



INSTITUTO NACIONAL DE ESTATÍSTICA
STATISTICS PORTUGAL

NATIONAL ACCOUNTS DEPARTMENT

QUARTERLY ACCOUNTS AND SHORT-TERM ANALYSIS UNIT

QUARTERLY NATIONAL ACCOUNTS
(Base 2000)

Sources and Methods

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1. Overview of the System of Quarterly National Accounts

1.1. Organisation and institutional arrangements

Statistics Portugal is responsible for the production and dissemination of Portuguese National (annual and quarterly) and Regional Accounts. Recently Statistics Portugal developed a system for producing flash estimates of GDP, which are being published since the 1st quarter 2007.

Quarterly Accounts and Short-term Analysis Unit (QASA unit), integrated into the National Accounts Department (NAD), is the direct responsible unit for the estimation of Portuguese Quarterly National Accounts (QNA), both for regular and flash estimates. This unit is also responsible for the short-term economic analysis (monthly and quarterly) as well as for the production of the Business and Consumer Surveys.

The Department is responsible for several projects, namely:

- National accounts (annual and quarterly), regional accounts and several satellite-accounts;
- General government accounts;
- Agriculture, forestry and fishing economic accounts;
- (Harmonised) consumer price index and purchasing power parities;
- Short-term business surveys (qualitative indicators);
- Short-term (quantitative) indicators;
- Short-term economic synthesis.

QASA unit is comprised of one head of unit, four graduated technicians (economics and mathematics) and one non-graduated technician allocated to QNA, which are responsible for GDP estimates from the expenditure and production approaches. This unit is also responsible for the production of the Rest of the World quarterly account. Other two graduated and three non-graduated technicians are allocated to the other projects under responsibility of this unit. For the time being, it is not yet available GDP from the income approach due to the lack of estimates on compensation of employees. The availability of this set of information is scheduled to the first half of 2008.

Annual National Accounts, on the other hand, are responsibility of two units: one for branches of activity accounts (Branches of Activity Accounts Unit) and other for institutional sectors

accounts (Institutional Sector Accounts Unit). These two units work in strict cooperation with each other, and also with QNA unit when a new account for a given year is being finished.

Technicians from QNA unit are in close collaboration with colleagues from annual accounts, accompanying the production of annual accounts, in order to transpose to QNA, whenever possible, the sources and methods used in their compilation.

This allows QNA technicians to anticipate some results from annual accounts, integrating them as soon as possible in QNA compilation. This also allows annual accounts to anticipate some problems due to the early analysis from QNA.

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1.2. Publication timetable, revisions policy and dissemination of QNA

Flash estimates are published 45 days after the reference quarter. The exact date of publication may vary according to Eurostat's press release for European Union flash estimate, in order to guarantee the simultaneous publication of flash estimates for EU-aggregates and each country. Flash estimates are only published as growth rates (quarter on previous quarter and quarter on same quarter of the previous year) for chain-linked volume GDP (no breakdown for the moment), seasonally adjusted.

Regular estimates are published 70 days after the reference quarter. Regular estimates are available both for expenditure and production approach and their respective breakdowns, seasonally adjusted. Quarterly data on employment according to national accounts concepts and definitions is not yet available. The same is applicable to GDP from the income side, which is

also not yet available due to the inexistence of estimates for compensation of employees. The availability of both of these sets of information is scheduled to the first half of 2008.

Revisions may occur in every QNA publication in order to incorporate the latest available data at any point in time and these can be broken down in two types: regular and exceptional revisions.

Regular revisions occur for the latest quarters available according to the revisions of the basic information used in the compilation of QNA. This revision procedure is applicable both to regular and flash estimates, meaning that when a flash estimate for some quarter is being calculated, previous quarters may be revised; in the same way, when the regular estimate for some quarter is being calculated, the flash estimate calculation for the same quarter and for the previous quarters may also be revised.

Exceptional revisions are normally linked to the availability of a new annual definitive account. This has a direct impact on the revision of the quarters of that year, but given the indirect method used to estimate QNA (temporal disaggregation models using related series) the re-estimation of the models' coefficients may also implicate the revision of the quarters of the preceding and following years.

1.3. QNA compilation approach

Portuguese QNA are compiled by means of temporal disaggregation methods using related indicators, which are included in Eurostat's *Handbook on Quarterly National Accounts* as a suitable indirect method. In general terms, these methods analyses the correlation of each aggregate from annual accounts (reference series) with one or more indicators available at least quarterly (related indicators). They can simultaneously solve two existing problems in QNA estimation: distribution (estimation of the quarterly values when the annual figure is known) and extrapolation (estimation of the quarterly values when no annual figures are available).

In some specific cases, approaches very similar to those used in annual accounts are used to estimate quarterly aggregates when the available information is suitable. The application of these direct methods implies a more detailed system of information.

Therefore, the general approach for compiling Portuguese QNA can be considered mixed, by using direct methods in a few specific cases, and indirect methods as the main approach.

No balancing is performed by the use of supply-use tables on a quarterly basis, but the estimation of some aggregates (mainly from the expenditure side) follows a commodity approach.

1.4. Balancing, benchmarking and other reconciliation procedures

GDP from annual definitive accounts is fully balanced between expenditure, production and income approach due to the use of supply-use procedures. In QNA, conversely, there is no full balancing between expenditure and production approaches.

In Portugal, quarterly GDP is mainly determined by the expenditure approach, resulting in a recorded statistical discrepancy between GDP from the expenditure side and Gross Value Added (GVA) plus taxes less subsidies on products. One must note that the magnitude of this statistical discrepancy may be used as an indicator for balancing both production and expenditure approaches.

Benchmarking of QNA with annual accounts is the underlying principle of the methodology applied on their compilation. For those years where annual accounts are available, quarterly figures are compiled by distributing annual totals, guaranteeing consistency.

1.5. Volume estimates

Quarterly volume estimates from Portuguese QNA are chain-linked type, derived from chain-linked annual accounts. Chain-linked annual data is obtained by projecting a given base year (currently in Portuguese QNA, 2000) with the volume changes calculated at previous year prices for each elementary item. The drawback of this type of data is the non-additivity of volume estimates at each aggregation level.

Quarterly chain-linked volume series are obtained by applying disaggregation techniques to annual chain-linked series, by using related indicators available at least quarterly, which should be statistically and economically significant in explaining annual changes. These disaggregation techniques follow the base principle defined by Chow and Lin, but updated with some newer developments as the introduction of AR(1) processes, enabling the estimation of quarterly aggregates in terms of change rates rather than levels.

This procedure guarantees consistency with annual accounts as they constitute the base stone for obtaining quarterly values.

1.6. Seasonal adjustment and working day correction

Aggregates from Portuguese QNA are all seasonally adjusted. The procedure of seasonal adjustment is performed to the indicators used in the temporal disaggregation technique as the models are, by construction, annual, meaning that no seasonal component can be estimated.

Seasonal adjustment is done with the X12-Arima procedure using the Demetra interface, which proved to be more robust to double seasonality identification.

For the time being there are no raw estimates (non-seasonally adjusted) for GDP and components due to the particularity of the base method of compilation: disaggregation techniques rely on annual models (no seasonal component can be estimated). Nonetheless, Statistics Portugal will present non-adjusted quarterly estimates from National Accounts in 2008, necessary to the compilation of quarterly accounts for the institutional sectors.

Finally, no calendar adjusted data is available at present. The unavailability of this type of data is linked to some operational problems and to the defined work plan, which prioritises other tasks. Calendar adjustment will be introduced in the near future.

1.7. Additional information

Statistics Portugal website: <http://www.ine.pt>

Detailed QNA information:

- Data from Quarterly National Accounts is organized in tables adapted to users' needs and associated to the Press Release, available in xls format, that can be viewed and/or downloaded at <http://www.ine.pt> > Statistical Information > Press Releases (Direct link: http://www.ine.pt/portal/page/portal/PORTAL_INE/Destaques/?menuBOUI=387636);
- All data from Quarterly National Accounts are also organized as indicators in a statistical database where they can be selected, compared to other indicators, viewed and/or downloaded at <http://www.ine.pt> > Statistical Information > Statistical Data (Direct link: http://www.ine.pt/portal/page/portal/PORTAL_INE/DEstatisticos?menuBOUI=387635).

QNA press releases:

- *Press Release: Quarterly National Accounts* is available in Portuguese (long version) and in English (short version), which can be viewed and/or downloaded at <http://www.ine.pt>

> Statistical Information > Press Releases (Direct link: http://www.ine.pt/portal/page/portal/PORTAL_INE/Destaques/?menuBOUI=387636).

- *Press Release: Quarterly National Accounts – Flash Estimate* is available in both Portuguese and English, which can be viewed and/or downloaded at <http://www.ine.pt> > Statistical Information > Press Releases (Direct link: http://www.ine.pt/portal/page/portal/PORTAL_INE/Destaques/?menuBOUI=387636).

2. Publication timetable, revisions policy and dissemination of QNA

2.1. Release policy

Portuguese QNA are currently published 70 days after the end of the reference quarter. This publication timetable is only subject to minor adjustments when the 70th day coincides with weekends or holidays, case in which the publishing date maybe anticipated in one or two days (anticipating rather than postponing).

Publishing date for QNA, as for other projects of Statistics Portugal, is publicly announced 3 months before on a publishing schedule (http://www.ine.pt/prodserv/destaque/calend_eng.asp) available at <http://www.ine.pt/>. This calendar is updated regularly and the press-releases for the week after are highlighted in each Friday afternoon.

This publication timetable is in line with ESA95 revised regulation, which determines the availability of first estimates of quarterly GDP 70 days after the reference period.

Statistics Portugal started in 2007 to publish flash estimates of Portuguese quarterly GDP, 45 days after the reference quarter. The specific days will be determined according to the publication date of Eurostat's flash estimate for EU-aggregates, but preferably will match the t+45 days timetable. As for current (or first) estimates of QNA, flash estimates dates of publication are publicly announced 3 months in advance.

Revision policy for QNA, both for previously published flash estimates and for subsequent revisions of current estimates, implies the integration of the most up-to-date basic data available at each moment. Therefore, revisions on basic data are integrated every quarter. This is also the case for flash estimates, meaning that the flash estimate of each quarter may revise the previous quarters, and may all be revised again afterwards when current estimate (t+70 days) with breakdowns is published.

Major revisions concerning methodological improvements, revision of seasonal factors, and revisions on estimation coefficients are normally done when a new year from annual accounts is integrated.

These major moments for revision do not follow yet a specific timetable due to the process of catching up on the release calendar of Annual National (definitive) Accounts.

Releases of ANA are usually aligned with QNA in order to always avoid inconsistencies between them. Therefore, ANA releases preferably coincide with those of QNA, or they are fixed in such a way that a new QNA release never occurs after one of ANA if data is not consistent. Bear in mind that QSA need some time interval for integrating ANA.

There is also an alignment of releases between QNA and external trade data, a major source for compiling national accounts. Release of external trade data for the last month of each quarter is usually aligned with release of QNA (for several quarters, they actually match the day), meaning that QNA integrate the most updated data for external trade.

QNA are disseminated via <http://www.ine.pt/> by means of a press release and detailed tables.

The press release, which is the main channel for Statistics Portugal communicating with the general public, contains both economic analysis of the results and some methodological notes relevant for the understanding of the figures (causes for revision, main information included, etc).

At the same time, detailed QNA tables for each release (see contents published) are available at <http://www.ine.pt/>.

2.2. Contents published

Besides the information sent to Eurostat on a regular basis, according to the ESA95 transmission programme, Statistics Portugal publishes a set of detailed tables for QNA on its website.

Those tables contain information on quarterly GDP and components, for the expenditure and production approaches, and also a table from GDP to Net Lending/Borrowing of total economy.

Presently, there are no estimates on GDP from the income side, because compensation of employees is not calculated on a quarterly basis for the moment.

Information on GDP and components is available both in current prices and chain-linked volume series. For both, it is available data on levels, year on year quarterly growth rates and annual growth rates at the end of each quarter. All data is seasonally adjusted (but not adjusted for calendar effects).

On the press release there is also information on contributions to growth for major GDP components: internal demand and external demand balance (exports less imports).

Detailed contents published:

A) Expenditure approach

1) Tables on Gross Domestic Product:

- Final Consumption Expenditures, total;
- Gross Capital Formation;
- Exports of Goods and Services;
- Imports of Goods and Services;
- GDP: Gross Domestic Product at market prices;

2) Tables on details for Final Consumption Expenditures:

- Final Consumption Expenditures of Resident Households in Food and Beverage Goods;
- Final Consumption Expenditures of Resident Households in Durable Goods;
- Final Consumption Expenditures of Resident Households in Current Goods and Services;
- Final Consumption Expenditures of Resident Households, total;
- Final consumption Expenditures of Non Profit Institutions Serving Households;
- Final Consumption Expenditures of General Government (includes Individual Consumption Expenditures and Collective Consumption Expenditures);

3) Tables on details for Gross Capital Formation (GFC):

- Gross Fixed Capital Formation in products of Agriculture, Forestry, Fisheries and Aquaculture;
- Gross Fixed Capital Formation in Metal Products and Machinery;
- Gross Fixed Capital Formation in Transport Equipment;
- Gross Fixed Capital Formation in Construction;
- Gross Fixed Capital Formation in Other Products;
- Gross Fixed Capital Formation, total;
- Acquisitions Less Disposables of Valuables;
- Changes in inventories;

4) Tables on details for External Trade:

- Exports of Goods (FOB);
- Exports of Services;
- Exports, total;

- Imports of Goods (FOB);
- Imports of Services;
- Imports, total;

B) Production approach

Tables on Gross Value Added (GVA):

- Gross Value Added of Agriculture, Hunting, Forestry and Fishing Activities;
- Gross Value Added of Electricity, Gas and Water Supply Activities;
- Gross Value Added of Industry Activities;
- Gross Value Added of Construction Activities;
- Gross Value Added of Trade, Hotels and Restaurants Activities;
- Gross Value Added of Transport, Storage and Communication Activities;
- Gross Value Added of Financial Intermediation Activities;
- Gross Value Added of Public Administration and Defence, Education, Health and other services Activities, including Business Activities;
- Gross Value Added at basic prices, total;
- Taxes less Subsidies on Products (including VAT – Value Added Tax);
- Statistical Discrepancies between GVA+Taxes and Gross Domestic Product at market prices;

Table on Net Lending / Borrowing:

- Gross Domestic Product at market prices;
- Primary Income Receivable from the Rest of the World;
- Primary Income Payable to the Rest of the World;
- Gross National Income at market prices;
- Consumption of Fixed Capital;
- Current Transfers Receivable from the Rest of the World;
- Current Transfers Payable to the Rest of the World;
- Net National Disposable Income;
- Capital Transfers Receivable from the Rest of the World;
- Capital Transfers Payable to the Rest of the World;
- Net Lending (if positive) or Borrowing (if negative)¹.

¹ Includes acquisition less disposals of non-financial non-produced assets.

2.3. Special transmissions

There are some special transmissions of QNA to several institutions, mostly regarding additional details not relevant for general users.

Following the practice for all Statistics Portugal releases, and according to the law for the National Statistical System, Portuguese government receives QNA press release and tables, 24h in advance of its publication, with an embargo status.

Also about 24h in advance to its publication, Eurostat receives the flash estimate for each quarter, with an embargo status as well.

At the time of each QNA publication, the following institutions receive special data:

- Eurostat: ESA95 table 01, regarding ESA95 transmission programme;
- OCDE: ESA95 table 01;
- Portuguese Central Bank: additional details on final consumption expenditures of resident households; details on consumption expenditures of resident households outside the economic territory and expenditures of non-resident households in the economic territory; and details on FISIM (important for quarterly BoP report to Eurostat);
- Ministry of Finance: additional details on final consumption expenditures of resident households; details on consumption expenditures of resident households outside the economic territory and expenditures of non-resident households in the economic territory.

2.4. Policy for metadata

Statistics Portugal subscribes International Monetary Fund Special Dissemination Standard for several statistics, namely for quarterly accounts. View IMF site for details: <http://dsbb.imf.org/Applications/web/sddsctycatbaselist/?strcode=PRT&strcat=NAG00>.

This means that Statistics Portugal follows the commitment to comply with a given quality standard and to provide information about the production process and dissemination practices. Major methodological changes are announced in advance in our press release, which also gives some methodological details and explanations for important facts every quarter in a specific text-box.

Methodological documents for discussion are available to relevant users on the meetings of CSE (Statistical Council – body whose mission is to guide and coordinate Portuguese Statistical System) and its working groups on economic issues.



3. Overall QNA compilation approach

3.1. General architecture of the QNA system

Portuguese QNA are compiled by means of temporal disaggregation methods using related indicators, which are included in Eurostat's *Handbook on Quarterly National Accounts* as a suitable indirect method. In general terms, these methods analyse the correlation of each aggregate from annual accounts (reference series) with one or more indicators available at least quarterly (related indicators). They can simultaneously solve two existing problems in QNA estimation: distribution (estimation of the quarterly values when the annual figure is known) and extrapolation (estimation of the quarterly values when no annual figures are available).

In some specific cases, approaches very similar to those used in annual accounts are used to estimate quarterly aggregates when the available information is suitable. The application of these direct methods implies a more detailed system of information.

Therefore, the general approach for compiling Portuguese QNA can be considered mixed, by using direct methods in a few specific cases, and indirect methods as the main approach.

The reason for the use of this type of indirect approach is usually the lack of a broad and developed system of infra-annual information. In addition, the indirect approach can be applied much more swiftly, becoming more suitable for estimating results in the short period of time that QNA must be available.

No balancing is performed by the use of supply-use tables on a quarterly basis, but the estimation of some aggregates (mainly from the expenditure side) follows a commodity approach.

3.2. Balancing, benchmarking and other reconciliation procedures

3.2.1. Quarterly GDP balancing procedure

GDP from annual definitive accounts is fully balanced between expenditure, production and income approach due to the use of supply-use procedures. In QNA, conversely, there is no full balancing between expenditure and production approaches.

In Portugal, quarterly GDP is mainly determined by the expenditure approach, resulting in a recorded statistical discrepancy between GDP from the expenditure side and Gross Value Added (GVA) plus taxes less subsidies on products. One must note that the magnitude of this statistical

discrepancy may be used as an indicator for balancing both production and expenditure approaches.

No balancing is performed by the use of supply-use tables on a quarterly basis, but the estimation of some aggregates (mainly from the expenditure side) follows a commodity approach.

3.2.2. Benchmarking of QNA and ANA

Benchmarking with annual accounts is the underlying principle of the methodology applied on the compilation of QNA. For those years where annual accounts are available, quarterly figures are compiled by distributing annual totals, guaranteeing consistency.

The general methodology used by Portuguese QNA consists in the econometric methods of disaggregation of time series introduced by Chow and Lin². There are some developments after the Chow and Lin method (among them is the method used in Portugal), but this is still the most common method in practice in European countries to estimate quarterly accounts.

In general terms, these methods relate each Annual Accounts' variable (reference variables) with one or more indicators (related indicators) available quarterly.

Two problems are present in the estimation of QNA: distribution (quarterly estimation when annual total is known) and extrapolation (quarterly estimation when annual total is unknown).

In Portuguese QNA both distribution and extrapolation problems are present, and solved by using these econometric methods. In some cases where no reliable infra-annual information is available, the estimation of quarterly values is based on annual values, using the smoothing methods discussed ahead.

When applying these methods, at a first stage, it is necessary to select appropriate indicators for each aggregate's estimation. For that purpose, an annual econometric model that relates each reference variable with the annualised indicators is estimated in order to obtain the coefficients associated to each indicator. The choice of the relevant indicators to estimate each reference

² Chow and Lin (1971). This work, which introduced interpolation and extrapolation of time series, presents the use of monthly series applied to a quarterly model. Subsequent investigation has generalised this procedure, for instance the estimation of quarterly figures from annual series.

variable is a compromise of statistical significance (evaluated by the common tests) and economic sense.

The quarterly algorithm estimates simultaneously the coefficients associated to each indicator (in annual terms) and the corresponding quarterly figures. This procedure is based on the original work from Chow and Lin, from which is possible to prove that the coefficients estimated by the annual regression model can be used to estimate the corresponding quarterly figures. Therefore quarterly estimates are the result of two components: the first is the product of the estimated coefficients (by the annual regression model) and the quarterly values of the indicators; the second is a function of the error from the annual regression model. This function determines how the error of the annual regression model is distributed along the four quarters.

Several solutions were suggested to treat the errors, depending on the variance-covariance matrix assumed. In Portuguese QNA, a flexible structure for the errors (AR(1) process) is applied and variables are estimated in first differences. In addition, a log-transformation is applied to the variables, which enables the interpretation of the results in terms of growth rates. Those solutions are synthesised below.

Chow-Lin method (simpler variant): in the simpler case proposed by Chow and Lin, errors are supposed to be independent and identically distributed. This implies that annual residuals are distributed equally along the four quarters. In practice this procedure is responsible for spurious discontinuities from the 4th quarter of one year to the 1st quarter of the following year.

Chow-Lin method (AR(1) error structure variant): alternatively to the simpler variant, Chow and Lin suggested a first order auto-regressive process for the errors. The main objective of this specification is to allow the errors to follow a long memory process in order to obtain smoother estimates. A consistent estimate for the auto-regressive parameter can be obtained using FGLS (Feasible Generalised Least Squares), which consists on a search for the value of the auto-correlation parameter (ρ) in the interval $]-1,1[$ in order to minimise the sum of squared errors.

Fernandez Method³: Fernandez verified that, in practice, using an AR(1) process for the errors was not sufficient to eliminate discontinuities between the end of one year and the beginning of

³ Fernandez (1981).

the following year, specially when series are not stationary. Fernandez' proposal was to take first differences from series⁴. This option simplifies the problem because there is no need to estimate any auto-correlation parameter, but this can be considered an extremely restrictive hypothesis.

Litterman Method⁵: Litterman, with the objective of allowing a more flexible error structure, considered an AR(1) process in the quarterly regression in first differences (proposed by Fernandez). In this case it is also necessary to search for the auto-correlation parameter. Note that the Fernandez method is a particular case of Litterman's method (where $\rho=0$) and of the Chow-Lin's method with auto-correlated errors (where $\rho=1$).

In addition a log-transformation can be used as suggested by Salazar et al. (1994), which uses the following statement

$$\ln(y_{4i-3} + y_{4i-2} + y_{4i-1} + y_{4i}) \cong \frac{1}{4}(\ln y_{4i-3} + \ln y_{4i-2} + \ln y_{4i-1} + \ln y_{4i}) + \ln 4$$

This allows a log-specification of the regression model, being the annual reference variable defined as: $\bar{y}_i^* = \ln(y_{4i-3} + y_{4i-2} + y_{4i-1} + y_{4i})$.

The use of this transformation is due to the fact that annual restraints are non-linear when using logarithms, which invalidates the direct use of GLS. The statement above defining an approximate relation solves this non-linearity problem, making possible the application of the Chow-Lin method or some other of its variants to the transformed regression model.

Considering the regression model estimated in first differences and bearing in mind that

$$\frac{y_{t+i} - y_t}{y_t} \cong \ln y_{t+i} - \ln y_t,$$

the use of logarithms allows the econometric model to be interpreted as a relation in terms of growth rates.

⁴ This problem is related to the log-transformation of the variables. In fact most economic series are only stationary after applying first differences to the log-transformed variables, that is, in growth rates rather than only in first differences.

⁵ Litterman (1983).

Portuguese Quarterly National Accounts use the Litterman's method applied to the log-transformation of variables described above, although other possibilities are also tested. The choice of this method relied on some empirical studies that showed that Litterman's method gives more accurate results than Chow-Lin's method (as economic variables are usually non-stationary)⁶. In some specific cases where differences are not necessary (as for external trade data, for example), the regression models are specified in levels. In other words, the Chow-Lin's method is used.

When no reliable information is available to estimate the quarterly behaviour of the variable, the method suggested by Boot, Feibes e Lisman (1967) is used. This method consists in minimising, subject to restrictions, a quadratic loss function of the differences between the values of the quarterly series.

Two alternative minimisation criteria were suggested: (i) minimisation of first differences, meaning that the quarterly values are obtained by minimising the square differences (first order) between the estimated values; (ii) minimisation of second differences, applied in case minimising first differences does not yield satisfactory results (namely when variables present a continuously increasing or decreasing trend), consisting in the minimisation of the squared second order differences.

Portuguese QNA usually use second order differences minimisation, although differences to the other alternative method are not significant. This mathematical procedure is preferable to the trivial solution of dividing the annual total by four, because it yields smoother results. This method is also referenced in Eurostat's Quarterly National Accounts Manual as acceptable when no reliable quarterly information is available.

This mathematical procedure is used in some specific cases like Agriculture, Forestry and Fishing Gross Value Added. In that case there is no reliable quarterly indicator, so quarterly values for the aggregates are derived by disaggregation of annual estimates without related indicator (annual values are definitive in those years for which Annual Accounts exists, and preliminary for years estimated by QNA).

⁶ For more details on this and for some empirical results, see Cardoso (1999).

3.2.3. Other reconciliation(s) of QNA different from balancing and benchmarking

No reconciliation of QNA other than balancing and benchmarking.

3.2.4. Amount of estimation in various releases

There are few limitations in the base information use in regular estimates (t+70 days). Most of those limitations apply to monthly information for which the last month of the quarter is not available.

This is the case for external trade deflators, where information about imports and exports of goods at current prices is available for the complete quarter, but not for price indices, which are calculated only with information on the two first months of the quarter. This information is re-calculated for the subsequent revision of that quarter, using data on the three months.

Nonetheless, the first regular estimate for a given quarter incorporates more than 90% of basic information. Flash estimates have a lower coverage of basic data, but still above 80%. Some techniques for forecasting missing values for unavailable basic data are applied for flash estimates, mostly based on ARIMA models.

3.3. Volume estimates

3.3.1. General volume policy

Volume estimates are generally obtained first, given its higher importance. In these cases, current prices estimates are derived from the volume and deflator estimates. However, there are exceptions to this rule, namely for those cases where data at current prices have a high correlation with the aggregate to be estimated. This is the case for external trade data, both for goods and services. Current prices and deflators are calculated and volume estimates are derived from the previous two.

Quarterly volume estimates from Portuguese QNA are chain linked type, derived from chain linked annual accounts. Chain linked annual data are obtained by projecting a given base year (currently in Portuguese QNA, 2000) with the volume changes calculated at previous year prices for each elementary item. The drawback of this type of data is the non-additivity of volume estimates at each aggregation level, usually growing as the distance from the reference year becomes wider.

Quarterly chain-linked volume series are obtained by applying disaggregation techniques to annual chain-linked series, using related indicators available at least quarterly, which should be statistically and economically significant in explaining annual change rates. The indicators used in disaggregation should also be chain linked. The disaggregation technique follows the base principle defined by Chow and Lin, but updated with some newer developments as the introduction of AR(1) processes, enabling the estimation of quarterly aggregates in terms of rate of change rather than levels (as seen in section 3.2.2.). The estimation in terms of rates of change is very useful in the context of quarterly chain linking derived from annual chain linked volume data.

The related indicators used in temporal disaggregation are either pure volume indicators or chain linked. Some indicators available at current prices are deflated with an appropriate deflator and chain linked, using 2000 as reference year. This is the case for series on external trade which are primarily available at current prices.

3.3.2. Chain-linking and benchmarking

The general procedure for estimating quarterly values guarantees consistency with annual accounts. Quarterly chain linked volume estimates are consistent with annual accounts as they result from a disaggregating procedure where chain linked annual aggregates are used as reference series.

These chain linked annual series are obtained by projecting a given base year with the volume changes calculated at previous year prices for each elementary item. The drawback of this procedure is the loss of additivity of volume estimates at each aggregation level. This means that volume GDP is not the sum of its components.

This general procedure is the same for aggregates from the expenditure and production approaches, being gross value added for some activities estimated directly. However there are some cases where gross value added is calculated as the difference between an estimated production and intermediate consumption, but the deflator is estimated directly for GVA. There are also some specific cases where volume gross value added is obtained by double deflation of production and intermediate consumption.

3.3.3. Chain-linking and seasonal adjustment

Seasonal adjustment on aggregates from Portuguese Quarterly National Accounts is performed at the level of each indicator used as related indicator. This implies that seasonal adjustment is applied at a first stage, and chain-linking and benchmarking are applied at a second stage.

Indicators used in disaggregation models should always be seasonally adjusted as good practice for short-term economic analysis. However, this is also a limitation of the indirect methodology, as the models are, by construction, annual, meaning that no seasonal component can be estimated. In the framework of temporal disaggregation methods there are absolutely no statistical grounds to justify the transposition of the seasonal pattern of one or several indicators to the aggregate to be estimated.

This problem is stronger in the case of a given aggregate which is estimated with two or more quarterly indicators. Only the seasonal adjustment of the each single indicator can ensure a correct adjustment as specific seasonal movements of each series can be captured. Seasonal adjustment of aggregates estimated by two or more uncorrected indicators is normally inefficient as the specific seasonal movements of each indicator are blended.

The estimated volume series by disaggregation models using seasonally adjusted indicators are also seasonally adjusted as the output of these models follow the same quarterly path as the original series (related indicators).

3.4. Seasonal adjustment and working day correction

Aggregates from Portuguese QNA are generally adjusted for seasonal effects. This is true for GDP aggregates from the expenditure and production approaches, but also for aggregates from the rest of the world account. There are few non-adjusted series, namely receivable and payable capital transfers, which are not adjusted due to a very strong volatility (no seasonal pattern can be correctly identified).

The procedure for seasonal adjustment is performed at the level of the indicators used in temporal disaggregation. This constitutes both a good practice for short-term economic analysis but also a limitation, as the models are, by construction, annual, meaning that no seasonal component can be estimated.

For the time being there are no raw estimates (non-seasonally adjusted) for GDP and components due to the reason previously mentioned. Nonetheless, Statistics Portugal will present

non-adjusted quarterly estimates from National Accounts in 2008, necessary to the compilation of quarterly accounts for the institutional sectors.

Also for the time being there are no working day adjusted estimates. This fact is explained simply by operational reasons. The studies for the implementation of working day corrected estimates will be initiated after the presentation of raw estimates (during 2008, as stated above).

3.4.1. Policy for seasonal adjustment

The procedure for seasonal adjustment relies on the use of X12-Arima with the Demetra interface. Several tests were carried out and X12-Arima proved to be more robust to double seasonality identification.

The method for adjusting GDP is the indirect, meaning that seasonally adjusted GDP is the sum of its adjusted components. Components are estimated indirectly using seasonally adjusted indicators, which are corrected on a quarterly basis, although some indicators are available on a monthly basis. This is mainly due to operational reasons.

Parameters from the seasonal decomposition models are re-estimated every time a new quarter is estimated. Theoretically, this can lead to revisions every quarter and covering the entire series. In practice, these revisions, when occur, cause a minor impact on the series. Models for seasonal decomposition, similarly to the models for disaggregation of annual series, are revised annually as a new year from annual national accounts becomes available.

3.4.2. Policy for working-day correction

Working-day correction is not yet performed on aggregates from Portuguese QNA. This fact is explained simply by operational reasons. The studies for the implementation of working day corrected estimates will be initiated after the presentation of raw estimates (during 2008, as stated above).

This sub-chapter will be updated as soon as these estimates become available.

4. GDP and components: the production approach

In Portugal, Quarterly National Accounts results for GDP from the production approach are usually less reliable than those from the expenditure approach. Nonetheless, results from the production approach are analysed and cross-checked with results from the demand side, which may imply corrections in the later. Discrepancy between approaches is not allocated and represents the difference between GDP and Gross Value Added plus taxes less subsidies on products.

4.1. Gross value added, including industry breakdowns (excluding FISIM)

Gross Value Added (GVA) is normally derived directly using some quarterly indicator for each relevant branch (or aggregate of branches) of activity. Although GVA should preferably be obtained by difference from output and intermediate consumption, the temporal disaggregation methods used in the compilation enables the use of this direct approach. The results should be similar to obtaining output with some quarterly indicator and afterwards the intermediate consumption as some quota of output.

In some specific cases, output and intermediate consumption are estimated separately and GVA is obtained as the difference.

4.1.1 Gross Value Added of Agriculture, Forestry, and Fishing Activities (NACE A+B)

The statistical sources for estimation of annual output and intermediate consumption at current prices and in volume terms are derived from Agriculture Income Index and Economic Accounts for Agriculture, Forestry and Fishing.

In absence of this information, annual data for output and price index are extrapolated using infra-annual indicators. Since there are no indicators available for intermediate consumption of agriculture and fishing activities, their change rates are based on the assumption of similarity with output change rates.

The framework when using the infra-annual indicators is the following:

- crops and animal production disseminated in the Agriculture Forecasts and in the Monthly Bulletin of Agriculture, Fisheries and Agricultural Processing used as a volume indicator of agriculture output;

- food consumer price index used as deflator of output and intermediate consumption of the agriculture activity;
- Industrial Production Index (IPI) and Production's Price Index (PPI) of NACE's 20 and 21, weighted by the implicit structure in the latest annual accounts are used as a volume and deflator indicators of the forestry output;
- quarterly fishing accounts provides information for output and intermediate consumption of the fishing activity at current prices and in volume terms;

The annual constraint of total gross value added of agriculture, forestry, and fishing activities are used in the econometric model without related indicator in order to estimate quarterly data.

4.1.2 Gross Value Added of Industry Activities (NACE C)

Quarterly chain linked volume estimates for valued added of industry activities are obtained using a chain linked composite industrial production index, re-weighted according to the relative weights of disaggregated NACE in the last available year from definitive annual accounts. The re-weighting procedure allows for a more consistent sub-activity structure to that from annual accounts and also more updated. This indicator is used as related indicator in a disaggregation model where chain linked annual data from annual accounts plays as reference variable. Information on production and intermediate consumption for industry activities from the quarterly survey to non-financial enterprises and deflated turnover index for industry activities are used as supporting information and may lead to changes in the main estimates from the disaggregation model.

Current prices estimates are obtained using industry turnover index, also re-weighted according to the relative weights of disaggregated NACE in the last available year from definitive annual accounts. As for volume estimates, this indicator is used as related indicator in a disaggregation model where annual data from annual accounts is the reference variable.

There is also an estimate for deflator obtained with temporal disaggregation techniques, where annual accounts' deflator for GVA of industry activities is broken down into quarters using industrial production price index, re-weighted according to the relative weights of disaggregated NACE in the last available year from definitive annual accounts. This estimate for deflator is compared to the deflator obtained from volume and current price estimates, which may lead to corrections both in volume or current prices estimates.

4.1.3 Gross Value Added of Electricity, Gas and Water Supply Activities (NACE E)

The annual estimates of production and intermediate consumption for these activities are based on the following indicators and sources:

- reports and accounts of electricity and gas companies;
- total electricity consumption (Gwh) provided by EDP – Energias de Portugal;
- breakdown of electricity generation by fuel type provided by REN;
- imports of energy products (volume and prices);
- fuel consumption on electricity and gas production and distribution provided by Directorate-General for Energy and Geology (Minister for Economy and Innovation);
- electricity and gas consumer price index;

Quarterly estimates of gross value added of electricity, gas and water supply activities (volume and deflator) are obtained using the econometric method of temporal disaggregation with electricity consumption and corresponding consumer price index as related indicators.

4.1.4 Construction activities (NACE F)

Quarterly chain linked volume estimates for valued added of construction activities are obtained using sales of cement and steel for construction (considering both national market sales and imports) as main indicators on a disaggregation model. The cement time series is obtained by adding imports to domestic sales of cement produced by national cement companies. These imports are corrected by subtracting the imports of the national cement companies, in order to avoid duplication of data. Due to its strong volatility, the sales of steel for construction time series are considered using a 2 quarters moving average. Building permits, placing of contracts for public works, short-term qualitative survey on construction and public works and production index of construction and public works are used as supporting information.

Quarterly deflator is estimated using manpower and construction materials cost indices to disaggregate annual deflator and current prices estimates are implicit. These indicators are used under the assumption of maintenance of the relation between production and value added.

4.1.5 Wholesale and retail trade, repair of motor vehicles, motorcycles and personal and household goods (NACE G)

Quarterly chain linked gross value added of trade activities is estimated using a chain linked composite indicator, weighted by the relative weights from the last year available for annual

accounts, of the following indicators: retail trade turnover index, on a real basis; volume index of car sales; and volume index of petrol and diesel sales.

Services turnover index (on the activities of trade and repair of motor vehicles and wholesale trade), imports of consumer goods and short-term qualitative surveys on trade activities are used as supporting information.

Deflator is estimated using composite CPI of goods as related indicator for disaggregation of the annual deflator. Current prices estimates are derived from volume and deflator estimates. These indicators are used under the assumption of maintenance of the relation between production and value added.

4.1.6 Hotels and restaurants (NACE H)

Quarterly chain linked gross value added of restaurants and hotels activities is estimated using overnight stays in hotels as main indicator. Services turnover index on hotels and restaurants activities is used as supporting information.

Deflator is estimated using hotels and restaurants CPI as related indicator for disaggregation of the annual deflator. Current prices estimates are derived from volume and deflator estimates. These indicators are used under the assumption of maintenance of the relation between production and value added.

4.1.7 Transport, storage and communication (NACE I)

Quarterly chain linked gross value added of transport activities are estimated using the sum of total imports and exports in volume as main indicator. The use of this indicator is explained by the relative importance of transport services by road, compared to the other types of transport services. Deflated services turnover index on transport activities, information from the quarterly survey to non-financial enterprises (data on production and intermediate consumption) and transport statistics (passengers and goods) are used as supporting information.

Deflator is estimated using transport services CPI as related indicator for disaggregation of the annual deflator. Current prices estimates are derived from volume and deflator estimates.

Quarterly gross value added of communication activities at current prices is estimated using direct information from the quarterly survey to non-financial enterprises. This data concerns both

production and intermediate consumption for the main companies of this branch of activity. Deflated services turnover index on communication activities is used as supporting information.

Deflator is estimated using communication services CPI as related indicator for disaggregating the annual chain linked deflator. Volume estimates are derived implicitly from current prices and deflator estimates.

4.1.8 Financial Intermediation (NACE J)

The value added for NACE 65 and 66 is derived from the difference between production and intermediate consumption. Volume estimate for value added of this NACE is obtained by double deflation, e.g., separate deflation of production and intermediate consumption.

To obtain both production and intermediate consumption, at current prices, it is used quarterly information compiled by the Portuguese Central Bank concerning operating losses and gains of financial institutions (monetary and non-monetary). Note that FISIM, whose estimation process is explained specifically in the section 4.2., is incorporated in production.

After determining production at current prices, it is then deflated using the CPI for financial services. To deflate intermediate consumption we use a composite deflator that includes the most relevant CPI's for the main consumption items for this industry: postal services, communication services, electricity, other services and miscellaneous printed matter and stationary. These items are identified according to the detail provided by the last known year of the Annual National Accounts.

Finally, the usual econometric methods of temporal disaggregation already described are used for distribution and extrapolation of quarterly values.

4.1.9 Real estate, renting and business activities (NACE K)

4.1.9.1 Real estate and renting activities

Gross value added for real estate and renting activities is mainly calculated in annual terms. At current prices, the calculation follows the same framework as for annual definitive accounts, where the global value of dwelling rents is obtained by updating a housing stock split by actual, imputed and seasonal and the average value of rents, also respecting the same breakdown. The information for the base year is obtained from the last available Census. For the most recent years, the housing stock is updated with the volume index of construction of residential buildings

and the average rent is updated with the legal updating coefficient of dwelling rents. Services turnover index on real state and renting activities and information about rents in commercial areas included in tax deductions at source (personal and corporate income tax) are used as supporting information.

The chain linked deflator is estimated using the legal updating coefficient of dwelling rents. Annual chain linked volume estimates are derived from current prices and deflator estimates.

These annual estimates, both chain linked volume and current prices series, are disaggregated to obtain the corresponding quarterly estimates using econometric methods without related indicator.

4.1.9.2 Business activities

Quarterly chain linked gross value added of business activities is estimated using employment for these activities from Labour Force Survey as main indicator on a disaggregation model where chain linked annual GVA for business activities from annual accounts constitutes the reference variable. Deflated services turnover index on business activities and information from the quarterly survey to non-financial enterprises (data on production and intermediate consumption) for these activities are used as supporting information.

Deflator is estimated using total CPI as related indicator for disaggregating the annual chain linked deflator. Current prices estimates are derived from volume and deflator estimates. These indicators are used under the assumption of maintenance of the relation between production and value added.

4.1.10 Public administration and defence; compulsory social defence; education, health and social work (NACE L-N)

The general government sector represents more than 70% of total production of public administration and defence, compulsory social defence, education, health and social work and almost 80% of GVA. Therefore, GVA for these branches of activity is mainly determined by general government. This fact, associated to a low coverage of base data on a quarterly basis for education, health and social work services rendered by private enterprises, lead to the estimation of GVA of this aggregate using data from general government final consumption expenditures.

The estimation relies mainly on annual data. The series for the GVA of this aggregate from annual accounts is used as reference in a forecasting model, where data for general government final consumptions expenditures is used as indicator. This procedure in annual terms is applied both for chain linked volume and current prices series. Deflator results implicit from volume and current price series.

Quarterly values, both chain linked volume and current prices are obtained by applying the disaggregation methods with no related indicator. The use of this mathematical procedure is explained by the unavailability of good quarterly indicators which could determine the quarterly behaviour of this aggregate. However, note that, similarly to general government final consumption expenditures, this mathematical procedure will be replaced by direct quarterly compilation with the full integration of quarterly accounts for the general government in QNA estimation process.

4.1.11 Other community, social and personal service activities; private households (NACE O-P)

Quarterly chain linked for gross value added of other community, social and personal service activities and private households is estimated using employment for these activities from Labour Force Survey. This data is used as related indicator on a disaggregation model where chain linked annual GVA for these activities from annual accounts constitutes the reference variable. Information from the quarterly survey to non-financial enterprises (data on production and intermediate consumption) for these activities is used as supporting information.

Deflator is estimated using services CPI as related indicator for disaggregating the annual chain linked deflator. Current prices estimates are derived from volume and deflator estimates. These indicators are used under the assumption of maintenance of the relation between production and value added.

4.2. Financial Intermediation Services Indirectly Measured (FISIM)

FISIM quarterly estimates are calculated based on quarterly data from the Portuguese Central Bank on savings, deposits, interests, expenses and revenue comprising internal data but also information on imports and exports. Applying internal and external interest rates accordingly to the residency of the savings deposits and credit holders and considering the available detail by sector (Households, Enterprises, Public Sector, etc) and by use of the financial stocks (final consumption or intermediate consumption), it is possible to build the necessary data base for the

calculation of FISIM. Final estimates of FISIM by sector for the demand side, global production and global intermediate consumption are obtained using the temporal disaggregation technique described earlier, taking into consideration the information from annual definitive accounts as reference series.

Regarding the allocation of FISIM on the production side and since it is not possible to compute the intermediate consumption of FISIM by industry, the global value determined is distributed by each industry according to its relative weight of value added. The only direct estimation of intermediate consumption of FISIM is the case of Real Estate industry where, due to a more than proportional weight of FISIM compared to value added caused by imputed rents, it is necessary to compute a specific estimation. The estimation process uses household's FISIM associated to dwellings as an indicator. Before applying the distribution by industry, the estimated value for real estate activities is subtracted to total intermediate consumption on FISIM. This distribution is done using Rossi's multivariate method with the Ecotrim software.

After a thorough process of tests on the recommended methodology for FISIM deflation, the obtained results were very unstable, what must be related to the extreme volatility of the base data. It was then determined that changes on volume FISIM depends mainly on the change of the respective stock and that the deflator for each operation generating FISIM is basically affected by inflation and by margin variation. Econometric models were developed for savings and credits for each economy sector as for exports and imports. Each model uses annual chain linked FISIM as anchor and the respective quarterly stock as indicator.

The models proved to provide a fairly good estimation to replicate the annual national accounts series and to predict subsequent quarters for savings, deposits as well as for exports and imports.

The deflator for each of these series comes implicitly from the ratio between the values in current prices and those in real terms.

4.3. Taxes less subsidies on products (D21-D31)

Annual data of D21 and D31 components are compiled by General Government Statistics Unit.

The quarterly estimates of D21 paid by residents to General Government at nominal terms use monthly data on collection of indirect taxes (Ministry of Finance) as main indicator, on a cash basis in what concerns VAT. The process of obtaining quarterly estimates of D21 paid by residents to European Union will be explained in more detail ahead in section 8.1.4.

The quarterly estimates for D21 deflator are the result of a composite price index that is obtained considering the latest annual structure for taxes and the following indicators:

- total CPI is used as an indicator for VAT price index;
- purchase of vehicles CPI is used as an indicator for tax on motor vehicles price index;
- tobacco CPI is used as an indicator for tax on tobacco price index;
- and an implicit price index for the tax on petroleum products derived from the sales of petrol, diesel and fuel and the amount of collected receipts of tax on petroleum products, weighted by the collected receipts structure.

In each QNA exercise, the estimate of the previous quarter can be revised by incorporating D2 and D211 data (taxes of value added type - VAT) of General Government Quarterly Accounts.

When the annual information of D21 and D31 is not yet available, data on D2 (taxes on production and imports, payables) and D3 (subsidies on production and imports, receivables) from Table 02 of the Reporting of Government Deficits and Debt Levels is considered.

The quarterly estimates of D31 paid by General Government are obtained from the general government quarterly accounts data set.

The quarterly estimates of D31 received from the rest of the world will be explained in more detail ahead in section 8.1.3.

5. GDP components: the expenditure approach

5.1. Household final consumption

Final consumption expenditures of resident households (at current prices and in volume terms) is equal to final consumption expenditures in the economic territory plus consumption expenditures outside the economic territory of resident families minus consumption expenditures in the economic territory of non resident households.

Both final consumption expenditures of households in the economic territory and of resident households are estimated by three main categories: food and beverage goods, durable goods, and non-durable goods (except for food and beverage) plus services.

5.1.1 Final consumption expenditures of households in food and beverage goods, in the economic territory

Final consumption expenditures in the economic territory for this type of goods are estimated indirectly using the retail trade turnover index for food and beverage goods as quarterly indicator. The econometric model for temporal disaggregation, as described earlier, uses the annual chain linked final consumption expenditures on food and beverage as reference series for estimating quarterly values at real terms. The retail trade turnover index is available on a real basis, which is obtained by deflating turnover indices with the appropriate CPI's. Data on imports and domestic production of food and beverage goods are used as auxiliary information and may also determine some effect on changes in inventories.

Quarterly deflator for this aggregate is also obtained using temporal disaggregation techniques, where annual deflator series is disaggregated using the CPI for food and beverage as quarterly indicator.

Final consumption expenditures of households in food and beverage goods at current prices are derived from the quarterly chain linked volume series plus the quarterly deflator.

5.1.2 Final consumption expenditures of households in durable goods, in the economic territory

Final consumption expenditures in the economic territory for this type of goods are estimated in two main groups: motor vehicles and other durable goods.

Quarterly chain linked volume final consumption expenditures of households in motor vehicles are also estimated with disaggregation models, where the annual chain linked series is used as

reference. The quarterly indicator is calculated using the sales of passenger motor vehicles (both two-wheel and four-wheel drive) weighted by the average price of each main segment. These segments are defined by the motor vehicle retail trade association and allow separating city vehicles, small, medium and large family vehicles, and luxury vehicles. This segmentation is able to capture main quality effects due to different composition of sales. Imported second hand vehicles are also considered and summed up. Note that sales to rent-a-car enterprises and taxis are previously subtracted from passenger vehicles sales. Data on imports and domestic production of motor vehicles (although domestic production for domestic demand is rather small) are used as supporting information and may also determine some effect on changes in inventories.

Quarterly deflator for this aggregate is also obtained using temporal disaggregation techniques, where annual deflator series is disaggregated using the purchase of vehicles CPI.

Quarterly consumption expenditures in vehicles at current prices are derived from the volume and deflator series.

For other durable goods, the econometric model for temporal disaggregation uses the annual chain linked final consumption expenditures in other durable goods as reference series. The main quarterly indicator is the retail trade turnover index for other durable goods, available on a real basis. Data on imports and domestic production of other durable goods are used as auxiliary information and may also determine some effect on changes in inventories.

Annual deflator series is disaggregated using the CPI for other durable goods as quarterly indicator to obtain the quarterly deflator for this aggregate.

Final consumption expenditures of households in other durable goods at current prices are derived from the quarterly chain linked volume series plus the quarterly deflator.

5.1.3 Final consumption expenditures of households in non-durable goods (except food and beverage) and services, in the economic territory

Final consumption expenditures in the economic territory for this type of goods and services are estimated indirectly using a composite indicator described later on and total employment as quarterly indicators. The econometric model for temporal disaggregation uses annual chain

linked final consumption expenditures in non durable goods and services as reference series for estimating quarterly values at real terms.

The composite indicator is a chain linked index, weighted by the relative weights from the last year available for annual accounts, of the following indicators:

- Retail trade turnover index, on a real basis, for non-durable goods;
- Services turnover index for some NACE's, deflated with the appropriate CPI's;
- Total expenditures on rents (real and imputed);
- Sales of fuels;
- Electricity consumption.

Total employment indicator is included for capturing movements associated to consumption of other services for which no quarterly relevant information is available. Unfortunately, reliable infra-annual information on services is rather scarce, although the high relative importance of this sector.

There are also other indicators used to cross-check the main estimate, namely: imports and domestic production of non-durable goods (which also may lead to some effect on changes in inventories), ATM withdrawals and information about services rendered from the quarterly survey to non-financial enterprises.

Quarterly deflator for this aggregate is also obtained using temporal disaggregation techniques, where annual deflator series is disaggregated using an aggregated CPI for non-durable goods and services as quarterly indicator.

Final consumption expenditures of households at current prices are derived from the quarterly chain linked volume series plus the quarterly deflator.

5.1.4 Final consumption expenditures of non resident households in the economic territory

At current prices, the source for this aggregate is the item travel (exports) from the balance of payments. Since only a part of this item is considered as final consumption expenditures in national accounts, the relative weight of this aggregate for the last available year from annual accounts disaggregated by food and beverage, durable and current goods and services is applied to the travel item of balance of payments.

Quarterly estimates of each deflator are obtained using a composite CPI weighted by the latest annual account breakdown.

5.1.5 Final consumption expenditures of resident households outside the economic territory

At current prices, the source for this aggregate is the item travel (imports) from the balance of payments. Since only a part of this item is considered as final consumption expenditures in national accounts, the relative weight of this aggregate for the last available year from annual accounts disaggregated by food and beverage, durable and current goods and services is applied to the travel item of balance of payments.

Quarterly estimates of each deflator are obtained using as indicators some composite CPI's for the European Union weighted by the effective exchange rate (provided by the Portuguese Central Bank).

5.2. Government final consumption

Currently, Quarterly National Accounts do not use direct quarterly information on Government Final Consumption Expenditures. This information has not been reliable enough to be directly incorporated. However, during 2008, quarterly non-financial accounts for general government will be directly incorporated into QNA, which will determine an updating of this document in this specific case. Hereafter is described the current method.

The usual procedure followed is based on an annual estimate at current and previous year prices, which afterwards are transformed into chain linked volume type (annual). This estimate is then disaggregated using the mathematical approach of minimisation of second differences already described. The final result is a fairly trimmed series which is concurrent with the nature and the expected variation of this aggregate that should be computed in accrual basis.

The estimate is based on the annual general government budgets, which may be revised in some cases and, in recent years, the report for the excessive deficits procedure delivered twice a year to the European Commission. These data sets contain details for governmental consumption aggregates in annual terms.

The current prices estimate comes directly from the source of information and the deflation is made using the relevant data from Consumer Price Index or from the general government budget (like the public servants annual wage increase rate) that are treated as the best proxy for the adequate deflator for each aggregate.

Additional assumptions are usually derived from the available information, namely historical data on the budget rate of execution or on the announced structural reforms on the civil servants human resources structure and careers that complement the value/price distribution that is made.

5.3. Non Profit Institutions Serving Households (NPISH) consumption

Due to lack of direct information for this aggregate (besides the annual data from Annual National Accounts that constitutes the reference variable), and due to the fairly relevant correlation between this aggregate and general government final consumption, the current prices annual change rate of the latter is imputed to the last known year from annual accounts for NPISH final consumption expenditures. In some cases it is used direct information for the sector, when available from annual sector accounts unit.

Chain linked volume estimates are obtained by deflating current prices figures using annualised CPI for services.

For the quarterly distribution the procedure is the same used for general government final consumption: disaggregate the annual figures in quarters and predict the required additional quarters by using the mathematical approach of minimisation of second differences already described.

5.4. Gross capital formation

5.4.1. Gross fixed capital formation

5.4.1.1 Gross fixed capital formation in products of agriculture, forestry, fisheries and aquaculture

Annual estimates (current prices and volume) are obtained from the unit responsible for agriculture and fishing economic accounts.

For the current year, for which no direct annual estimate is available, the only indicator usable is the imports of living animals for GFCF in animals. Therefore, when the estimate for current year is not yet available it is used this indicator for GFCF in animals and it is assumed a null change rate for the remaining components.

Finally, quarterly estimates are calculated using the econometric method without related indicator.

5.4.1.2 Gross fixed capital formation in metal products and machinery

Quarterly chain linked volume GFCF in metal products and machinery is estimated with disaggregation models, where the annual chain linked series is used as reference. Deflated imports of machinery and equipment and the composite industry production index of machinery and equipment (calculated using the annual accounts weights structure) are used as main quarterly indicators. Loans to non-financial enterprises, short-term qualitative survey on wholesale trade of machinery and equipment and short-term survey on enterprises' investment are used as supporting information for this aggregate.

Quarterly deflator is also obtained with disaggregation models where annual deflator series is disaggregated using imports price index of machinery and equipment. Finally, current prices estimates are implicit.

5.4.1.3 Gross fixed capital formation in transport equipment

Quarterly chain linked volume GFCF in transport equipment is estimated using temporal disaggregation techniques, where the annual chain linked series is used as reference. Two main quarterly indicators are used as related indicators: a composite indicator for investment in auto vehicles, weighted by the last annual account's structure, that integrates a small percentage of the volume indicator for passenger vehicles used in the estimation of durable goods consumption, the sales of commercial vehicles (under 3.5 tons), the sales of commercial vehicles (above 3.5 tons) and the rent-a-car sales; and deflated imports of other transport equipment (excluding motor vehicles).

Quarterly deflator is also obtained with disaggregation models, where annual deflator series is disaggregated using imports price index of transport equipment. GFCF in transport equipment at current prices is derived from the volume and deflator series.

5.4.1.4 Gross fixed capital formation in construction products

Quarterly chain linked volume GFCF in Construction is estimated with temporal disaggregation techniques and using the same production indicators used in the estimation of valued added of construction activities, namely sales of cement and steel for construction. Building permits, placing of contracts for public works and production index of construction and public works are used as supporting information.

Quarterly deflator is also obtained with disaggregation models where annual deflator series is disaggregated using manpower and construction materials cost indices. Finally, current prices estimates are implicit.

5.4.1.5 Gross fixed capital formation in other products

An important share of this aggregate is directly related to housing and comprises housing legal registry and taxes on the transmission of houses' property. This component is estimated at current prices with temporal disaggregation techniques using GFCF in Construction at current prices as related indicator. The other component, also at current prices, is estimated on an annual basis from the balance of payments' items "copyright and patent royalties"; "computer services"; and "personal, cultural and recreational services". This annual estimate is broken down by quarters using econometric methods without related indicator. The final quarterly estimate for gross fixed capital formation in other products is obtained by summing up those two components.

Quarterly deflator is obtained using temporal disaggregation techniques where chain linked annual deflator series is disaggregated using services CPI. Finally, chain linked volume estimates for this GFCF in other products are implicit.

5.4.2. *Changes in inventories and acquisitions less disposable of valuables*

Changes in inventories are the most difficult aggregate to estimate in quarterly frequency. Its direct estimation is not feasible in quarterly terms given the usual low coverage of base data. Indirect estimation using disaggregation methods with related indicators is difficult to put in practice given the particularity of the series being a first difference of other series (the inventories).

Annual chain linked volume and current prices changes in inventories are broken down to quarters using disaggregation methods without related indicators, for those years where no major quarterly movements are observed. When major quarterly movements are relevant, changes in inventories are usually estimated in terms of contributions to GDP growth, both in volume and current prices. Those contributions to GDP growth are based on data from quarterly survey to non-financial enterprises and on the analysis of discrepancies between imports plus domestic production and expenditures by major groups of products (namely petroleum and fuels).

Acquisitions less disposable of valuables is estimated in annual terms. The estimate at current prices is obtained directly from imports of non monetary gold and jewellery and similar goods. The chain linked deflator is calculated using gold price statistics and total CPI, respectively. Chain linked annual estimate for this aggregate is obtained by deflation of the current price estimate.

After obtaining the annual estimates quarterly estimates are calculated using econometric methods without related indicator.

5.5. Imports and exports

5.5.1 Imports and exports of goods

At current prices, the source for estimating imports and exports of goods is external trade statistics from Statistics Portugal. These external trade statistics, for the most recent months, are estimated on the basis of a common sample used to calculate change rates that are applied to the last definitive year available. With this procedure, applied at a level of detail of more than 100 aggregates of products, it is possible to estimate values associated to non-responses from enterprises. Total imports and exports series are then used as related indicators in a disaggregation model where the reference data are total import and exports of goods from annual accounts.

Quarterly deflators are also estimated in an indirect way, distributing the corresponding annual deflator from annual accounts using related indicators. These related indicators consist on quarterly deflators for external trade on goods, calculated by the external trade statistics unit. For the first estimate of a given quarter, these quarterly deflators are calculated with information on the first two months and in the first revision of that quarter, deflators are corrected by incorporating the information on the complete quarter.

Chain linked volume estimates for imports and exports of goods are finally obtained by distributing (and extrapolating) chain linked volume annual imports and exports of goods (from annual accounts) using as related indicators the value and deflator estimates obtained before. The resulting quarterly values are chain linked and totally consistent with annual accounts.

5.5.2 Imports and exports of services

At current prices, the source is the imports and exports of services from the balance of payments. Some items of balance of payments are not consistent with national accounts and have to be compiled according to the annual accounts methodology, namely, government expenditures, insurance, travel, and merchanting and other trade-related services.

The quarterly indicators for import and export deflators consist of several CPI's related to each one of the services' components, weighted according to the last annual accounts' structure of services external trade. This data are used as related indicators in the econometric estimation of quarterly deflators. Chain linked volume imports and exports of services are derived from current prices and deflator estimates.

5.5.3 CIF/FOB adjustment

Data at current prices is provided by balance of payments statistics of the Portuguese Central Bank. The quarterly indicators for deflators result from the aggregation of related CPI items weighted by the balance of payments' structure of freights and insurance of commodities. This data are used as related indicators in the econometric estimation of volume CIF/FOB adjustment.

6. GDP components: the income approach

For the time being, it is not yet available GDP from the income approach due to the lack of estimates on compensation of employees. The availability of this set of information is scheduled for the first half of 2008.

This chapter will be updated when these estimates become available on a regular basis.

6.1. Compensation of employees, including components (wages and salaries)

Not available for the moment.

6.2. Taxes less subsidies on production

Not available for the moment.

6.3. Gross operating surplus and mixed income

Not available for the moment.

7. Population and employment

For the time being, it is not yet available estimates for population and employed persons on a quarterly basis in the set of information provided by Quarterly National Accounts. The availability of this set of information is scheduled for the first half of 2008.

This chapter will be updated when these estimates become available on a regular basis.

7.1. Population

Not available for the moment.

7.2. Employment: persons

Not available for the moment.

7.3. Employment: hours worked

Not available for the moment.

Portuguese National Accounts have derogation on the transmission of data on employment in terms of hours worked until 2008.

8. From GDP to net lending/borrowing

QNA publishes quarterly non-financial accounts for the rest of the world (ROW), which are compatible with the latest annual accounts. The main data sources for the compilation of the rest of the world accounts are:

- Balance of payments statistics, compiled by the Portuguese Central Bank;
- Financial flows with European Union, provided by Directorate General for the Treasury and Finance (Ministry of Finance and Public Administration);
- General State Accounts, provided by Directorate General for Budget (Ministry of Finance and Public Administration).

The transition from GDP to net lending/borrowing of the total economy is made using items from the rest of the world accounts, according to this sequence:

- Gross national income at market prices equals GDP at market prices plus primary income receivable from the rest of the world minus primary income payable to the rest of the world;
- Gross national disposable income equals gross national income plus current transfers receivable from the rest of the world minus current transfers payable to the rest of the world;
- Gross saving equals gross national disposable income minus final consumption expenditure;
- Net lending (if positive) or borrowing (if negative) equals gross saving plus capital transfers receivable from the rest of the world minus capital transfers payable to the rest of the world minus gross capital formation minus acquisitions less disposals of non-produced, non-financial assets.

8.1. Primary income from/to the ROW (D.1 to D.4) and gross national income

Primary incomes receivable from the rest of the world include:

- Compensation of employees (D.1) receivable from the rest of the world;
- Subsidies (D.3) receivable from the rest of the world;
- Property income (D.4) receivable from the rest of the world.

Primary incomes payable to the rest of the world include:

- Compensation of employees (D.1) payable to the rest of the world;
- Taxes on production and imports (D.2) payable to the rest of the world;
- Property income (D.4) payable to the rest of the world.

8.1.1 Compensation of employees (D.1) from/to the ROW

Quarterly data on compensation of employees from and to the rest of the world are obtained directly from the balance of payments statistics.

8.1.2 Property income (D.4) from/to the ROW

The balance of payments is the data source for the following components of property income:

- Interest (D.41) from and to the rest of the world;
- Distributed income of corporations (D.42) from and to the rest of the world;
- Reinvested earnings on direct foreign investment (D.43) from and to the rest of the world.

The correspondence between the balance of payments items and the above mentioned components of property income is:

Investment income – Balance of Payments	ESA95
Investment income	
Direct investment income	
Income on shares and other equity	
Dividends and profits distributed	D42
Reinvested earnings	D43
Income on debt	D41
Portfolio investment income	
Income on shares and other equity	D42
Income on debt	
Long-term debt securities	D41
Short-term debt securities	D41
Other investment income	
Income on long- and short-term loans	D41
Income on deposits	D41
Other income	D41

Property income attributed to insurance policy holders (D.44) is not recorded in the Portuguese balance of payments. QNA estimate this item using the same methodology as annual accounts.

Rents (D.45) from/to rest of the world are considered to be an irrelevant amount and consequently there is no data recorded.

8.1.3 Subsidies (D.3) from the ROW

The subsidies receivable from the rest of the world are current payments made by the European Union and comprise only the European Agricultural Guidance and Guarantee Fund (EAGGF). These subsidies are classified as subsidies on products (D.319), other subsidies on production (D.39), miscellaneous current transfers (D.74), investment grants (D.92) and other capital transfers (D.99).

The proportion of this component derived from the latest annual accounts data is applied to the EAGGF total data disseminated by Directorate General of the Treasury (DGT) whenever the annual accounts' data is not available. Quarterly estimates are simultaneously compatible with the infra-annual evolution of DGT data and the defined annual constraint.

8.1.4 Taxes on production and imports (D.2) to the ROW

Taxes on production and imports paid to the rest of the world are disaggregated as follows:

- Value added type taxes (D.2111);
- Imports duties (D.2121);
- Agriculture levy (D.2122);
- Sugar levy (D.2122).

Annual data is provided by General Government Accounts. When annual data is not available, the growth rates of the data compiled by DGT are applied to the latest annual accounts data. Quarterly estimates are simultaneously compatible with the infra-annual evolution of DGT data and the defined annual constraint.

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

8.2.1 Consumption of fixed capital (K.1)

Quarterly estimates of consumption of fixed capital are obtained using the econometric method without related indicator (Boot, Feibes e Lisman). The annuals constraints are provided by annual accounts and for the years which annual accounts are not yet available, Quarterly

Accounts unit estimates the last years using the annual accounts' methodology with some simplifications.

The consumption of fixed capital is compiled using the Perpetual Inventory Method, as recommended by ESA95 whenever direct information on the stock of fixed assets is not available. Each annual estimate is obtained by the following process:

- a) Determining the expected service life for each type of fixed asset;
- b) Obtaining the GFCF series for each type of fixed asset;
- c) Capital stock compilation;
- d) Consumption of fixed capital compilation.

The expected service life for each type of fixed asset, established by annual accounts, is the following:

Transport equipment

Useful life period (years)	S11		S12		S13		S14		S15	
	min	max	min	max	min	max	min	max	min	max
Transport equipment	-	-	4	8	4	8	-	-	4	8
Branch 05	7	14	-	-	-	-	7	14	-	-
Branch 60	9	25	-	-	-	-	9	25	-	-
Branch 61	13	25	-	-	-	-	-	-	-	-
Branch 62	10	20	-	-	-	-	-	-	-	-
Branch 71	2	4	-	-	-	-	2	4	-	-
Other branches	4	8	-	-	-	-	4	8	-	-

Plantations

Useful life period (years)	S11		S12		S13		S14		S15	
	min	max	min	max	min	max	min	max	min	max
Agricultural plantations	-	-	-	-	-	15	-	-	-	-
Prunoideas and Pomaceous	-	20	-	-	-	-	-	20	-	-
Kiwi and semi-tropical fruit	-	15	-	-	-	-	-	15	-	-
Citrines	-	30	-	-	-	-	-	30	-	-
Vineyard and olive-tree	-	45	-	-	-	-	-	45	-	-
Hop	-	-	-	-	-	-	-	2	-	-
Forestry plantations	-	15	-	-	-	15	-	15	-	-

Metal products and machinery

Useful life period (years)	S11		S12		S13		S14		S15	
	min	max	min	max	min	max	min	max	min	max
Metal products and machinery	-	-	5	10	5	10	-	-	5	10
Farm tractors	13	25	-	-	-	-	13	25	-	-
Computers and office machinery	3	5	-	-	-	-	3	5	-	-
Other metal products and machinery	5	10	-	-	-	-	5	10	-	-

Construction

Useful life period (years)	S11		S12		S13		S14		S15	
	min	max	min	max	min	max	min	max	min	max
Construction										
Housing Buildings	-	50	-	50	-	50	-	50	-	-
Other constructions	-	60	-	40	-	60	-	45	-	-
Roads	-	-	-	-	-	60	-	-	-	-

Other products

Useful life period (years)	S11		S12		S13		S14		S15	
	min	max	min	max	min	max	min	max	min	max
Other products	-	-	3	6	3	6	-	-	3	6
Computer software	3	5	-	-	-	-	3	5	-	-
Repair of motor vehicles	4	8	-	-	-	-	4	8	-	-
Real estate margins	-	50	-	-	-	-	-	50	-	-
Costs of ownership transfer										
Housing	-	50	-	-	-	-	-	50	-	-
Buildings			-	-	-	-	-	45	-	-
Other constructions	-	-	-	-	-	-			-	-
Other products	3	6	-	-	-	-	3	6	-	-

Whenever annual accounts constraints of GFCF are not yet available, annualised quarterly accounts estimates are used to extrapolate the latest data of GFCF in nominal terms and price indices. Since the disaggregation level of GFCF quarterly accounts estimates is less than that from annual accounts, it is used the latest annual accounts breakdown.

Capital stock compilation is consistent with the survival functions used by annual accounts, namely:

Asset	Survival functions
Plantations	Simultaneous exits
Metal products and machinery	Delayed linear
Transport equipment	Delayed linear
Construction	Simultaneous exits
Other products	
Computer software	Delayed linear
Repair of motor vehicles	Delayed linear
Real estate margins	Simultaneous exits
Costs of ownership transfer	Simultaneous exits
Other products	Delayed linear

8.2.2 Acquisitions less disposals of non-financial non produced assets (K.2)

Acquisitions and disposals of non-financial non-produced assets are provided by balance of payments.

8.3. Current transfers from/to the ROW (D.5 to D.7) and net national disposable income (B.6n)

8.3.1 Current taxes on income, wealth, etc. (D.5)

Current taxes on income are provided by balance of payments.

8.3.2 Social contributions (D.61)

Social contributions are provided by balance of payments.

8.3.3 Social benefits other than social transfers in kind (D.62)

Social benefits other than social transfers in kind are a component of private current transfers items from balance of payments.

8.3.4 Net non-life insurance premiums (D.71)

Net non-life insurance premiums are derived from balance of payments data but not directly, instead it is used the same methodology as annual accounts.

8.3.5 Non-life insurance claims (D.72)

Non-life insurance claims are provided by balance of payments.

8.3.6 Current international cooperation (D.74)

Annual data of current international cooperation are compiled by General Government Statistics Unit, using the General State Account as a main source of information.

When annual data is not available, the growth rates of the data compiled by DGT and Portuguese Central Bank are applied to the latest data from annual accounts. Quarterly estimates are simultaneously compatible with the infra-annual evolution of DGT and balance of payments data and the defined annual constraint.

8.3.7 *Miscellaneous current transfers (D.75)*

The private component of D.75 is derived from balance of payments.

Annual data for public current transfers are compiled by General Government Statistics Unit. When annual data is not available, the growth rates of the data compiled by DGT and Portuguese Central Bank are applied to the latest data from annual accounts. Quarterly estimates are simultaneously compatible with the infra-annual evolution of DGT and balance of payments data and the defined annual constraint.

8.4. Adjustment for the change in net equity (D.8) and net saving (B.8)

Change in net equity is not recorded in annual accounts, and subsequently not recorded in QNA. Net saving is equal to gross saving minus consumption of fixed capital.

8.5. Capital transfers (D.9) and net lending/borrowing (B.9)

8.5.1 *Investment grants (D.92)*

Annual data of investment grants are compiled by General Government Statistics Unit. Whenever the annual accounts' investment grants data is not available it is used the following framework:

- Since investment grants payable to the rest of the world are a small amount, it is extrapolated using the annual growth rate of other capital transfers (D.99). Quarterly estimates are compatible with the defined annual constraint and the infra-annual evolution of D.99;
- Investment grants receivable from rest of the world are extrapolated from DGT data in what concerns to the structural funds (European Regional Development Fund (ERDF) and EAGGF - Guidance and Guarantee sections) and to Social Cohesion Fund. The other components are extrapolated from balance of payments data. Quarterly estimates are compatible with the defined annual constraint and the infra-annual evolution of DGT and balance of payments data.

8.5.2 *Other capital transfers (D.99)*

Other capital transfers payable to the rest of the world are derived from balance of payments.

Other capital transfers receivable from the rest of the world comprise the balance of payments data and subsidies from EAGGF classified as D.99. Whenever data on subsidies from annual

accounts is not available, the proportion of this component derived from the latest annual accounts data is applied to the EAGGF total data disseminated by DGT. Quarterly estimates are simultaneously compatible with the infra-annual evolution of DGT data and the defined annual constraint.

9. Flash estimates

The calculation of flash estimates is embedded in the framework of the regular QNA and follows the data generation process of the regular estimates. Therefore, the methodological description for flash estimates is the same as for regular disseminations and the main differences are the set of information used and the imputation and forecasting methods applied to overcome eventual lacks of data.

The advantage of compiling flash estimates within the same framework as regular releases is the possibility to revise the results of the previous quarters during the process of calculating the flash estimate for a given quarter. Such an update of past observations is of great benefit when compiling flash estimates, as the lack of data for the most recent quarters is usually bridged by time series methods, relying heavily on the quality of observations of the most recent past.

9.1. Flash estimates of GDP

One of the main conclusions retained from the trial period, prior to the implementation of the Flash Estimates release, is that the methodology used by Quarterly National Accounts for regular estimates can be mostly replicated for the calculation of flash estimates, with just a few modifications. The relatively small number of modifications is due to the unavailability of some of the raw data needed at the flash estimates schedule.

Most of the indicators necessary for the calculation of the quarterly estimates of GDP are available until 40 days after the end of the period. In fact, the percentage of information available reaches 82% of the global data set used in a regular Quarterly National Accounts procedure. This level of coverage is quite satisfactory, especially when compared to the example of other European countries.

We emphasize, however, that the restrictions in terms of raw data is significant in the case of international trade on goods (particularly with regard to deflators), which, given the high weight of these components in GDP, could pose problems of some gravity. In terms of Exports (FOB) the degree of coverage is of 57%, while the level of coverage of information on Imports (FOB) is calculated at 59%. It is precisely in these components that imputation techniques and prediction plays the more significant role in the whole flash estimates procedure. Namely, the deflator of international trade of goods for the quarter is forecasted, with the exception for the petroleum and fuels deflators, for which information on international markets can be used to estimate them. Forecasting procedures resulted from several tests on various possible hypothetical solutions.

Flash estimates are published in the form of growth rates, both quarter on quarter and quarter on same quarter of the previous year, for volume GDP. The choice for only publishing GDP growth rates is justified, on one hand, by the higher importance of this information compared to other details, and, on the other hand, by a lower probability of revision of a broader aggregate like GDP. Many revisions on GDP components tend to cancel out when summed to GDP level.

Up until now, considering in addition the test period prior to the public dissemination (which started from 1st quarter 2007 on), the mean absolute error for GDP growth rates (both quarter on quarter and quarter on same quarter of the previous year) is less than 0.2 percentage points (p.p.).

Considering international quality standards, revisions on volume GDP growth rates lower than 0.2 p.p. are perfectly acceptable and clearly under the limits admissible by most countries producing GDP flash estimates.

9.2. Flash estimates of employment

There are no flash estimates of employment at present.

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