

# **The role of income measures in producing a single estimate of UK GDP, on a quarterly and annual basis.**

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## **Abstract**

The paper provides a brief overview of the UK approach to the compilation of its quarterly integrated economic accounts including how the choice is made between the three measures of GDP which are estimated each quarter. It then describes in more detail the methods used to compile the income measure of GDP. This explains how annual administrative data and quarterly inquiry data are used in producing the quarterly and annual estimates of GDP (Income) and how the choice is made between these sources. Finally the paper mentions some future developments in UK national accounts.

## **I Overview of UK approach**

### **Introduction**

1. This section describes the United Kingdom approach to the compilation of its quarterly integrated economic accounts. The Office for National Statistics is responsible for the compilation of the whole account including the balance of payments.
2. With a single organisation responsible for the whole account, we can achieve integration and consistency. Integration starts at the data collection level with many surveys conducted from a single business register. GDP is measured in three ways - as the sums of production, expenditure and income components respectively. On an annual basis the three approaches are reconciled using current price supply use balancing so that there is a single estimate of GDP at current prices. Less formal processes are used to ensure that annual chained volume measures (CVM) agree closely. On a quarterly basis GDP is also estimated on the three separate approaches. Less formal methods are used to reconcile the three estimates to produce a single quarterly estimate of GDP, again for both current prices and CVM.
3. Linked to the GDP estimates, there are also full sector accounts for the six main institutional sectors of the economy. These include the current, capital and financial accounts together with balance sheets.
4. Thus the integration of the accounts manifests itself in many ways:
  - Integration of data sources
  - Integration of the domestic and balance of payments accounts
  - Integration of quarterly and annual estimates
  - Integration of annual GDP with production, expenditure and income components fully reconciled via current price supply use balancing

- Integration of quarterly GDP - a single estimate with consistent production, expenditure and income components
  - GDP fully integrated with quarterly sector accounts
  - estimates of dividend and interest flows fully integrated with the financial balance sheets.
5. This integration and the process of achieving it leads to better quality accounts as all data sources have to be checked and reconciled. This helps identify problems with data and gives an opportunity to investigate and correct it before publication.

## **Background**

### **Key indicators**

6. Many users of the UK accounts tend to focus on a few key aggregates, which are commonly reported in news media. The headline number widely reported in the press, and used in economic discussion, is the growth in the quarterly seasonally adjusted CVM of GDP. There is also interest in the household saving ratio and the financial position of corporations. However expert users also focus more widely on the whole accounts and use them to, for example, build economic forecasting models and manage the large London financial markets.

### **Timetables**

7. During each quarter, economic accounts statistics are produced as follows in the weeks after the end of the quarter:

- 3 weeks  
a preliminary estimate of the growth in the CVM of GDP from the previous quarter based on production information using available monthly inquiry data plus some projections.
- 8 weeks  
expenditure, production and income breakdowns of CVM GDP showing growth in the latest quarter based on early returns to quarterly business inquiries
- 12 weeks  
full set of economic accounts, including revisions to some earlier quarters. In addition to a full breakdown of GDP at current prices and CVM, the full sector accounts and balance of payments accounts are published based on near final versions of quarterly household and business inquiry results.

8. The annual current price supply use balancing takes place when the necessary data is available and is reflected in estimates first published between 18 and 21 months after the end of the year concerned.

## **Revisions policy**

9. The UK operates a revisions policy to limit the number of revisions made to the data and to ensure that revisions are only made when they are economically significant. The policy is currently under review and the rules are operated flexibly. The normal rules are:

- Revisions to past periods are only made at the “12 week” stage when the full accounts are published. Revisions are normally allowed to between 1 and 6 past quarters.
- Once a year in June or September annual estimates for the past three completed years can be revised.
- At the same time revisions to earlier years may be selectively allowed if they have a significant impact on the economic picture presented.
- Also at this time quarterly series may be reassessed for several back years to take account of, for example, re-estimated seasonal factors.

## **Role of supply use balancing**

10. In the UK, once sufficient data is available, the production, expenditure and income approaches to GDP are balanced through an annual current price supply use process. The work generally starts just over a year after the end of the year concerned and accounts based on the results are published between 18 and 21 months after the end of that year. The supply use balancing process is normally applied in full to that year and the year before it. Thus there will be one provisional balancing followed, a year later, by a full revision of the balance. Supply use balances for earlier years may be reopened selectively if revisions are allowed. Please see annex A at the end of paper for more information on the supply use balancing process.

11. In the UK, value added by industry and total value added (ie GDP) are key products of the supply use process. A square matrix of 123 industries and 123 products is used.

## **Compiling quarterly estimates**

### **Underlying principles**

12. The most reliable basis for determining the annual current price level of GDP is the supply use process described in the previous section. To supplement this we use the principle that the production approach gives the best short-term estimates of CVM change. This is mainly because of the absence from production of highly volatile, harder to measure components such as inventories and company profits. Further, production components tend to be revised less and are available earlier. Thus, although the UK monitors expenditure and income components, the published quarterly movements in GDP normally match movements in the total of production components. Providing the expenditure and income components gives users information about the structure of the overall movement. For example an increase in growth may have different implications if it were led by a boom in exports, than if it were led by a boom in consumer spending.

## **Quarterly GDP balancing process**

13. The process concentrates on CVM estimates because our users are mainly interested in estimates of real growth with the effects of inflation stripped out. The production components are available only as CVM index numbers. The expenditure components are available at both current prices and as CVMs. Finally, the income components are available only at current prices. So that all three approaches can be compared on a common basis, the income components are put on a CVM basis by dividing them by the implied deflators derived from the expenditure approach. Once the CVM estimates have been balanced, consistent current price estimates of the expenditure and income components are derived and published.

14. The balancing process is designed to reduce inconsistencies in the accounts and to come to a firm view on movements in the key aggregates. The aim is to produce accounts where all three approaches converge on a single estimate of GDP and there are credible explanations for movements in the components. The process consists of three basic stages, scrutiny of the initial estimates, adjustments decided by national accounts experts and, finally, "alignment" adjustments. The balancing process is summarised here and explained in more detail in Annex B.

15. The latter is the final balancing step, incorporating mechanically calculated alignment adjustments. These alter the quarterly paths of income and expenditure totals so that they match, as closely as possible, the movements in production without altering annual totals.

16. In the expenditure analysis, the adjustments are added to inventories and, within the income analysis, to non-financial corporation operating surplus. Over each calendar year the adjustments sum to zero.

17. The outcome of this process is a GDP estimate, which is supported by three separate analyses all adding up to the same total. This meets the user requirement for a single estimate of GDP with consistent supporting income, expenditure and production analyses. The estimate of GDP is the Office for National Statistics' best view of the level and growth in economic activity having considered all the available information.

## **Quarterly Sector Accounts**

18. In parallel with the preparation of the GDP estimates full quarterly sector accounts are compiled for the current, capital and financial transaction accounts, together with sector balance sheets. There are complete accounts for six institutional sectors:

- Households (including non-profit institutions serving households)
- Non-financial corporations
- Financial corporations
- Central government
- Local government
- Rest of the world (equivalent to balance of payments)

19. The processes used to compile the sector accounts are basically similar to those for GDP described in section 4 above. There is a fairly full range of quarterly inquiry and

administrative data to inform the estimates. Some sources are available only annually, with quarterly paths interpolated.

20. The main aim of balancing in the sector accounts, besides ensuring plausibility and internal consistency, is to minimise the mismatch between the sector financial surplus or deficit and the identified borrowing and lending in the financial account.

21. The balancing of GDP can affect the balancing of the sector accounts and vice versa. For example one influence on the judgmental adjustments applied in the balancing of GDP will be information on which sectors are most out of balance. The final meeting of each quarterly round gives special emphasis to looking at both GDP and sector accounts together before agreeing the final version of the accounts for publication. Key indicators are considered. These include, for example, the household sector savings ratio and the financial surplus or deficit of companies. These will confirm that the accounts present a credible and explainable picture of the economy.

## **II      **Compilation of the income measure of GDP****

22. The current strategy for the income measure is to base annual estimates of the main components on administrative data used in tax systems. Alternative inquiry sources are used for the most recent periods for which administrative data is not available. The inquiry sources are also mostly used to provide quarterly estimates consistent with the annual administrative data. Key features of the administrative data and inquiry sources are discussed below.

### **Administrative sources**

23. The use of administrative sources in UK statistics has a long history from the period when our inquiry systems were less comprehensive and detailed. However we have continued to use them as the basis of our income estimates because they should in theory be providing quality audited estimates at little cost to government or businesses.

24. The source is the Inland Revenue, which is the department responsible for collecting most taxes on income and wealth in the United Kingdom. The Inland Revenue has developed the statistical analysis of tax records so that a substantial amount of detail can be obtained from them and they can be used for the UK economic accounts. They also use their analysis to help manage tax policy - looking at the yield of different taxes for example. Having two uses for the analysis makes for efficiency and also increases quality as there is more checking. Tax data is used as the source for the annual estimates of profits of private non-financial corporations, of most mixed incomes (income from self-employment) and of total wages and salaries. Thus about two-thirds of the annual estimates of UK income come from information available in the systems used to administer taxes.

25. Although the quality of the data is extremely good and detailed by its very nature, there are deficiencies from an economic accounting viewpoint. There are delays because of the process of assessment and appeal; there are incomes below the taxable level which need to be estimated; there can be difficulty in assigning incomes to the period in which they accrue (as distinct from when they are taxed); there may be differences in definition between taxable income and the income measure used for national accounts; and there is evasion (income not declared to the tax authorities). These issues are dealt with below. There have also been a

number of reforms in the operation of the UK tax system, which make the information on incomes easier to use in the national accounts.

### **Delays in the availability of data.**

26. As most of the tax systems work on tax years (in the UK these run from April of one year to March of the next) there is a delay before the data is available. These delays are less than they used to be as the UK has adopted systems known as "self assessment" whereby the taxpayer is responsible for calculating and paying their tax liabilities. There are fairly large penalties and disincentives for under payment. Even so it is usually about a year after the close of the tax year before comprehensive estimates are available. The delays can also be much longer than this if problems occur. For example there has been a long delay in the provision of data on income from employment following problems with the introduction of a new computer system. The tax authorities first priority was to get the tax collection and national insurance system working correctly and there has been a long delay before correcting the statistical analyses. **Thus the inflexibility of the large administrative systems may impede the use of their outputs for statistics.**

### **Incomes below tax thresholds**

27. Tax thresholds are generally lower compared with average earnings than they used to be, so the amounts involved are smaller. The issue is most significant for income from employment where information from household surveys is used to supplement estimates.

### **Assigning incomes to the right period**

28. This used to be a major issue with incomes of businesses taxed a year in arrears, and with some non-standard tax assessment periods. However businesses are now taxed on a current year basis and allocation to the correct period is easier.

### **Differences in the definition of income**

29. This is now mainly an issue for corporations. Benefits in kind (eg company cars, subsidised loans etc) are now almost all taxable and definitions of personal incomes align fairly well. However for corporations taxable income includes a variety of items including capital gains, interest charges etc as well as operating surplus. Corporation tax returns are fairly detailed, showing the composition of taxable income. Therefore calculations can be done to convert the estimates of taxable income into the income components needed for national accounts.

### **Evasion**

30. As in all countries this has been an issue for the UK. The extent of evasion has been reduced over the years as the tax authority has imposed new control mechanisms. For example evasion in the construction industry, where there is a lot of self-employment, has been reduced by a requirement that employers withhold income tax when they pay workers. The worker then has to reclaim any tax over paid by completing a tax return. We have processes in place to estimate evasion, although in the short term this is made more difficult by the new regulations, which have reduced it.

## **Financial corporations**

31. Tax sources are not used for estimating the income of financial corporations. This is because the gap between their taxable income and the definition of income needed for national accounts is too great. Income is therefore estimated from a range of mainly quarterly inquiries conducted by ONS, Bank of England etc.

## **Supplementary inquiry sources**

32. As already explained alternative sources are needed for the latest periods and to produce quarterly estimates - the tax sources are mostly only annual.

33. For **income from employment** we use labour market statistics as the main source. We multiply numbers in employment by average earnings. These are based on surveys to employers but we also check against the Labour Force Survey to ensure consistency.

34. For **non-financial corporations operating surplus** we use a fairly small inquiry asking for the UK trading profits of large corporations. This covers a major proportion of the value of profits and usually predicts the later tax based estimates well.

35. We have no reliable short-term source for **mixed income**. We use estimates of the number of self-employed from the Labour Force Survey together with trends in both profits and income from employment. However we have found that these relationships are not strong. One explanation for this may be to do with the nature of self-employment. The numbers of the self-employed may rise in economic downturns, with the newly self-employed having very low incomes. In good times people with these very low incomes may become employed again. Thus the average incomes of the self-employed may move differently to either profits or income from employment.

## **III Future Developments in UK National Accounts**

36. The UK is in the early stages of a complete review and update of the way that the national accounts are compiled. This large project, referred to as National Accounts Re-engineering, is likely to take about 3 years (costing nearly €7 million) with data from the new system then introduced into our publications.

### **Why are we doing this?**

37. The National Accounts are the economic accounts for the UK. Given their importance both domestically and internationally, the National Accounts are arguably ONS's most important and most prominent product. However, the systems, methods and processes that support their production have evolved over time in a non-systematic, often non-standard way, resulting in significant business risks to ONS. Through a re-engineering of the methods, processes, data flows and systems used in the production of the Accounts, this programme of change is intended to strengthen and improve the National Accounts and to reduce the current excessive pressures and stress placed on staff. These changes will improve the quality and reliability of the National Accounts, significantly reduce the risks, and strengthen the reputation of the ONS.

## **Summary of main changes**

38. Some of the details of this are not yet decided but the following is now reasonably clear:

- There will be a complete overhaul of production systems to make them easier to use and more reliable.
- There will be less reliance on judgement in the balancing of the accounts.
- There will be increased use of supply use balancing quarterly and in volume terms in addition to the annual current price supply use balancing used at present.
- Staff will be reskilled to use the new systems and will also be used to provide more analysis of the accounts.
- All aspects of the methodology to produce the accounts are being considered for review. The aim is to make it as appropriate and efficient as possible, consistent with ESA 95.



**Annual current price Input-Output balancing process**

The process of balancing involves a number of steps. These may start as independent steps or interlinked with others, culminating with an iterative type of process converging to a single estimate of GDP.

The result of this process is a single GDP estimate, supported by production, income and expenditures reconciled and balanced in the same framework, and credible time-series of the detail underlying the I-O Supply and Use Tables. Consequently, there is no need for a statistical discrepancy as shown in the subsequent quarterly and annual GDP estimates. This discrepancy represents the difference between the sum of the components and average GDP, where an I-O framework has not been used for balancing.

The main core of the I-O balancing process extends from December to May each year, although the entire exercise runs from October to early July. The process relies heavily on the effective co-operation, teamwork and problem solving skills of all the national accounts and survey compilers involved.

This ensures that the quality of aggregate GDP and the underlying detail, in terms of congruency and consistency, is of a high degree, and that the aggregate level of GDP is much more firmly based on expenditure, income and production estimates.

The attached schedule should be referred to as a guide to the steps described in this section:

**Compilation of initial estimates**

CP I-O Branch gathers initial estimates from annual surveys and national accounts compilers in line with previously agreed deadlines. These estimates cover a number of years. For example, the 2004 exercise involves gathering data for 2001 and 2002, as well as any revisions to earlier periods going back to 1989 for the purposes of I-O Supply and Use Tables.

Using these data, estimates of the components of supply and demand for products are prepared, together with the estimates of industry outputs and inputs, thus gross value added, using a single uniform framework of industry and product classifications at the I-O group level.

In some cases, for example PRODCOM, estimates are aggregated from the 5-digit SIC (92) sub-class level to the 123 I-O group level. At the I-O group level, one hundred and twenty-three industries and products are identified separately.

Production based estimates of current price gross value added by industry are compiled by CP I-O Branch. The production-based estimate of gross value added is then compared with the expenditure and income measures.

In compiling these estimates various types of adjustments are required and, in the light of the information available, particular judgements are made. For example, allowances for under-coverage of an industry and for mis-recording of data on inquiry forms returned by businesses. Any adjustments made by the CP I-O Branch are fed back to the survey or national accounts compilers, as appropriate. This may lead to further investigations.

CP I-O Branch carries out various comparisons, checks and analyses on the data it receives, resolving queries with respective compilers, which often result in changes and re-delivery of compilers' estimates. This extends the validation checks already carried out by suppliers. For example, comparisons between Annual Business Inquiry and PRODCOM lead to investigations and subsequent changes affecting both product supply and industry gross value added.

In parallel with the above, alternative estimates of value added for each of the one hundred and twenty-three industries are prepared using the income based data.

### **Balancing meetings**

A short meeting is held for all the compilers after completion of the initial estimates. This meeting briefly covers preliminary estimates but is primarily used to clarify the way forward in order to complete the annual balancing exercise. There are several meetings through the process involving the national accounts divisional directors.

### **Assessment of estimates**

Using the initial estimates, various tables of analyses, charts and graphs are produced showing the coherence of these estimates. These show:

- Comparisons of gross value added for each industry using the income and production based approaches.
- Comparisons of the components of supply and demand for each type of product.

Several other analyses in the form of time series are also compiled to aid the balancing process, showing:

- growth rates;
- gross value added to total output ratios
- changes in the composition of GDP weights, and
- taxes and margins as a proportion of supply and demand.

Having compiled initial estimates at this stage, production, income and expenditure aggregates will typically show different profiles over time.

This begins an on-going iterative process of scrutiny and validation, checking the plausibility and coherence of estimates across all industries and products. Bilateral meetings involving appropriate compilers are held as necessary to resolve particular issues.

This assessment exercise is driven by two underlying themes, which are linked:

- Reconciliation of estimates of industry gross value added between the income based and production based approaches, and
- Reconciliation of supply and demand for each product, essentially matching production and expenditure.

These 'reconciliation' themes must ensure that consistency and coherency over time is also achieved. This includes:

- Consistency over time of individual series, both within the I-O Supply and Use Tables and compilers' own detail series;
- Consistency over time of aggregated series; and
- Considering the consistency of current price estimates and constant price estimates in terms of implied deflators, both at the aggregate and component level.

When assessing the above, the impact of revisions to earlier years and the quality of the relative data sources is also taken into account.

Judgements made during the preparation of the first set of estimates are re-assessed in the light of any discrepancies shown in the analyses prepared in step 5.

At the same time, other sources of information are utilised, as appropriate, depending upon the specific industry or product, such as:

- Company Annual Reports and Accounts;
- Information from monthly/quarterly ONS based inquiries, for example, Monthly Production Inquiry and Retail Sales Inquiries;
- Information from ONS' quarterly supply models - providing both current price and constant price information, and
- External economic and business indicators.

In parallel with the above, investigations of the underlying source data for possible errors and inconsistencies are also carried out. Where such errors are discovered, appropriate corrections are made. For example, reconciliation of individual companies' data with their respective annual report and accounts, can lead to changes to the inquiry based data, where it has been identified the business has incorrectly completed the ONS inquiry form.

#### **Final estimates**

In line with previously agreed deadlines, final estimates are provided by survey and national accounts compilers during the period February through to May. Although 'final' estimates are provided, the work carried out earlier may generate several additional deliveries of compilers' estimates.

As final estimates are received, steps covered in the 'assessment of estimates' process is continually repeated. Further discussions are held with appropriate compilers via bilateral meetings, electronic e-mail and telephone calls, resulting in further deliveries.

Any changes to compilers' estimates are negotiated by the I-O branch and agreed with the respective compilers, before delivery of further datasets. However, the ownership of the resulting estimates rests with the compilers, not with the I-O branch.

This process continues to reduce inconsistencies between supply and demand, and between output and income based gross value added estimates at the one hundred and twenty-three I-O group level, resulting in converging aggregate totals.

If total convergence has not been achieved, we continue and until the remaining discrepancies are thought to be well within the potential uncertainty of the source data, before proceeding to the next phase.

In practice, following the method laid out in the 'assessment of estimates', the estimates of total GDP from the various approaches converge to within a very small range. Once the difference between the three measures of GDP is sufficiently small (between £0.5 billion and £1.0 billion compared to a total of around £500 billion), further small adjustments are made in order to achieve an agreed single best GDP estimate.

This single best estimate will reflect the relative merits of the output, income and expenditure estimates at the aggregate level. This is achieved by considering each aggregate's:

- Revisions performance;
- Quality of the source data, and
- Specific estimation problems for each year in question.

A number of other assessments providing different perspectives are also taken into consideration, for example:

- Effect on current and constant price expenditure growth rates;
- Impact on the expenditure deflator and its component deflators;
- Assessment of the production based constant price gross value added aggregate in relation to the current price aggregate derived from the I-O balances; and
- Comparisons with previously published estimates.

### **Balancing (confirmation) meeting**

Then, having completed the process up to this stage, a meeting is held for all compilers to assess the agreed estimate of GDP, the components of the three measures and the impact of the revisions incorporated during the exercise. In the light of further discussion of the GDP components, the meeting may recommend further changes to improve the overall aggregates.

Any changes are then incorporated in the balance, and industry gross value added is fixed after the full reconciliation of the income-based components with the production-based estimate at the one hundred and twenty-three I-O group level. The gross value added weights (in parts per 1000) are also fixed.

### **Completion of the product balances**

Product supply and demand still differ, mainly reflecting the approximations in transforming source data to I-O group level. Further adjustments are made at this stage to address these imbalances.

There are some important parts of the balance where it is necessary to estimate component figures for a wider estimate because of the lack of detailed source data. Foremost amongst these are distributors' trading margins and the analysis of purchases by the distribution and service trades industries. Another example is the allocation to products of other services provided by manufacturers, where compliance cost constraints on ONS inquiries restrict the amount of information available.

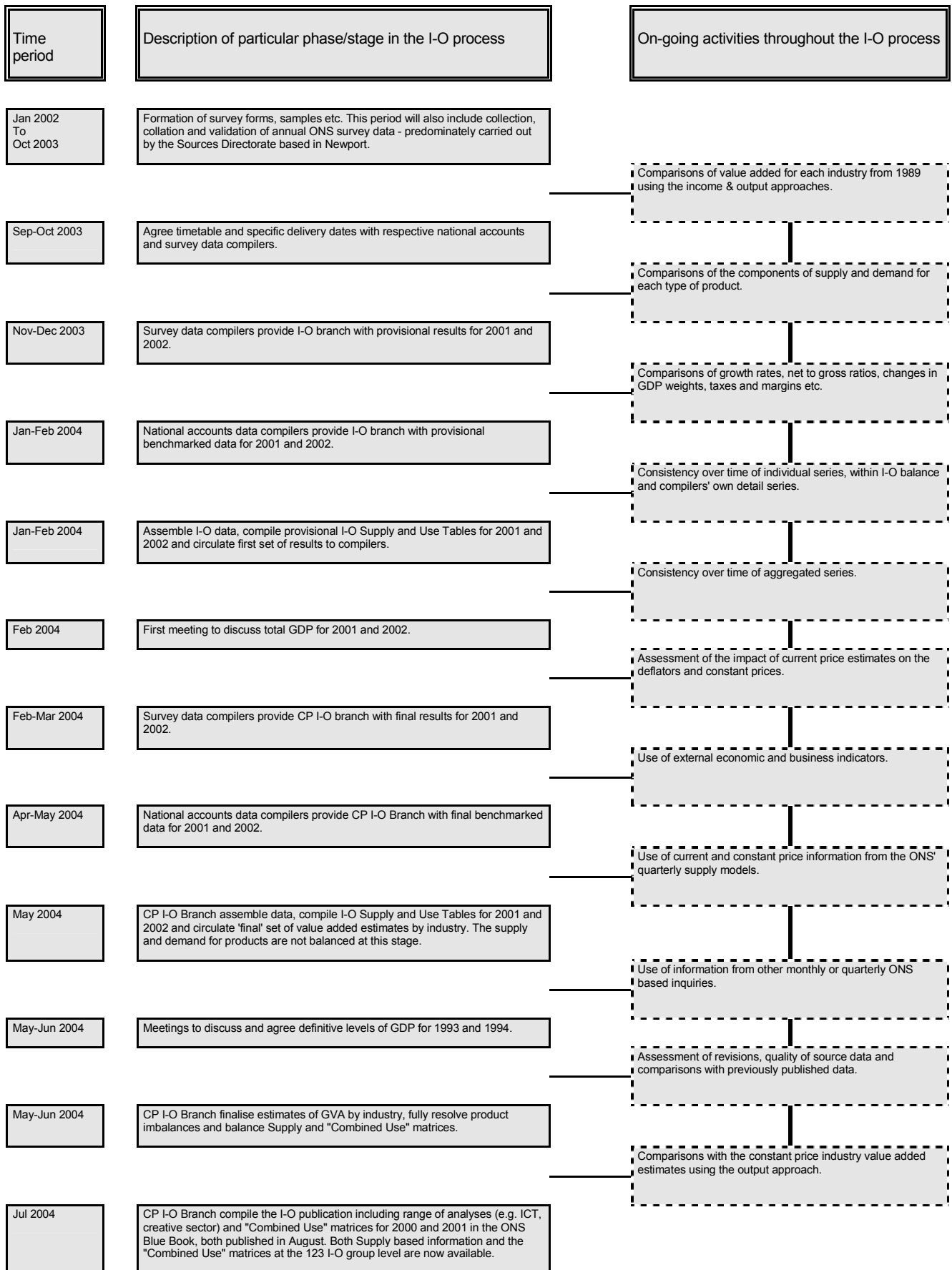
These areas, together with all the industries and final demand purchasing structures, are reviewed. Appropriate adjustments are made to reduce supply and demand product imbalances. For example, when a business purchases a manufacturing product for intermediate consumption, reflected within the purchase price will be an associated service. These may cover partly professional and business services.

Similarly, the purchases of capital expenditure items as recorded in the ONS inquiries will also include some service costs. Within the I-O process, small adjustments are made to allow for this aspect, by reducing the purchases of goods and increasing by the same amounts the purchases of such services.

This work continues until the imbalances between supply and demand are 'small', in terms of either percentage or absolute amounts as a proportion of supply.

The very final step in the balancing process is to apply the r.A.s. Method to the intermediate section of the "Combined Use" matrix. This process will adjust the intermediate purchases in line with pre-determined row and column totals, resulting in a fully balanced table.

## I-O Schedule of producing I-O Supply and Use Tables and balancing annual GDP for 2002



## Quarterly GDP balancing process

The process concentrates on constant price estimates because our users are mainly interested in estimates of real growth with the effects of inflation stripped out. The production components are available only as constant price index numbers. The expenditure components are available at both current and constant prices. Finally, the income components are available only at current prices. So that all three approaches can be compared on a common basis, the income components are put on a constant price basis by dividing them by the implied deflators derived from the expenditure approach. Once the constant price estimates have been balanced, consistent current price estimates of the expenditure and income components are derived and published. The balancing process is designed to reduce inconsistencies in the accounts and to come to a firm view on movements in the key aggregates. The aim is to produce accounts where all three approaches converge on a single estimate of GDP and there are credible explanations for movements in the components. The process consists of three basic stages, scrutiny of the initial estimates, adjustments decided by GDP experts and finally "alignment" adjustments.

### Scrutiny stage

Responsibilities are allocated to individuals for each GDP component. They are responsible for processing and validating the data for that component. At fixed times in the quarter a "balance" is struck showing the aggregates from the three different approaches to GDP. The initial estimates supplied for the balance are best estimates on the basis of source data. Initially response rates to statistical inquiries may still be fairly low and numbers subject to revision. The individual components are aggregated and the resulting overall picture examined. Typically, income and expenditure figures will show different profiles from production. Different levels of GDP may also emerge from each approach. There is then a period of scrutiny and validation, which includes meetings of key players. The scrutiny of initial estimates is designed to test the plausibility of the estimates and consistency of information across the accounts. For example, output of the construction industry will normally be closely related to the level of investment in buildings. Additional information from outside surveys and sources is considered in the scrutiny process. This provides a useful alternative view to compare with our own statistics. It may support existing estimates or point to ways of resolving problems and discrepancies. As an additional mechanism for ensuring consistency across the accounts, estimates based on supply are used to validate estimates of expenditure (demand). A simplified analysis is used based on a recent input-output analysis. Supply (the sum of outputs and imports less exports) is allocated to components of expenditure at a product level. The supply based estimates also provide an alternative source of estimates for some investment components to supplement quarterly survey data.

### Adjustments decided by national accounts experts

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

### **Alignment adjustments and the calculation of GDP**

After these processes, the movements in expenditure and income will still not match exactly that of production. The final balancing step is the incorporation of mechanically calculated alignment adjustments. These alter the quarterly paths of income and expenditure totals so that they match, as closely as possible, the movements in production without altering annual totals.

In the expenditure analysis, the adjustments are added to change in inventories and, within the income analysis, to non-financial corporation profits. Over each calendar year the adjustments sum to zero. The allocation to inventories and profits is under review because, following the establishment of a new inquiry, the error margin on profits is smaller than it used to be.

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

The outcome of this process is a GDP estimate which is supported by three separate analyses all adding up to the same total. This meets the user requirement for a single estimate of GDP with consistent supporting income, expenditure and production analyses. The estimate of GDP is the Office for National Statistics's best view of the level and growth in economic activity having considered all the available information.