



EUROPEAN UNION

THE EUROPEAN PARLIAMENT

THE COUNCIL

Brussels, 3 April 2013
(OR. en)

2010/0374 (COD)

PE-CONS 77/12
ADD 12

STATIS 106
ECOFIN 1090
UEM 345
CODEC 3081
OC 768

LEGISLATIVE ACTS AND OTHER INSTRUMENTS

Subject: REGULATION OF THE EUROPEAN PARLIAMENT AND OF
THE COUNCIL on the European system of national and regional
accounts in the European Union
(ESA 2010) - (Annex A - Chapter 12)
COMMON GUIDELINES
Consultation deadline for Croatia: 17.4.2013

CHAPTER 12

QUARTERLY NATIONAL ACCOUNTS

INTRODUCTION

- 12.01 This Chapter sets out the major principles and characteristics of quarterly national accounts.
- 12.02 Quarterly national accounts are national accounts whose reference period is a quarter. They are a system of integrated quarterly indicators. Quarterly national accounts provide a comprehensive accounting framework within which economic data can be compiled and presented in a format that is designed for purposes of economic analysis, decision-taking and policymaking, on a quarterly basis.
- 12.03 Quarterly national accounts adopt the same principles, definitions, and structure as annual national accounts. Quarterly national accounts use the concepts of annual national accounts unless indicated otherwise in this Chapter.
- 12.04 Quarterly national accounts cover the entire sequence of accounts and balance sheets. In practice, the constraints of data availability, time, and resources mean that quarterly national accounts are less complete than annual national accounts.

In comparison to annual national accounts, quarterly national accounts are more limited in scope. They focus on measuring GDP, on measuring the supply and use of goods and services, and on the generation of income. There is limited detail on industry activity and specific transactions. This reflects a trade-off between timeliness and scope, detail and reliability.

- 12.05 Compared to annual national accounts, quarterly national accounts are compiled and released more frequently. They provide an early overview of economic developments and can be used for early estimates of annual national accounts.
- 12.06 The time series of quarterly national accounts statistics, due to their quarterly frequency, present a seasonal pattern and are affected by calendar events. The seasonal pattern is smoothed out through seasonal and calendar adjustment procedures.
- 12.07 Quarterly national accounts rely on more limited data sources than annual national accounts and their compilation requires more use of statistical and econometric techniques. There are two approaches to the compilation of quarterly national accounts: the direct approach and the indirect approach.

12.08 The direct approach is based on the availability, at quarterly intervals, of similar data sources as those used to compile annual accounts; under this approach, similar methods of compilation are applied. The indirect approach uses statistical and econometric estimation techniques that use information from the annual accounts and short-term indicators to interpolate and extrapolate from the annual estimates. The choice between those approaches depends on the information used in the production of annual accounts being readily available in the same form at quarterly level.

12.09 The purpose of quarterly national accounts is different from that of annual national accounts. Quarterly national accounts focus on the short-term movements of the economy and provide a coherent measure of such movements within the national accounts framework. Emphasis is placed on growth rates and their characteristics over time such as acceleration, deceleration or change in sign. The annual national accounts' emphasis is on levels and the structure of the economy, as well as growth rates.

Annual national accounts are less suitable than quarterly national accounts for business cycle analyses, because annual data mask short-term economic developments.

12.10 Quarterly national accounts may be used in the compilation of annual national accounts. They improve the reliability and timeliness of annual national accounts and, in some countries, annual national accounts are directly derived from the aggregation over the year of quarterly national accounts. Those different roles reflect differences in data availability and in compilation processes.

12.11 A range of data feeds into the compilation of quarterly national accounts, such as short term statistics on production, prices, employment and external trade, confidence indicators of business and consumers and administrative data like VAT revenues. In comparison to such indicators, quarterly national accounts offer:

- (a) a broader scope;
- (b) exhaustiveness;
- (c) a coherent national accounts framework;
- (d) consistency with the concepts and data in national accounts;
- (e) international comparability based on an international methodological framework, the 2008 SNA.

12.12 The coverage of quarterly national accounts corresponds to the coverage of annual accounts, encompassing the entire sequence of accounts and the corresponding aggregates as well as the supply and use framework. However, the reduced availability of information and the quarterly frequency of compilation usually result in reduced coverage and scope for quarterly national accounts.

The quarterly accounts framework includes the following:

- (a) main aggregates, including employment and population;

- (b) financial and non-financial accounts by institutional sector;
- (c) limited detail breakdowns of key aggregates such as gross value added, final consumption expenditure, gross fixed capital formation, imports and exports of goods and services, and employment; and
- (d) a simplified sequence of accounts.

Such elements are usefully complemented, for compilation purposes, by a simplified supply and use framework.

SPECIFIC FEATURES OF QUARTERLY NATIONAL ACCOUNTS

12.13 Compilation issues which are especially important for quarterly national accounts are:

- (a) time of recording;
- (b) flash estimates;
- (c) balancing and benchmarking;
- (d) chain-linked volume measures; and
- (e) seasonal and calendar adjustments.

Time of recording

12.14 The rules on the time of recording that apply to quarterly national accounts are the same as those that apply for annual national accounts. However, specific measurement problems with respect to the time of recording arise due to the shorter period of recording. This affects, in particular, measuring of:

- (a) work-in-progress;
- (b) activities in specific periods within a year; and
- (c) low-frequency payments.

12.15 For quarterly national accounts, recording of activities and flows concentrated in specific periods within a year is important. The size of such activities by quarter, such as the output of agriculture, construction and tourism, depends on external factors such as the weather and official holidays. The payment of wages, taxes, social benefits and dividends can be subject to temporary quarterly effects such as annual bonuses being paid in one month. Errors in measuring the timing and size of such events lead to errors in the measurement of quarterly growth.

Work-in-progress

12.16 Work-in-progress is incomplete output that is not yet ready for delivery. It occurs when production lasts more than one period. Long production cycles occur in activities such as agriculture, construction, manufacturing of machinery, cars and ships, and services like the development of software, architectural services, the making of a film or large sport events. Such long production processes are often accompanied by progress payments, occurring especially in activities such as shipbuilding, aircraft construction, wine production and advertising contracts.

Measurement of such production requires that a single process is split into separate periods. This is more difficult for quarterly national accounts than for annual national accounts. However, the same principles apply for measuring work-in-progress on a quarterly and on an annual basis.

Activities concentrated in specific periods within a year

12.17 Allocation of output on the basis of costs incurred over time is the normal means of allocating eventual output to periods on an accruals basis, but does not always apply in full. No output should be allocated to periods in which there is no ongoing production process, even if there are ongoing costs. This applies to the cost of using capital, for example rental payments for the use of machinery. This situation can apply to agriculture, where there may be no production in some periods. Periods with no output can also arise in food processing industries that are dependent on products from harvests.

Low-frequency payments

- 12.18 For an activity occurring throughout the year, low-frequency payments are payments made once a year, or infrequent instalments over the year. Examples of such payments are dividends, interest, taxes, subsidies and employee bonuses, such as end-of-year bonuses and vacation bonuses. All such distributive transactions are recorded on an accrual basis, when the claim arose rather than when it was paid. This issue of timing of recording also occurs in annual national accounts, when payments may partly relate to another accounting year.
- 12.19 In order to deal with such timing issues, two categories of payments are distinguished.
- (a) Payments that have a purely ad hoc character are to be recorded in the period in which they are actually made. Dividends, for example, are usually determined only after the books are closed on a fiscal year and may not relate to the company's profits over that year.
 - (b) Payments that have a fixed relation to a particular period (e.g. accrued in a previous period or accrued over a number of accounting periods) are to be allocated to the periods in which they accrued. Examples are taxes on income and products, that may be collected in a subsequent period.

12.20 The application of accrual principles to quarterly data in such cases may be extremely difficult, and alternative methods are necessary, such as a cash adjusted basis, or allocating accrual payments to periods so that there is minimal distortion of the characteristics of time series.

Flash estimates

12.21 Quarterly national accounts provide an overview of the state of the economy with a short delay after the end of the reference quarter. The timely availability of such information helps to identify and interpret economic trends. For this reason, flash estimates of key macroeconomic aggregates including GDP growth and quarterly national accounts indicators are compiled more frequently by statistical authorities.

12.22 A flash estimate is an early estimate of an economic variable for the most recent reference period. The flash estimate is normally calculated on incomplete data, but using the same statistical or econometric model as for regular estimates. The compilation of flash estimates incorporates as much data as possible. The differences between flash estimates and traditional estimates are as follows:

- (a) timeliness: flash estimates are available earlier than the traditional estimates;
- (b) accuracy: there is a trade off between timeliness and accuracy. Flash estimates are in general more prone to revision than the traditional ones;

- (c) coverage: the number of variables covered by flash estimates is more limited than traditional estimates;
- (d) information: flash estimates are based on less information. Often the information for traditional estimates is not fully available;
- (e) estimation method: due to the lack of data, flash estimates rely more on econometric methods and assumptions.

Balancing and benchmarking of quarterly national accounts

12.23 Quarterly national accounts are a coherent set of accounts compiled on a quarterly basis. They are an integral part of the national accounts framework and are consistent with annual accounts.

12.24 The internal consistency of quarterly accounts is achieved by reconciling estimates of supply and use for the accounts on a quarterly basis. The consistency with annual accounts is ensured either by benchmarking quarterly accounts to annual accounts or by deriving annual accounts from quarterly accounts.

Balancing

- 12.25 The balancing or reconciliation process is an integral part of the compilation process of national accounts. It makes optimum use of the diverse sources of information underpinning different measures in the accounts. In broad terms, balancing seeks to fit the statistical basic data underlying the different approaches to the compilation of GDP and the other parts of the accounts into a supply and use framework, and so use all the available information in an effective manner.
- 12.26 The principles and procedures of the balancing process applied to annual accounts apply to quarterly accounts, with additional procedures reflecting the quarterly frequency of compilation. Such additional procedures reflect the following features of quarterly accounts:
- (a) maintaining consistency between seasonally adjusted and unadjusted data;
 - (b) ensuring consistency between current price and volume measures;
 - (c) reconciling measures from the different approaches to the compilation of GDP.

A simplified quarterly supply and use framework will help in balancing quarterly national accounts. When annual supply and use tables are regularly compiled, information in the quarterly supply and use tables can be explicitly linked to them as part of the balancing and benchmarking process.

Consistency between quarterly and annual accounts — benchmarking

- 12.27 The process of alignment of quarterly accounts to annual ones can be approached in two ways:
- (a) aligning quarterly accounts to annual accounts, also known as benchmarking;
 - (b) deriving annual accounts from quarterly accounts.
- 12.28 Discrepancies between quarterly and annual accounts are mainly due to differences in sources, and availability of information from shared sources.
- 12.29 Many different methods can be used for reconciling quarterly and corresponding annual aggregates.

The ideal method is to identify the causes of the differences and to derive new, reconciled quarterly and annual aggregates using all available information.

Benchmarking techniques ensure consistency between the two sets of aggregates by taking one as the standard and adapting the other to be consistent with it, through a variety of methods from simple mathematical adjustments to complex statistical and econometric procedures. Benchmarking techniques aim to ensure the accounting coherence of the two sets of aggregates in terms of preservation of movements or other well-defined criteria.

Benchmarking is an integral part of the compilation process and should, in principle, be conducted at the most detailed compilation level. In practice, this may imply benchmarking different series in stages over time, where data for some series, which have already been benchmarked, are used to estimate other series, followed by a second or third round of benchmarking.

- 12.30 When quarterly aggregates are taken as the benchmark, annual aggregates are derived by adding the appropriate quarterly figures. In this way, consistency is ensured.
- 12.31 Very often, the reconciliation between quarterly and annual aggregates results from a mix of benchmarking approaches: for example, preliminary annual estimates can be derived by aggregating quarterly figures, and, once annual information becomes available and the annual aggregate is revised, the annual benchmark is applied to revise the corresponding quarterly figures.

Chain-linked measures of price and volume changes

- 12.32 For annual national accounts, the measure of price and volume changes is in principle through an annual chain index. For the sake of coherence, the quarterly measures of price and volume changes are constrained to the annual chain-linked measures.

- 12.33 Consistency between quarterly and annual accounts price and volume measures requires either that the annual measures are derived from quarterly measures or that the quarterly data is constrained to the annual using benchmarking techniques. This is true even if the basic requirement is met that the quarterly and annual measures are based on the same methods of compilation and presentation, for example using the same index formula, base year and reference period. Strict consistency is not possible because quarterly indices will not normally reflect exactly the same growth as the corresponding annual indices, due to the index mathematical form.
- 12.34 Whilst quarterly chain-linked volume measures could be based on quarterly frequency of chain linking, chain linking is in principle to be carried out annually. Quarterly volume measures are annually chain linked.
- 12.35 Quarterly national accounts chain-linked volume series are quarterly volume changes using the annual averages of prices of the previous year. Three approaches for annually chain linking quarterly volume indexes may be used:
- (a) annual overlap;
 - (b) one-quarter overlap;
 - (c) over-the-year approach.

Creating a time series by applying one of the three chain-linking techniques normally induces structural breaks in the resulting chain-linked series, the impact of which is determined by the chosen linking approach and by the change of the price structure over time.

- 12.36 The annual overlap approach uses the annual average values of the respective previous year in prices of that year. It results in annual aggregates of quarterly volume measures identical to the independently derived chain-linked annual national accounts series. Moreover, the quarter-on-quarter rates of change within the same calendar year between Q1 and Q 4 are not affected by breaks. However, the volume series is affected by breaks occurring from the fourth quarter of a year to the first quarter of the following year, which also appear in the respective quarter-on-quarter rate of change.
- 12.37 By contrast, the one-quarter overlap approach generally leads to undistorted quarter-on-quarter rates of change for all quarters of the year, since the chain links refer to the quantities of the fourth quarter of the respective previous year valued at average prices of that year. However, unlike the annual overlap approach, the one-quarter overlap approach leads to quarterly chain-linked series which are not consistent with the independently derived chain-linked annual national accounts series.

12.38 The over-the-year approach of chain linking leads to undistorted year-on-year growth rates for all quarters, since the chain links refer to the volumes of the same quarter in the respective previous year, valued at average prices of that year. However, this approach leads to results that are affected by structural breaks in every quarter, so that each quarter-on-quarter rate of change is affected by a break. Hence, the over-the-year approach impacts most on the intra-annual profile of a series.

12.39 Provided the substitution effects (changes in volumes due to shifts in price structure) within a year are small, the three approaches for quarterly chain linking of volumes lead to very similar results.

Based on practical considerations such as quarterly growth consistency with annual chain-linked growth and simplicity and transparency of computation, the annual overlap method is the recommended method.

Seasonal and calendar adjustments

12.40 Seasonality is any pattern that recurs on a regular basis within the same period of each year.

An example is the sale of ice cream in the summer. Regularly recurring events are smoothed over the year by adjusting for seasonality, whereas the impact of irregular events remains unaffected. Adjusting for seasonality includes allowing for the different lengths of months and quarters. The seasonally adjusted results reflect 'normal' and recurring events over the whole year in which they occur. Seasonally adjusted series reveal more clearly than unseasonally adjusted series the following features for example:

- (a) changes in trend; and
- (b) turning points in the business cycle.

12.41 The calendar effect is the impact on a time series of the following:

- (a) the number and composition of working and trading days;
- (b) the occurrence of fixed and moving holidays;
- (c) leap years and other calendar phenomena such as bridging days.

- 12.42 The presence of seasonal and calendar effects in quarterly national accounts time series obscures the trend in growth of quarterly national accounts aggregates. So, adjustments for seasonal effects and calendar effects assist in the drawing of inferences on trends from quarterly national accounts; furthermore, seasonal adjustment reveals the impact of major irregular effects or events to help in understanding economic developments through the quarterly national accounts statistics.
- 12.43 Seasonal variations are commonly the effect of variations in energy use, tourism activity, weather conditions that affect outdoor activity such as construction, salary bonuses and fixed holidays effects, as well as all kinds of institutional or administrative practices. Seasonal variations in quarterly national accounts depend also on the data sources and compilation methods used.
- 12.44 For a reliable estimation of seasonal factors, the time series may need to be pre-treated. This prevents outliers such as impulse outliers, transitory changes and level shifts, calendar effects and national holidays from affecting the quality of the seasonal estimates. However, outliers should remain visible in the seasonally adjusted data unless they are the result of errors, because they may reflect specific events such as strikes, natural disasters, etc. Therefore the outliers should be reintroduced into the times series after the seasonal components have been estimated.

Sequence of compilation of seasonally adjusted chain-linked volume measures

12.45 The compilation of seasonal and calendar adjusted quarterly national accounts chain-linked volume measures is the result of a sequence of operations including seasonal and calendar adjustment, chain linking, benchmarking and balancing, applied to the available basic or aggregated information.

12.46 The sequence of application of the different steps of the compilation process of seasonally adjusted chain-linked quarterly national accounts volume measures depends on the specificities of the production process and on the level of aggregation at which it is applied.

Ideally, seasonally adjusted chain-linked volume series are obtained by seasonally adjusting the chain-linked series, followed by a benchmarking of the adjusted chain-linked series.

12.47 There are quarterly national accounts compilation systems in which seasonally adjusted data are produced at a very detailed level, and even at a level at which no chain linking is applied, e.g. when producing quarterly national accounts from quarterly supply and use tables. The order in this case is seasonal adjustment, followed by balancing, chain linking and benchmarking. At a disaggregated level, the estimates of the seasonal component may not be as reliable as at higher quarterly national accounts levels. Particular care is then needed for revisions of the seasonal component. Furthermore, balancing and chain linking seasonally adjusted data must not result in a seasonal pattern being introduced into the series.

- 12.48 Quarterly national accounts volume measures in average prices of the previous year can be chain linked by using the one-quarter-overlap, the annual overlap or the over-the-year technique. From the perspective of seasonal adjustment of quarterly national accounts volume measures, the one-quarter-overlap and the annual overlap technique are preferred. The over-the-year-technique is not recommended as it can introduce breaks in every single quarter-on-quarter movement of the series.
- 12.49 Seasonally adjusted chain-linked quarterly volume measures are constrained to the respective non-seasonally adjusted chain-linked annual data by using benchmarking or constraining techniques that minimise the impact on the quarter-on-quarter changes of the series. The benchmarking is required for purely practical reasons, e.g. the consistency of annual average growth rates. Benchmarking shall not result in introducing a seasonal pattern in the series. The reference should be the independently derived chain-linked annual series in unadjusted form for only seasonally adjusted quarterly national accounts. Exceptions from the desired consistency over time are acceptable if the seasonality is changing rapidly.

- 12.50 The calendar effect can be divided into a seasonal and a non-seasonal component. The former corresponds to the average calendar situation that recurs each year at the same season; the latter corresponds to the deviation of the calendar variables, such as numbers of trading/working days, moving holidays and leap year days, from the month- or quarter-specific average.
- 12.51 Calendar adjustment removes those non-seasonal calendar components from the series, for which there is statistical evidence and an economic explanation. Calendar effects, for which a series are adjusted for, should be identifiable and sufficiently stable over time or, alternatively, it should be possible to model their changing impact over time appropriately.
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