

# Summary Quality Report for Gross Domestic Product (GDP) Data Releases

## 1 Introduction

This report is part of a rolling programme of quality reports being introduced by the Office for National Statistics (ONS). The full programme of work being carried out on [Statistical Quality](#)<sup>1</sup> is available on the National Statistics website. Summary Quality Reports are overview notes which pull together key qualitative information on the various dimensions of quality as well as providing a summary of methods used to compile the output.

This report relates to estimates of [Gross Domestic Product \(GDP\)](#)<sup>2</sup> and aims to provide users with information on usability and fitness for purpose of these estimates.

Methods and terminology used in National Accounts can be obtained from the following publications:

- [UK National Accounts \(Blue Book\)](#)<sup>3</sup>
- [United Nations: Introduction to the System of National Accounts, 1993 \(SNA93\)](#)<sup>4</sup>
- [UK National Accounts: Concepts, Sources and Methods](#)<sup>5</sup>
- [\[ESA95\] Gross National Income \(GNI\): Inventory of Methods](#)<sup>6</sup>

## 2 Summary of Quality

### 2.1 Relevance

*The degree to which the statistical product meets user needs for both coverage and content.*

The [UK National Accounts](#)<sup>7</sup> provide the basis for analysing the economic performance of the country and are used throughout business and research communities, education, media and the general public. The accounts are major inputs to [HM Treasury](#)<sup>8</sup> and [Bank of England](#)<sup>9</sup> decisions on fiscal and monetary policy. Large parts of the accounts have a legal basis in the European Union. Most importantly GNI is used as one source on which contributions to the EU budget are based.

The UK National Accounts are compiled in accordance with the [European System of Accounts 1995 \(ESA 95\)](#)<sup>10</sup>, under EU law. [ESA 95](#)<sup>10</sup> is itself consistent with the standards set out in the [United Nations, System of National Accounts 1993 \(SNA 93\)](#)<sup>4</sup>

The accounts cover the UK as a whole, with three estimates of GDP published each quarter. In month one, the [Preliminary estimate](#)<sup>11</sup>, based on output, is published. In month two, these estimates are improved within the [Output Income and Expenditure](#)<sup>12</sup> release and more detail is available. In month three, the [UK Quarterly National Accounts](#)<sup>13</sup> are published, which includes a full National Accounts dataset, including sector accounts. These estimates are again updated in the [Blue Book](#)<sup>3</sup>, where a fully balanced dataset is published. Further details are provided in section 3 of this report.

Regional components of the national estimate are available. These are model-based, or derived from surveys that do not give sufficient sample sizes at smaller areas for reliable estimates to be derived. The Office for National Statistics publishes an annual news release presenting [Regional Gross Value Added \(GVA\)](#)<sup>14</sup> estimates for English regions, Scotland, Wales and Northern Ireland which includes component totals and industry group totals.

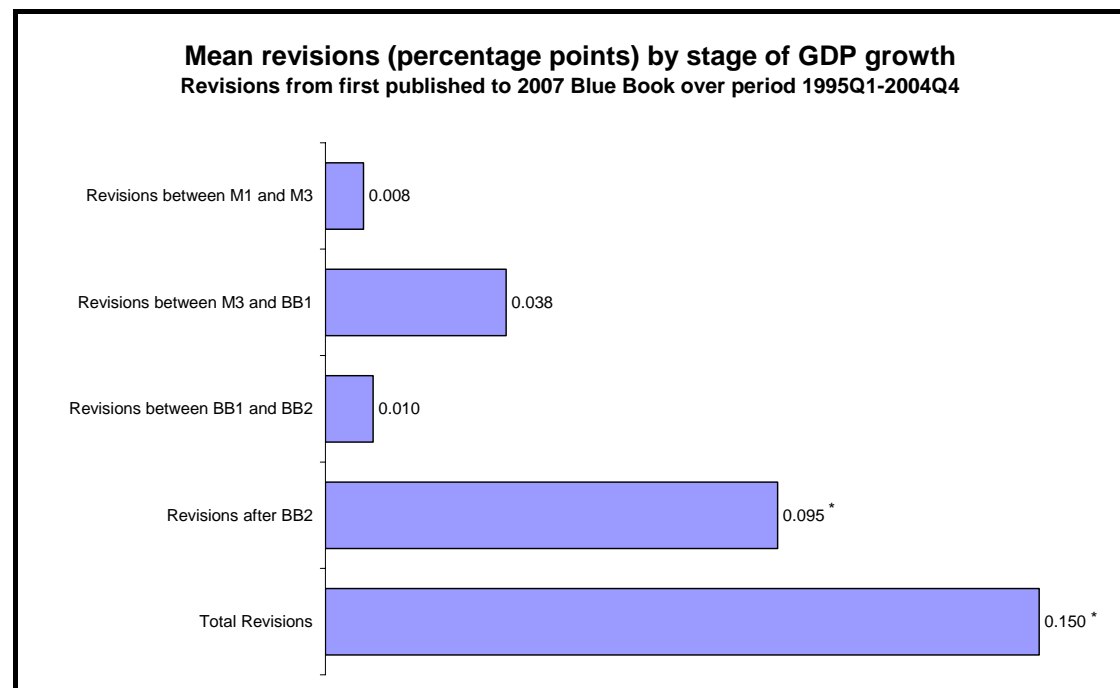
## 2.2 Accuracy

*The closeness between an estimated result and the (unknown) true value.*

There is no simple way of measuring the accuracy of GDP - that is, the extent to which the estimate measures the underlying 'true' value of GDP in the UK for a particular period. The latest edition of the [Blue Book](#)<sup>3</sup> (pages 27-30) provide more information on this.

One dimension of measuring accuracy is reliability, which is measured using evidence from analyses of revisions to assess the closeness of early estimates to subsequently estimated values. The results of revisions analysis are regularly presented in the background notes of [GDP First Releases](#)<sup>2</sup> and [revisions spreadsheets](#)<sup>15</sup> containing the data behind this. In addition, [Revisions to Quarterly GDP Growth and its components \(2007\)](#)<sup>16</sup>, published in the Economic and Labour Market Review, is part of an annual series of articles analysing revisions.

The chart below presents the mean revision by stage of the GDP compilation process, using ten years worth of data. A statistical test has been applied to the average revision to find out if it is statistically significantly different from zero. An asterisk (\*) shows that the test is significant.



It is important to note that there are other aspects to accuracy, which revisions analysis cannot attempt to measure. A value can be reliable (as in not revised) without being accurate.

Broader ways of examining accuracy are presented in a number of articles.

[Accuracy Assessment of National Accounts Statistics \(2002\)](#)<sup>17</sup> describes how basic "raw" data are transformed by a series of adjustments to give the statistical estimates that are used to compile the National Accounts.

[Early estimates of GDP: information content and forecasting methods \(2005\)](#)<sup>18</sup> analyses the amount of data available at different stages of the publication process for GDP (O). In summary:

- Preliminary estimate is based on 44 per cent data;
- Month 2 estimate is based on 67 per cent data; and

- Month 3 estimate is based on 80 per cent data.

More detail is available within Section 3 of this report.

Accuracy of the short-term estimates of GDP growth can be affected by response rates to key surveys. If a lower response rate than normal is received then there is a decrease in the information base of the estimate in the short term, and this may possibly lead to an increased chance of revisions in subsequent estimates of GDP.

[Monitoring the Quality of the National Accounts \(2008\)](#)<sup>19</sup> looks at ways of assessing accuracy, amid a wider discussion of quality in the current climate.

ONS are continually working on methodological changes to improve the accuracy of the National Accounts. For example, an improved method of estimating investment in own account software was introduced in the 2007 [Blue Book](#)<sup>3</sup>. Formerly, this was based on a demand-side survey, whereas the new method is a supply side approach, in accordance with the recommendations of Eurostat and the OECD.

## 2.3 Timeliness and Punctuality

*Timeliness refers to the lapse of time between publication and the period to which the data refer. Punctuality refers to the time lag between the actual and planned dates of publication.*

[Provisional estimates of GDP](#)<sup>11</sup> are published around 25 days after the end of the accounting period; the fastest in the world.

The online [Release Calendar](#)<sup>20</sup> is the official calendar of releases published by ONS and provides advanced notice of releases.

The [Special Data Dissemination Standards](#)<sup>21</sup> page on the International Monetary Funds' (IMF) website provides more information on periodicity and timeliness of estimates.

There is a trade off between accuracy and timeliness. Provisional outputs are timely, but less firmly based

Estimates may be revised during intermediate stages which are explained in section 3.

## 2.4 Accessibility and Clarity

*Accessibility is the ease with which users are able to access the data, also reflecting the format(s) in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the metadata, illustrations and accompanying advice.*

Availability of [GDP First Releases](#)<sup>2</sup> - Download free from the National Statistics website at 9.30am on the day of publication. ONS allows a list of agreed officials to have access to data before publication. This period was shortened to 24 hours from April 2008. Each GDP release is accompanied by a briefing note, providing a detailed explanation of the dataset.

Availability of the [UK National Accounts \(The Blue Book\)](#)<sup>3</sup> - Download free from the National Statistics website. A hard copy can be purchased through [Palgrave Macmillan](#)<sup>22</sup>

Availability of the [UK Economic Accounts](#)<sup>23</sup> - Download free from the National Statistics website. A hard copy can be purchased through [Palgrave Macmillan](#)<sup>22</sup> or downloaded free from the National Statistics website at 9.30am on the day of publication.

[Time series Data](#)<sup>24</sup> - Download data free from the National Statistics website.

General enquiries – A GDP helpline is available either by phone (02070 142083) or email ([gdp@ons.gov.uk](mailto:gdp@ons.gov.uk)) for queries on the GDP series, compilation methods, quality information or difficulties in finding the latest figures.

## 2.5 Comparability

*The degree to which data can be compared over time and domain.*

Every effort is made to ensure that the series is comparable over time, and a comparable time series is available back to 1948 for annual estimates (1955 for quarterly estimates). Where possible, changes to methodology are applied to the whole series to ensure this comparability is maintained. However, the [National Accounts revision policy](#)<sup>25</sup> may mean that this is not possible.

Since international standards such as [SNA 93](#)<sup>4</sup> and [ESA 95](#)<sup>10</sup> are used in the production of the National Accounts, the figures should be directly comparable with the accounts of other countries. However the revisions policies of these countries should be examined before comparing data for back periods.

## 2.6 Coherence

*The degree to which data that are derived from different sources or methods, but which refer to the same phenomenon, are similar.*

Data in the GDP first releases are consistent with the following ONS outputs:

- [Index of Production](#)<sup>26</sup>
- [Index of Services](#)<sup>27</sup>
- [Business Investment](#)<sup>28</sup>
- [Consumer Trends](#)<sup>29</sup>
- [Trade in Goods \(part of the UK Trade release\)](#)<sup>30</sup>

The only inconsistencies occur when more timely monthly releases introduce revisions in advance of their incorporation into the later quarterly publications. For example, data are not always consistent with Trade in Goods as the [UK Trade](#)<sup>30</sup> release contains more up to date quarterly data. Inconsistencies with the Public Sector Accounts releases are also possible due to the different revisions policies being applied to these releases.

When annual data first become available (in the February Month 2 release) they contain revisions to previous quarter data. This introduces inconsistencies between the latest [Output, Income and Expenditure](#)<sup>12</sup> data and [Sector and Financial Accounts](#)<sup>31</sup> data published in the earlier [Quarterly National Accounts \(Month 3\) release](#)<sup>13</sup>.

Another important aspect is the coherence between the different measures of GDP. Three different approaches exist (explained further in section 3 below) which are theoretically equal. However, since they are measured independently, statistical and measurement errors will mean that this is not the case.

Before a single estimate of GDP is published careful analysis of the coherence of the three measures is carried out and a number of methods are used to bring the three measures into line. Further explanation is provided within the Balancing Process section of this document. These issues also formed a major part of the article [Monitoring the Quality of the National Accounts \(2008\)](#)<sup>19</sup>.

## 3 Summary of Methods Used to Compile the Output

ONS produces a comprehensive set of National Accounts of which the main components are;

- Quarterly and annual GDP estimates;
- Quarterly and annual sector and financial accounts; and
- Financial and non-financial balance sheets.

[Trade statistics](#)<sup>32</sup>, [Balance of Payments](#)<sup>33</sup>, [Public Sector](#)<sup>34</sup> accounts and other short-term indicators of economic activity are all integrated within the system of National Accounts.

It is important to stress that the National Accounts are estimates of an underlying reality, based on statistical surveys, forecasts and models; they are not compiled through “accounting” in the common sense of the word.

GDP estimates use three theoretical approaches:

- output (or production)
- expenditure, and
- income.

The components of each approach to measuring GDP are estimated through sample surveys, and in the short run forecasts and models are used to estimate growth for the later months of the quarter, for which data have not been collected yet. A single estimate is then derived and published as the official estimate of GDP.

There are different methods to annual and quarterly estimation with subsequent integration. Two key principles drive GDP estimation in the UK.

**Principle 1** – The level of GDP is best estimated using a [supply and use framework](#)<sup>35</sup>. This breaks the economy down to display transactions of all goods and services between industries and final consumers in the UK, enabling GDP to be based on a fully consistent set of components.

**Principle 2** - Short-term growth is best estimated using the production measure of GDP, and the other two measures are brought in line with the production measure through careful analysis of the coherence of the three measures.

### **Production Stages**

*The main stages of the GDP production process are outlined here*

**[Month 1 \(M1\) Preliminary estimate](#)**<sup>11</sup> - This is based on information on output (production) only and is published around 25 days after the end of the quarter.

This preliminary estimate is based on 44 per cent ‘actual’ data. The rest is based on projections using a variety of modelling techniques. The data content varies by industry; for the service industries estimates are based on 39 per cent actual data, for the production industries the figure is 73 per cent and for the construction industry 0 per cent.

**[Month 2 \(M2\) Output Income and Expenditure](#)**<sup>12</sup> - The second estimate is published around 55 days after the end of the quarter.

In this release, ONS improves on the preliminary estimate by including more complete output data, as well as providing early information on GDP measured by the expenditure and income measures. At this point the output measure of GDP is based upon 67 per cent of actual data. The output measure is thought to be the best measure of growth in the short term, however at this point any conflicting information from the expenditure or income sides would be used to inform the average estimate of GDP.

**[Month 3 \(M3\) UK Quarterly National Accounts](#)**<sup>13</sup> - The third estimate is published 85 days after the end of the quarter.

In this release the ONS produces a full set of quarterly economic accounts, updating and expanding the information made available in the earlier estimate as well as updating estimates for earlier quarters in the current year and normally the previous year. Fuller survey data for components of each of the expenditure, output and income measures are available. At this point the output measure of GDP is based upon 80 per cent of actual data. This is still taken to be the best estimate of short term growth, although again, the other measures are used to inform the average measure of GDP, as well as to construct the sector and financial accounts.

[Annual Blue Book](#)<sup>3</sup> - Annual estimates are published in the Blue Book, usually in June or September.

The quarterly data are updated again during the production of the first and second estimates of annual GDP, as data from new and more comprehensive annual data sources become available. The second time an annual estimate is published in the Blue Book, Input-Output Supply and Use balancing is applied to the estimate for the first time. The Input-Output Supply and Use balancing is re-run in subsequent Blue Books using further benchmark data.

Methodological improvements may also be made during the publication of Blue Books.

Methodology is published on the IMF website under [Special Data Dissemination Standards](#)<sup>21</sup>. This website also provides comparisons with other countries systems.

### **Balancing Process**

The three measures become coherent in the long term through the use of a [supply and use framework](#)<sup>35</sup>. This enables differences between the estimates of supply and use of specific products to be investigated, and the accounts adjusted to ensure a balance.

The balancing chapter of the [Gross National Income \(GNI\) inventory](#)<sup>6</sup> provides further detail on the balancing process.

In the short run, there are not enough data available to produce a full supply-use balancing table. The first step in increasing the coherence of the raw data received is adjustment for quality by National Accounts experts following comprehensive analysis and investigation of possible incoherencies.

Estimates of quarterly growth from the expenditure and income sides are brought into line with the estimate measured from the output side using an alignment adjustment. The estimate measured from the output side is taken to be the best estimate of growth in the short term. The alignment adjustment is applied to the component of the accounts that is the most difficult to measure. It is applied to the series 'changes in inventories' (on the expenditure side) and 'gross operating surplus of non-financial private corporations' (on the income side).

The size of these alignment adjustments is one measure of coherence of the accounts, and is published in the [Quarterly National Accounts](#)<sup>13</sup>. These alignment adjustments sum to zero annually as output is not thought to be the best estimate of annual growth because unlike expenditure and income, it does not feed into the supply-use framework which is used to balance GDP.

Further to the alignment adjustments a statistical discrepancy remains between the three measures until supply use balancing is run, and this is also published. This is the difference between the sum of the expenditure components and average GDP - and similarly for income components. These are detailed in Table M of the [Quarterly National Accounts First Release](#)<sup>13</sup>.

The residual error is the amount by which the expenditure-based approach to measuring GDP exceeds the income-based estimate. It is also the sum of the statistical discrepancy (expenditure) with sign reversed and the statistical discrepancy (income) with natural sign (Tables C and D of the [Quarterly National Accounts First Release](#)<sup>13</sup>).

### **Deflation**

Nominal GDP (GDP in current prices) gives the value of GDP at a specific point in time. Growth in nominal GDP reflects the effects of inflation, as well as real GDP growth; it reflects changes in value terms. Real GDP (GDP in constant prices) excludes any inflationary issues and reflects the changes in volume terms. Real GDP is estimated using chained volume measures. For instance, in [The effects of annual chain linking on the output measure of GDP \(2003\)](#)<sup>36</sup> the volume growth is estimated using the most relevant set of weights available.

## Seasonal Adjustment

The headline estimates of quarterly GDP are seasonally adjusted (non-seasonally adjusted versions are available). Seasonal adjustment is the process of removing the variations associated with the time of year, or the arrangement of the calendar, from a time series.

GDP estimates, as for many time series, are difficult to analyse using raw data because seasonal effects dominate short-term movements. Identifying and removing the seasonal component leaves the trend and irregular components.

## 4 References

	Title of Reference	Website Location
1	Statistical Quality Programme	<a href="http://www.statistics.gov.uk/about/data/methodology/quality/default.asp">http://www.statistics.gov.uk/about/data/methodology/quality/default.asp</a>
2	Guide to GDP	<a href="http://www.statistics.gov.uk/ci/nugget.asp?id=56">http://www.statistics.gov.uk/ci/nugget.asp?id=56</a>
3	UK National Accounts (The Blue Book)	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=1143">http://www.statistics.gov.uk/statbase/product.asp?vlnk=1143</a>
4	United Nations: Introduction to SNA 93	<a href="http://unstats.un.org/unsd/sna1993/introduction.asp">http://unstats.un.org/unsd/sna1993/introduction.asp</a>
5	UK National Accounts, Concepts, Sources & Methods	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=1144">http://www.statistics.gov.uk/statbase/product.asp?vlnk=1144</a>
6	ESA95: GNI Inventory of Methods	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=6392">http://www.statistics.gov.uk/statbase/product.asp?vlnk=6392</a>
7	Guide to National Accounts	<a href="http://www.statistics.gov.uk/ci/nugget.asp?id=55">http://www.statistics.gov.uk/ci/nugget.asp?id=55</a>
8	HM Treasury	<a href="http://www.hm-treasury.gov.uk">http://www.hm-treasury.gov.uk</a>
9	Bank of England	<a href="http://www.bankofengland.co.uk/">http://www.bankofengland.co.uk/</a>
10	European System of Accounts 1995 (ESA 95)	<a href="http://circa.europa.eu/irc/dsis/nfaccount/info/data/esa95/esa95-new.htm">http://circa.europa.eu/irc/dsis/nfaccount/info/data/esa95/esa95-new.htm</a>
11	GDP Preliminary estimate	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=406">http://www.statistics.gov.uk/statbase/product.asp?vlnk=406</a>
12	Output, Expenditure and Income release	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=1129">http://www.statistics.gov.uk/statbase/product.asp?vlnk=1129</a>
13	Quarterly National Accounts	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=818">http://www.statistics.gov.uk/statbase/product.asp?vlnk=818</a>
14	Regional Gross Value Added	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=7359">http://www.statistics.gov.uk/statbase/product.asp?vlnk=7359</a>
15	GDP revisions triangles	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=13560">http://www.statistics.gov.uk/statbase/product.asp?vlnk=13560</a>
16	Revisions to Quarterly GDP Growth and its components (2007)	<a href="http://www.statistics.gov.uk/ci/article.asp?id=1888">http://www.statistics.gov.uk/ci/article.asp?id=1888</a>
17	Accuracy of National Accounts Statistics	<a href="http://www.statistics.gov.uk/ci/article.asp?id=275">http://www.statistics.gov.uk/ci/article.asp?id=275</a>
18	Early estimates of GDP: Information content and forecasting methods	<a href="http://www.statistics.gov.uk/ci/article.asp?id=1113">http://www.statistics.gov.uk/ci/article.asp?id=1113</a>
19	Monitoring the Quality of the National Accounts (2008)	<a href="http://www.statistics.gov.uk/ci/article.asp?id=1948">http://www.statistics.gov.uk/ci/article.asp?id=1948</a>
20	Release calendar	<a href="http://www.statistics.gov.uk/releasecalendar/currentreleases.asp">http://www.statistics.gov.uk/releasecalendar/currentreleases.asp</a>
21	Special Data Dissemination Standards (IMF)	<a href="http://dsbb.imf.org/applications/web/sddsctycatbaselist/?strcode=GBR&amp;strcat=NAG00">http://dsbb.imf.org/applications/web/sddsctycatbaselist/?strcode=GBR&amp;strcat=NAG00</a>
22	Palgrave Macmillan	<a href="http://www.palgrave.com/ons">http://www.palgrave.com/ons</a>
23	Time Series data	<a href="http://www.statistics.gov.uk/statbase/tsdintro.asp">http://www.statistics.gov.uk/statbase/tsdintro.asp</a>
24	UK Economic Accounts	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=1904">http://www.statistics.gov.uk/statbase/product.asp?vlnk=1904</a>
25	National Accounts: Revisions Statement	<a href="http://www.statistics.gov.uk/ci/article.asp?id=1187">http://www.statistics.gov.uk/ci/article.asp?id=1187</a>
26	Index of Production	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=6230">http://www.statistics.gov.uk/statbase/product.asp?vlnk=6230</a>
27	Index of Services	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=9333">http://www.statistics.gov.uk/statbase/product.asp?vlnk=9333</a>

28	Business Investment	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=171">http://www.statistics.gov.uk/statbase/product.asp?vlnk=171</a>
29	Consumer Trends	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=242">http://www.statistics.gov.uk/statbase/product.asp?vlnk=242</a>
30	UK Trade	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=1119">http://www.statistics.gov.uk/statbase/product.asp?vlnk=1119</a>
31	Institutional Sectors	<a href="http://www.statistics.gov.uk/ci/nugget.asp?id=154">http://www.statistics.gov.uk/ci/nugget.asp?id=154</a>
32	UK Trade latest data	<a href="http://www.statistics.gov.uk/ci/nugget.asp?id=199">http://www.statistics.gov.uk/ci/nugget.asp?id=199</a>
33	Balance of Payments latest data	<a href="http://www.statistics.gov.uk/ci/nugget.asp?id=194">http://www.statistics.gov.uk/ci/nugget.asp?id=194</a>
34	Public Sector Finances latest data	<a href="http://www.statistics.gov.uk/ci/nugget.asp?id=206">http://www.statistics.gov.uk/ci/nugget.asp?id=206</a>
35	Input-Output Supply and Use Framework	<a href="http://www.statistics.gov.uk/statbase/product.asp?vlnk=3026">http://www.statistics.gov.uk/statbase/product.asp?vlnk=3026</a>
36	The effects of annual chain-linking on the output measure of GDP (2003)	<a href="http://www.statistics.gov.uk/ci/article.asp?id=87">http://www.statistics.gov.uk/ci/article.asp?id=87</a>

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