personal Service

Name of data source: Employment by Economic Activity
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Number of employed persons (full-time equivalent): Other community, social and personal service activities
Further adjustments made to the data: No

Private households with employed persons

Name of data source: Employment by Economic Activity
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Number of employed persons (full-time equivalent): Private households with employed persons
Further adjustments made to the data: No

Value Added Tax

Name of data source: Administrative data
Organisation collecting the data, and purposes for which it is collected: VAT department
Periodicity: Quarterly
Variables used for QNA: VAT
Further adjustments made to the data: No

Import Duties

Name of data source: Administrative data (Financial Information Management Account System - FIMAS)
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Import duties
Further adjustments made to the data: No

12.2 Statistical data sources used for the expenditure approach

Food and Non-Alcoholic Beverages

Name of data source: Turnover Volume Index of Retail Sales
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Code 52A
Further adjustments made to the data: No

Alcoholic beverages, tobacco and narcotics

Name of data source: Turnover Volume Index of Retail Sales
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Code 52A
Further adjustments made to the data: No

Clothing and footwear

Name of data source: Turnover Volume Index of Retail Sales
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Code 524 A
Further adjustments made to the data: No

Furnishing, house equipment and routine maintenance of house

Name of data source: Turnover Volume Index of Retail Sales
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Code 524 B
Further adjustments made to the data: No

Health

Name of data source: Composite Weighted Index
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: First variable: Monthly   Second variable: Quarterly
Variables used for QNA: Number of employed persons on Health and Social Work   Turnover volume index of Retail Sales: Code 523 (Pharmacies)
Further adjustments made to the data: No

Transports

Name of data source: Composite Weighted Index
 	
        Turnover value Index of Air transport
 	
        Turnover value index of sale, maintenance and repair of motor vehicles

Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: The first source data: Quarterly   The second source data: Monthly
Variables used for QNA: Turnover value Index of Air transport   Turnover value Index: Code 501 (Sales of vehicles)
Further adjustments made to the data: No

Communications

Name of data source: Composite Weighted Index
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Volume Index of Telecommunications   Volume Index of Postal Services
Further adjustments made to the data: No

Recreation and Culture

Name of data source: Employment by Economic Activity
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Number of employed persons (full time equivalent): Other community, social and personal service activities
Further adjustments made to the data: No

Education

Name of data source: Employment by Economic Activity
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Number of employed persons (full time equivalent): Education
Further adjustments made to the data: No

Hotels and Restaurants

Name of data source: Composite weighted index
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: The first variable is Monthly   The second variable is Quarterly
Variables used for QNA: Tourists arrivals   Restaurant value index
Further adjustments made to the data: Yes

Miscellaneous goods and services

Name of data source: Employment by Economic Activity
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Number of employed persons (full time equivalent): Other community, social and personal service activities
Further adjustments made to the data: No

Final consumption expenditure of resident households in the ROW

Name of data source: Tourism Statistics-Return of Residents by Country Visited
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Return of Residents by Country Visited: All countries
Further adjustments made to the data: No

Final consumption expenditure of non resident households

Name of data source: Tourist statistics: Arrivals of Tourists by Country of Usual Residence
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Monthly
Variables used for QNA: Arrivals of tourists: All countries
Further adjustments made to the data: No

Final consumption expenditure of general government

Name of data source: Public finance
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Government consumption expenditure
Further adjustments made to the data: No

Final consumption expenditure of NPISH´s

Name of data source: Employment by Economic Activity
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Number of employed persons (full time equivalent): Other community, social and personal services
Further adjustments made to the data: No

Exports of goods

Name of data source: Balance of Payments
Organisation collecting the data, and purposes for which it is collected: Central Bank of Cyprus
Periodicity: Quarterly
Variables used for QNA: Exports of goods
Further adjustments made to the data: No

Exports of Services

Name of data source: Balance of Payments
Organisation collecting the data, and purposes for which it is collected: Central Bank of Cyprus
Periodicity: Quarterly
Variables used for QNA: Exports of Services
Further adjustments made to the data: No

Imports of Goods

Name of data source: Balance of Payments
Organisation collecting the data, and purposes for which it is collected: Central Bank of Cyprus
Periodicity: Quarterly
Variables used for QNA: Imports of goods
Further adjustments made to the data: No

Imports of Services

Name of data source: Balance of Payments
Organisation collecting the data, and purposes for which it is collected: Central Bank of Cyprus
Periodicity: Quarterly
Variables used for QNA: Imports of Services
Further adjustments made to the data: No

12.3 Statistical data sources used for the income approach

Agriculture, hunting, forestry and Fishing

Name of data source: Volume index of agricultural production
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Volume index of agricultural production based on anticipated production according to yield
Further adjustments made to the data: No

Mining and Quarrying

Name of data source: Labour Cost Survey
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost per employee Wages and Salaries per employee
Further adjustments made to the data: No

Manufacturing

Name of data source: Labour Cost Survey
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost per employee Wages and Salaries per employee
Further adjustments made to the data: No

Electricity, gas and water supply

Name of data source: Labour Cost Survey
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost per employee Wages and Salaries per employee
Further adjustments made to the data: No

Construction

Name of data source: Labour Cost Survey
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost per employee Wages and Salaries per employee
Further adjustments made to the data: No

Wholesale and Retail Trade; Repairs

Name of data source: Labour Cost Survey
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost per employee Wages and Salaries per employee
Further adjustments made to the data: No

Hotels and Restaurants

Name of data source: Labour Cost Survey
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost per employee Wages and Salaries per employee
Further adjustments made to the data: No

Transport, storage and communications

Name of data source: Labour Cost Survey
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost per employee Wages and Salaries per employee
Further adjustments made to the data: No

Financial Intermediation

Name of data source: Labour Cost Survey
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost per employee   Wages and Salaries per employee
Further adjustments made to the data: No

Real Estates and Other Business Activities

Name of data source: Labour Cost Survey
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost per employee   Wages and Salaries per employee
Further adjustments made to the data: No

Public Administration and Defence

Name of data source: Government expenditure: Compensation of employees
Organisation collecting the data, and purposes for which it is collected: Ministry of Finance
Periodicity: Monthly
Variables used for QNA: Wages and salaries and social security payments
Further adjustments made to the data: Yes

Education

Name of data source: Composite weighted index   Government expenditure   Labour Cost Index
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost index / Wages and Salaries per employee   Government expenditure for compensation of employees
Further adjustments made to the data: Yes

Health and Social Work

Name of data source: Composite weighted index
Government expenditure
Labour Cost Index
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost index / Wages and Salaries per employee
Government expenditure for compensation of employees
Further adjustments made to the data: Yes

Other Community, Social and Personal Service

Name of data source: Labour Cost Survey
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Labour cost per employee
Wages and Salaries per employee
Further adjustments made to the data: No

Private households with employed persons

Name of data source: : Employment by Economic Activity
Organisation collecting the data, and purposes for which it is collected: Statistical Service
Periodicity: Quarterly
Variables used for QNA: Number of employed persons (full time equivalent): Private Households
Further adjustments made to the data: No