

# QUARTERLY GDP - PROCESS AND ISSUES

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## Introduction

The Central Statistical Office (CSO) aims to produce credible, timely, integrated quarterly accounts which meet the needs of users. Full national accounts are produced quarterly and are regarded as the key national accounts product.

This article gives the background to the current systems, describes current practices and explains some problems with the present system. It deals primarily with the estimation of gross domestic product (GDP). Turnbull (1993) gives details on the sectoral accounts.

## Background

The CSO has produced quarterly national accounts since the 1950s. Traditionally, GDP has been estimated using the output, income and expenditure approaches with an arithmetical average of the three measures also being calculated. Full sectoral and financial accounts have also been produced since 1964. Quarterly financial balance sheets are a more recent addition, with regular publication of information covering all institutional sectors starting in 1993.

By the late 1980s, there were several highly visible problems with the published quarterly data. The three most quoted problems were:

- i) wide discrepancies between the three measures of GDP;
- ii) large and growing balancing items in the sectoral accounts with particular concern about the balance of payments;
- iii) frequent and major revisions to statistics.

Concern about these areas led to the Pickford Report on Government Economic Statistics (Pickford and others, 1989). This was followed by two expansions of work known as the Chancellor's Initiatives. These were aimed at improving statistics overall but had a strong emphasis on quarterly aggregates (CSO 1991, Caplan and Daniel 1992 and Wroe 1993 give further details). The CSO strategy following the Pickford Report and the Chancellor's Initiatives has focused on the production of fully articulated, accurate and integrated quarterly accounts. In particular, work has been focused on producing a single best estimate of GDP and in improving the timeliness of estimates. In 1993, CSO announced a new publication timetable which significantly reduced the time taken to publish GDP estimates.

## User Requirements

The CSO aims to produce statistics that meet user requirements. The most important single statistic for many users is gross domestic product at constant factor cost, which measures total, real economic

activity. Users also require information which helps them to explain this figure and to produce forecasts. Therefore, CSO produces fully consistent breakdowns of GDP by output, income and expenditure components. In addition, sectoral information is needed for both economic assessment and macro-economic forecasting.

Users also require accounts which do not contain large inconsistencies and which are not heavily or frequently revised. In addition, timely information is required, particularly for economic decision making by government. There is, of course, a conflict between these requirements.

## Current Practice

The CSO produces, each quarter, a single estimate of GDP with its income, output and expenditure components. The expenditure analysis is available at both current and constant prices. Output is in constant prices only and income at current prices. All three analyses are available at factor cost with expenditure also being shown at market prices. Current, capital and financial accounts are also produced for each of the institutional sectors; persons, industrial and commercial companies, financial companies, central government, local authorities, public corporations and overseas. The accounts are fully integrated, but with a balancing item shown for each sector account. This reflects the mismatch between the sector financial surplus or deficit and the identified borrowing and lending in the financial accounts. All of the quarterly accounts are fully integrated with the annual accounts. This means that as well as quarterly estimates always adding up to annual totals, for many series the annual totals are derived as the sum of quarters.

In the presentation of quarterly GDP and current and capital account estimates for sectors, the emphasis is placed on seasonally adjusted series. Seasonal adjustment is done at component (or sub-component) level and seasonally adjusted aggregates are calculated as the sum of seasonally adjusted components.

## Current timetable

In 1993, the CSO announced a new quarterly timetable for publication of its national accounts statistics. This coincided with changes to CSO practices for releasing data (CSO, May 1993). In particular, the compilation of early estimates of GDP for use only within government ended. Instead, a published, preliminary estimate of GDP was introduced. This is published around three weeks after the end of the quarter to which it relates. It is based on output estimates alone and is published with limited information on components.

At seven weeks, a further estimate of GDP is published. This includes a full analysis by output component. There are also less detailed analyses by income and expenditure components.

After twelve weeks, a full set of national accounts are published. This includes GDP breakdowns by output, income and expenditure components, full sets of sectoral current, capital and financial accounts and the balance of payments. The balance of payments statistics, which are also produced by the CSO, are identical with the rest of the world sector of the national accounts.

At each stage a "First Release" showing the data is released. In addition, data are published electronically. Following the full integration of the timetable for producing all aspects of the economic accounts, the CSO introduced a new publication called "United Kingdom Economic Accounts: a quarterly supplement to Economic Trends". It covers all of the economic accounts, national, sectoral and financial, and gives a brief economic commentary on the changes over the latest quarter. In addition, all data are published electronically at the time of release.

### THE NATIONAL ACCOUNTS COMPILATION PROCESS

This paper is not concerned with the sources of data used in compiling the accounts. Sources of data for GDP estimates are described in Cope (1994). Information on the sector accounts is in Turnbull (1993) and in the Financial Statistics Explanatory Handbook (CSO 1994). In general, data from quarterly surveys is available for key components. For other series, some interpolation and extrapolation of annual series is required. Some administrative data are also used.

#### Principles for estimating GDP

The CSO believes that the most reliable estimate of the current price level of GDP is derived using the annual input-output framework which produces a balanced GDP estimate. These balances are now available 18 months after the year to which they relate. For years when an input-output balance is available, GDP is set at the level derived from the balance. For subsequent periods, this level is carried forward using movements in output, income and expenditure totals.

The CSO also believes that the output approach gives the best short term estimate of volume change. This is mainly because of the absence from output of highly volatile, harder to measure components such as stockbuilding and company profits. Further, output components tend to be revised less than other components and are available earlier. Therefore, the CSO aims to publish quarterly movements in GDP which match, as closely as possible, the movements in the total of output components.

#### The balancing process

Within the CSO there is a process of balancing and adjustment. This process is designed to reduce inconsistencies in the accounts and to come to a firm view on movements in key aggregates. The aim is to produce accounts where all three approaches have similar movements and levels and there are credible explanations for movements in components. The process consists of three basic stages, scrutiny of initial estimates, judgemental adjustments and alignment adjustments.

Each GDP component is owned by a compiler who has responsibility for processing and validating basic data. At fixed times in the quarter a balance showing the aggregates from the different GDP approaches is struck. The initial estimates supplied for the balance are compilers' best estimates on the basis of their source data. The individual components are aggregated and the resulting overall picture examined. Typically, income and expenditure figures will show different profiles from output. Different levels for GDP may also emerge from each approach.

There is then a period of scrutiny and validation which includes meetings involving all the compilers. The scrutiny of initial estimates is designed to test the plausibility of estimates and for coherence of information across the accounts. For example, output of the construction industry will normally be closely related to the level of investment in buildings.

#### Non-CSO data and supply side modelling

Additional information is considered in the scrutiny process. Vernon (1994) describes the use of information collected by outside organisations. This provides a useful alternative view to CSO's own statistics. It may support existing estimates or provide a basis for adjustments.

Commodity flow techniques have, traditionally, not been much used within the UK. However, supply side estimates are now being compiled and used. These are estimates of demand for commodities, based on components of output and international trade derived using the latest input-output framework. Lynch and Caplan (1992) describes the modelling process in full. Briefly, supply is the sum of outputs and imports less exports, and this is allocated to components of expenditure at a detailed product level. This gives an alternative view to the data from expenditure surveys. The rules which allocate the supply over the categories of demand are based upon the structures in the 1990 input-output table. Supply estimates can help to identify inconsistencies in the accounts at low levels of aggregation. They provide an alternative source of estimates for some investment components to supplement quarterly survey data and can help to reconcile estimates of output and expenditure.

#### Judgemental adjustments

After scrutiny of the initial estimates, there may still be large discrepancies between income, expenditure and output approaches. A decision is taken on the movement in GDP which will be published. This takes into account movements in output components, in particular, but also movements in income and expenditure components and other information which may be available. Judgemental adjustments may then be made to component data so that aggregates match the movement in GDP. These adjustments are made to a variety of components and are within the error range of the components. They should also not remove the integrity of individual component series.

#### Alignment adjustments and the calculation of GDP

After the scrutiny and adjustment process, the movements in expenditure and income are unlikely exactly to match those of output. The final balancing step is the incorporation of mechanically calculated alignment adjustments. These alter the quarterly path of income and expenditure totals so that they match, as closely as possible, the movements in output without altering annual totals.

In the expenditure analysis, the adjustments are added to stockbuilding and, within the income analysis, to company profits. Over a calendar year these adjustments sum to zero. The adjustments are shown in separate tables in First Releases and in United Kingdom Economic Accounts. The adjustments are currently made to profits and stockbuilding as they are considered to have the widest error margins in the respective analyses.

Total GDP can then be calculated. For those periods covered by an input-output table, GDP is the aligned expenditure or income total. For subsequent periods, GDP is calculated as the average of the aligned income, aligned expenditure and output totals. As the output estimate may be at a different level to the income and expenditure totals, it is rescaled to the level of GDP in the last input-output year.

Any difference between the sum of components and total GDP is known as the statistical discrepancy. It is calculated as the difference between GDP and the total of the components. This is shown explicitly in the income and expenditure analyses and is implicit in the output analysis.

The outcome of this process is to have a GDP estimate which is supported by three separate analyses all adding up to the same total. This meets the user requirement for CSO to give a single estimate of GDP and to provide supporting income, expenditure and output analyses. The estimate of GDP represents the CSO's view of total economic activity having considered all the available information.

## THE PUBLISHED DATA

### The first estimate of GDP

The first estimate of GDP, which is published around three weeks after the end of the quarter, is a projection of the last quarter's final estimate. They base the projection entirely on output information and covers only constant prices. At this stage in the quarter not all the information needed for a full estimate is available. For example, the index of industrial production, a key component of the output analysis, is only available for two out of three months for the relevant quarter. Although an estimate for retail sales for the whole quarter is available, information on most services, construction and agriculture is incomplete. Therefore, this estimate is partly forecast and little supporting detail can be provided. In total, just over half of component information is based on data with forecasts made for remaining components. Some of these forecasts will be based on externally available information.

### The second estimate of GDP

The second estimate of GDP is published around seven weeks after the quarter. Estimates are published both at current and constant prices. At this stage some information on income and expenditure is available as is most of the output data. As with the first estimate, there are normally no revisions to estimates in recent quarters. However, there is scope to incorporate revisions to earlier quarters, particularly when publishing third quarter data shortly before the Budget statement in November.

At this stage there is far more data available than for the preliminary estimate. Most of the output data, including the full index of production for the quarter, are available as are provisional results from expenditure surveys. Limited income information, mostly covering employment income is used at this stage.

### The full national accounts

The full national accounts are published twelve weeks after the end of the quarter. These cover all the GDP components and sub-components, full sectoral accounts and financial balance sheets. The balance of payments statistics are published on the same day as the rest of the national accounts. Published figures will normally include revisions to estimates for between four and eight quarters. The balancing process is expanded to include sectoral information. So, for example, the profile of the personal sector saving ratio may influence estimates of personal sector GDP components. There is also a separate parallel exercise to reconcile sector accounts information and to minimise the size of the sectoral balancing items. The final part of the balancing process is a single meeting which looks at the accounts together.

## CURRENT ISSUES FOR THE CSO

The CSO is currently looking at the way it balances the accounts. A number of key issues, for the quarterly process, have been identified.

### The scrutiny and adjustment process

The GDP figures must be consistent with a number of statistics published before the GDP compilation exercise is completed. This particularly applies to the index of industrial production and the estimates of trade in goods. This means that these figures tend to be treated differently from other GDP components and cannot easily be adjusted in the light of additional information from elsewhere in the national accounts.

Some other components also enjoy a similar protected status. Estimates of central government final consumption, for example, are rarely adjusted as this would lead to discrepancies between CSO and government accounts. However, in recent years, this aggregate is at least as susceptible to revision as other components and perhaps should be liable to some adjustments to improve coherence.

A possible result of this protected status is that a limited number of components may carry judgemental adjustments. Although all the adjustments which are made are within the error ranges of components, increasing the number of components that could be adjusted might have some advantages.

Further, there is scope for increasing the analytical basis for adjustments. This could include further developments in the use of the supply-side models, more use of external data and increased analysis of information on previous revisions to component series.

Some users have asked CSO to identify and publish the judgemental adjustments so that they can make their own assessment of errors and omissions within the data. The CSO considers that the estimates it publishes are the best possible and that making additional sets of data may confuse some users. For this reason, CSO is still considering the best way to respond to this need.

### The alignment process

The alignment process was introduced to solve the problem of producing varying growth measures from the three GDP approaches. It is mechanical and can lead to large adjustments to both company profits and stockbuilding. Part of the rationale for allocating adjustments to profits was the poor quality of quarterly information. However, there is now a new and much improved quarterly profits survey which should produce reliable quarterly estimates. At the same time, the sources used to estimate output have changed and the estimate has become more liable to revisions and less stable. For example, productivity adjusted employment data have been replaced by deflated turnover estimates. The CSO is considering whether its current approach produces the best estimate of the quarterly movement in GDP based on all of the information.

### Revisions and performance targets

Revisions are a key measure of the reliability of economic statistics. As an Executive Agency, the CSO has targets for its performance including targets on revisions. One of these targets covers revisions to estimates of growth in GDP between the first and third publication. Since the introduction of the preliminary GDP estimate, these revisions have mostly been upwards, although the latest revisions have been downwards. Given the importance of the early GDP estimate for economic policy making, the CSO is investigating the causes of these revisions.

## CONCLUSION

The CSO has in place a system for producing detailed, integrated, timely quarterly national accounts. The processes lead to products which strive to meet the requirements of users. In particular, GDP

estimates are supported by income, expenditure and output analyses. Full sectoral accounts including the balance of payments and financial balance sheets are published within an integrated framework. The CSO continues to improve and develop its products to match the demands of its customers. It is now establishing an economic

accounts user group to ensure that there is a close relationship between compilers and users of the accounts.

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