

Article

Economic Review: August 2015

The main economic stories from National Statistics produced over the latest month, painting a coherent picture of the UK economic performance using recent economic data.

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1. Main points

- Changes introduced in Blue Book 2015 raise the level of current price GDP by 0.3% per year on average between 1997 and 2013, with larger increases focussed on the later periods. However, these revisions are considerably smaller than those introduced in Blue Book 2014, which revised the level of current price GDP by 4.0% on average between 1997 and 2012.
- Estimates of the average annual growth rate of real GDP between 1997 and 2013 are broadly unchanged at 2.0%, although estimates of annual growth in 2011, 2012 and 2013 have been strengthened by 0.4, 0.5 and 0.5 percentage points respectively, while growth in 2010 has been revised down by 0.4 percentage points.
- Much of this additional strength has arisen as a consequence of changes required by international regulations on the measurement of Gross National Income (GNI). The largest effects in recent years have come from an under-coverage adjustment for the output of small firms and new data, although a range of other methods changes have also had an important impact on both the level and growth rates of GDP.
- The changes alter the profile of the UK's economic recovery: weakening growth during 2010, but strengthening growth over the following years. As a result, the UK economy is now thought to have recovered its pre-downturn level of output in Q2 2013: one quarter earlier than previously thought. These revisions notwithstanding, the current recovery remains the weakest in the past half-century.
- The Blue Book 2015 changes do little to alter the broad economic narrative of recent years. In particular, they do not significantly alter the scale of the 'productivity puzzle'.

2. Introduction

This special edition of the Economic Review examines the impact of methodological and data changes being introduced to the National Accounts in Blue Book 2015. These changes are designed to ensure that official statistics reflect the changing nature of the UK and global economies, to enable fair and meaningful international comparisons and to permit analysis of current economic trends on the best available data. While the scope and impact of these changes is smaller than in previous years – and notably less than in Blue Book 2014 – there are a range of important measurement developments.

The changes being introduced fall into three broad categories: (a) those related to meeting international guidelines on the measurement of Gross National Income (GNI), (b) incorporating reclassification decisions into the National Accounts and (c) a range of other methodological and data improvements. Of these, changes related to the measurement of GNI have the greatest impact on current price GDP, affecting estimates of the income of small firms in particular. This change, combined with new data on concealed income, methodological improvements to the measurement of the Non-Profit Institutions Serving Households (NPISH) sector and a range of other, smaller changes, mean that the GNI improvement category accounts for a large fraction of the revisions introduced in Blue Book 2015. Reclassifications and the introduction of other new methods and data all have a more modest impact – albeit more concentrated in recent years. The [impact of these changes on current price Gross Domestic Product \(GDP\)](#) and GNI has been the subject of several recent articles, and indicative estimates of their [impact on chained volume measure GDP](#) are published alongside this edition of the Economic Review.

In aggregate, the effect of these changes is to raise the level of current price GDP by £4.2bn per year on average between 1997 and 2013, or 0.3%. However, this varies depending on the period considered. The level of current price GDP was revised up by around £2.6bn per year between 1997 and 2011, or around 0.2%. However, the impact is larger in more recent years: increasing the level of current price GDP by 0.6% and 1.3% in 2012 and 2013 respectively. All these changes are considerably more modest than those introduced in Blue Book 2014, which increased the level of current price GDP by 4.0% per year on average between 1997 and 2012.

Much of the strength of the current price measure has been passed through to chained volume estimates of GDP, in particular in recent years. Over the 1997 to 2013 period as a whole, the compound average quarterly growth rate of real GDP is unrevised at 0.5%. However, the changes introduced in the Blue Book 2015 raise the growth of real GDP in 2011, 2012 and 2013, partially offset by a reduction in growth in 2010. Consequently, these revisions have the effect of strengthening estimates of growth during the recovery, with a corresponding impact on the recoveries of both GDP per capita and productivity. However, the changes introduced do little to solve the 'productivity puzzle'.

This edition of the Economic Review first sets out some details of the specific changes to be introduced in Blue Book 2015. It then considers their impact on current price and chained volume estimates of GDP, before examining the implications for the economic recovery and the UK's productivity performance. The final sections set out indicative estimates of the Blue Book 2015 consistent components of the expenditure and income measures of GDP.

3. Changes introduced in Blue Book 2015

This special edition of the Economic Review sets out the impact of methodological improvements and new data to be introduced in Blue Book 2015 on a range of National Accounts aggregates. These changes are designed to ensure that official statistics reflect the changing nature of the UK and global economies, to enable fair and meaningful international comparisons and to permit analysis of current economic trends on the best available data. This section briefly sets out the main changes which are being introduced to the National Accounts; following sections examine their impact on the economic narrative between 1997 and 2013.

Although smaller in scale than [Blue Book 2014](#), the annual National Accounts 2015 will include a range of important changes, including measures designed to:

1. address Gross National Income (GNI) reservations on a European System of Accounts 1995 (ESA 1995) basis
2. incorporate the impact of reclassification decisions
3. implement a range of other methodological improvements

Among these changes, addressing the GNI reservations has the greatest impact on current price National Accounts aggregates. GNI – which captures the value of income generated by production which accrues to the individuals in an economy, and was previously known as Gross National Product – is one measure of [economic well-being](#), and forms the basis for the relative contributions of member states to the budget of the European Union (EU). Due to its operational importance, the EU statistical office (Eurostat) carries out regular audits of the methods and data used in its estimation to ensure comparability across countries. Changes introduced in this category in Blue Book 2015 include a range of methodological improvements which apply to all member states – known as transversal reservations – and a number of UK-specific improvements, all of which are designed to ensure international comparability.

Details of these improvements – including the specific data involved and methodologies used – have been published by ONS in a range of articles over recent months. The most substantial change involves improvements to UK 'exhaustiveness' provisions, which are designed to account for both (a) under-coverage of the incomes accruing to small businesses and (b) income concealed by businesses and households through the evasion of [taxes \(225.9 Kb Pdf\)](#). The first of these changes ensures that sufficient provision is made for the income of businesses which fall below the Value Added Tax (VAT) and Pay as You Earn (PAYE) thresholds, using updated administrative data from Her Majesty's Revenue and Customs (HMRC). The second replaces the existing National Accounts treatment of concealed income with new, more comprehensive, modelled estimates of evaded corporation and income tax provided by HMRC.

Several other changes are also being implemented under the GNI improvements category. Following detailed analysis of the output of Non-Profit Institutions Serving Households ([NPISH sector \(185.9 Kb Pdf\)](#)) – which was the subject of [substantial changes in 2014](#) – ONS has also introduced changes to refine the accuracy of estimates of the contribution of NPISH to aggregate expenditure. Other changes in this category include revised treatments of vehicle registration tax, the consumption of fixed capital on roads and the repair and [maintenance of dwellings](#). A further set of changes has also been introduced to improve the measurement of [cross-border property income flows \(457.7 Kb Pdf\)](#), although these are neutral in terms of their impact on current price Gross Domestic Product (GDP).

Alongside these GNI improvements, ONS has also been undertaking work to ensure that recent reclassification decisions are reflected in the National Accounts. These include the reclassification of Network Rail from the Private Non-Financial Corporations (PNFC) sector to Central Government, the reclassification of Transport for London from Public Corporations to Local Government, as well as a range of other changes – including a reclassification of the 3G/4G mobile telephone spectrum sales. Some of these have an impact on a range of National Accounts aggregates because of both improved data and differences in the measurement of output between sectors. In particular, the switch from a turnover-based measure of output for Network Rail to an expenditure-based measure – consistent with the move from the private to the public sector – has increased current price output every year since 2004.

Thirdly, the annual Blue Book is also an opportunity for ONS to introduce a range of methodological and data changes which improve on existing measures of the UK economy. These include regular improvements – such as updating the National Accounts base and reference years by a year, on this occasion from 2011 to 2012 – but also a set of more substantive changes. This category includes the impact of carrying out the full input-output supply and use balancing process for 2013 for the first time. It also includes several other changes related to the measurement of Gross Fixed Capital Formation (GFCF), such as a revised [deflator for software investment](#). Further changes in this category that also have an impact on National Accounts aggregates include measures to:

1. align estimates of owner occupiers' housing costs in the National Accounts with CPIH in 2010
2. improve estimates of the imputed present value of local authority pension schemes
3. strengthen estimates of the consumption of alcohol and tobacco
4. improve estimates of trade in non-monetary gold
5. correct two errors – in the measurement of insurance industry output and estimates of global narcotics prices

Finally, revisions also arise from the introduction of newly available survey data. Reflecting the long time-lags associated with some datasets, these data have an impact on 2011, 2012 and 2013. This includes new data from the Annual Business Survey, the International Trade in Services survey and on wages and salaries from HMRC.

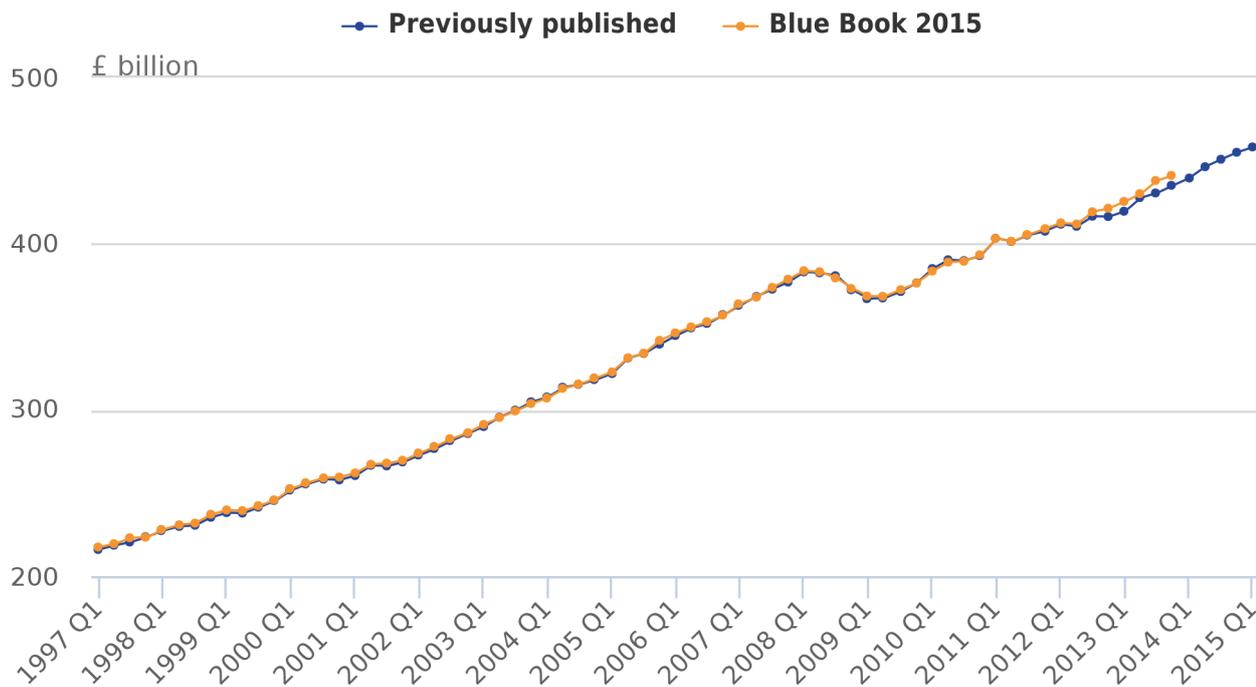
4. Estimated impact of Blue Book 2015 on GDP: 1997 to 2013

Indicative estimates of the impact of these methodological and data improvements to the National Accounts have been the subject of several recent articles. As near-final data have become available, articles have been published on their [impact on current price Gross Domestic Product \(GDP\) between 1997 and 2010](#) and on current price [Gross National Income \(GNI\) between 2002 and 2010](#). Estimates of their impact on chained volume measures of GDP between 1997 and 2013 are published alongside this edition of the Economic Review and are analysed in more depth in following sections. In the spirit of these companion articles, all the data considered here are near-final, as there may be further adjustments to the data before their final publication. Further details on these changes and new data – including the quarterly series up to and including Q2 2015 – will be published with the Blue Book 2015 consistent Quarterly National Accounts (QNA) on 30 September 2015.

Current price estimates

The impact of these changes on current price estimates of GDP is relatively modest, concentrated in the most recent years and is considerably smaller than the impact of changes introduced in Blue Book 2014. Figure 1 presents the previously published quarterly current price level of GDP (consistent with the QNA published on 30 June 2015), compared with indicative estimates consistent with Blue Book 2015. In aggregate, the effect of these changes is to raise the level of current price GDP by £4.2bn per year on average between 1997 and 2013, or 0.3%. Figure 1 shows that changes to the National Accounts had very little impact between 1997 and 2011: increasing the estimate of GDP by just £0.7bn per quarter on average over this period, or around 0.2%. The revision is slightly larger in later periods: rising from an annual average of £2.6bn between 1997 and 2011 to £9.8bn (0.6%) and £21.8bn (1.3%) in 2012 and 2013 respectively. By contrast, the changes introduced in Blue Book 2014 were significantly larger: raising the level of current price GDP by 4% on average between 1997 and 2012.

Figure 1: Current price GDP levels: Previously published compared with indicative Blue Book 2015, current price, seasonally adjusted



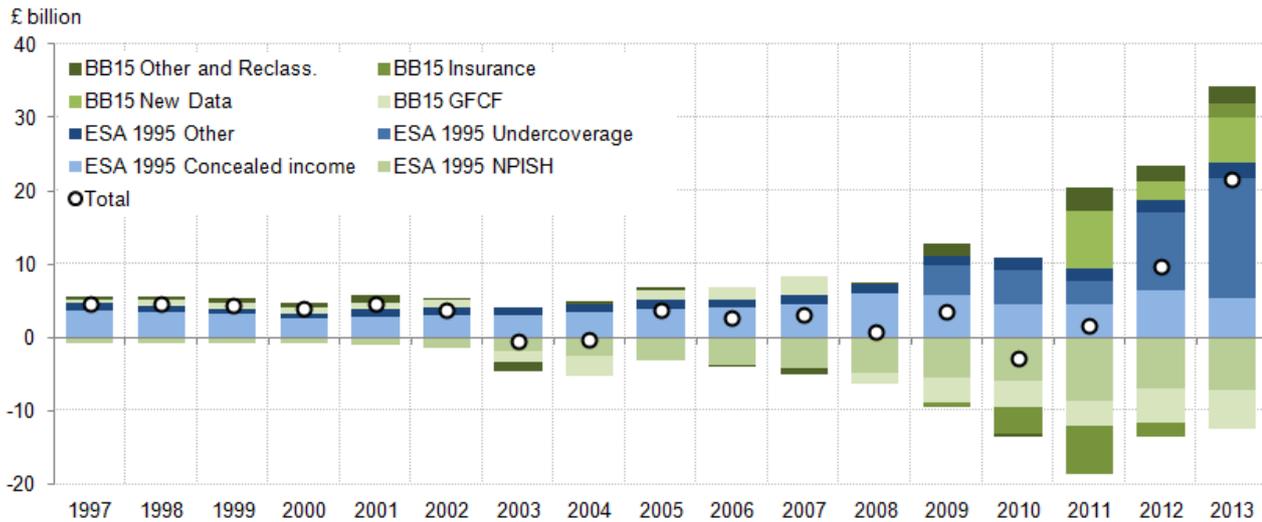
Source: Office for National Statistics

Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013.

Much of this revision is accounted for by the changes to the exhaustiveness provisions made in the National Accounts, although new data and changes to Gross Fixed Capital Formation (GFCF) also made substantial contributions in recent quarters. Figure 2 divides the revision to the current price level of GDP into two broad categories – those arising from addressing the GNI reservations (in blue and denoted by ESA 1995) and those arising from the other Blue Book changes (in green). It shows that the majority of the revisions over the period since 1997 are related to addressing the GNI reservations, and in particular to the changed exhaustiveness provisions in the National Accounts. New estimates of concealed income account for much of the upward revision in the early years of this series, while the under-coverage adjustment made for small firms makes a large impact in 2012 and 2013. New and corrected data also makes a positive contribution in recent years, offset by downwards revisions arising from updated estimates of the expenditure of the Non-Profit Institutions Serving Household (NPISH) sector and GFCF in particular.

Figure 2: Contributions to the revision to current price GDP: Previously published compared with Blue Book 2015, current price



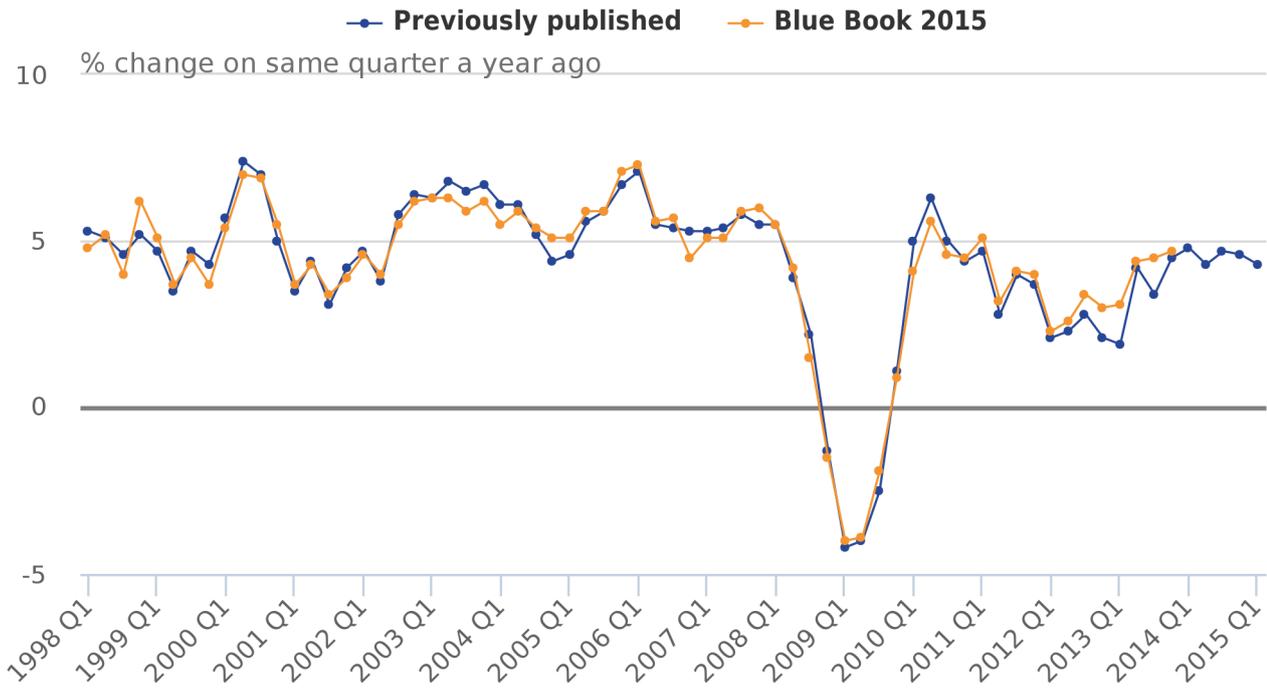
Source: Office for National Statistics

Notes:

1. Indicative Blue Book 2015 estimates are currently only available to 2013. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015. NPISH stands for non-profit institutions serving households. GFCF stands for gross fixed capital formation.

The modest scale of these revisions to the level of current price GDP implies equally modest changes to the growth rate of this series. Figure 3 shows the quarter on same quarter a year ago growth rate for the previously published and indicative Blue Book 2015 series presented in Figure 1. As with the level of current price GDP, the differences between these series are concentrated towards the end of the period, in 2012 and 2013 in particular. During these two years, the average revision to quarter on same quarter a year ago growth is 0.6 percentage points – compared with an average revision of 0.3 percentage points per quarter in 2011 and an average revision of -0.1 percentage points per quarter between 1998 and 2010. Taking the Q2 1997 to Q4 2013 period as a whole, the average revision to quarterly growth is 0.0 percentage points.

Figure 3: Current price GDP quarter on same quarter a year ago growth rates: Previously published compared with indicative Blue Book 2015, current price, seasonally adjusted



Source: Office for National Statistics

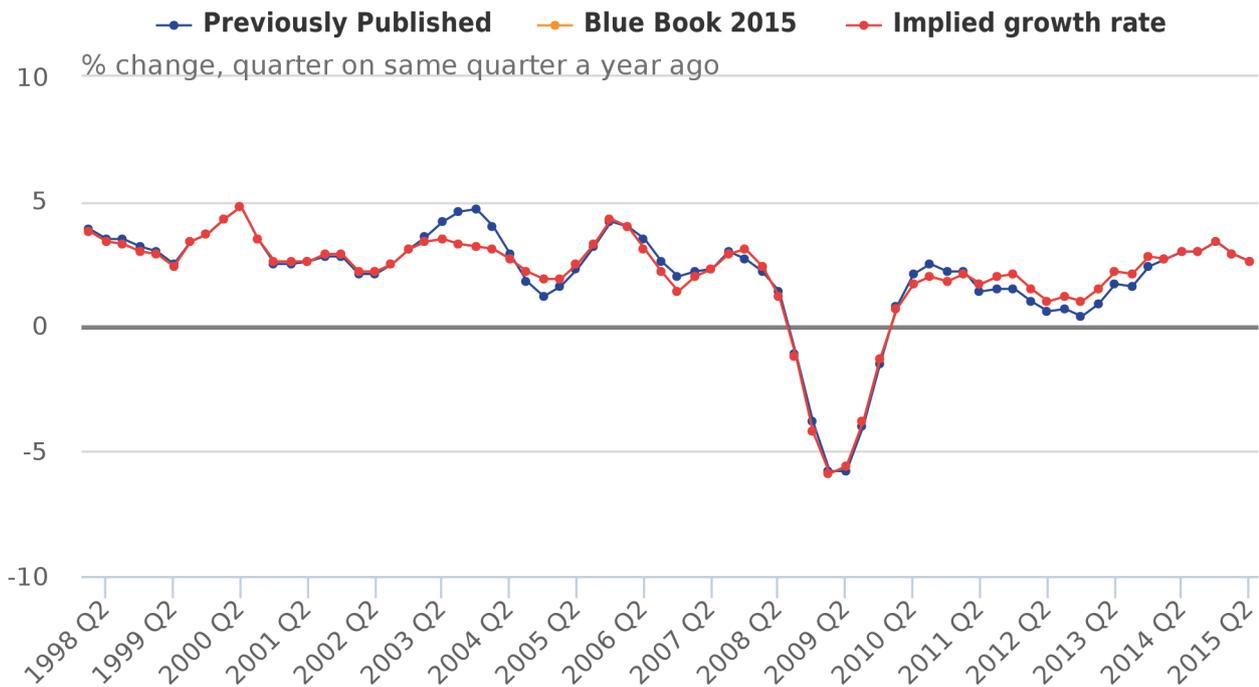
Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013.

Constant price (Chained volume measure)

The changes introduced in Blue Book 2015 also have a relatively modest impact on the growth of the chained volume measure of GDP over the 1998 to 2013 period, largely coinciding with the changes to growth in GDP in current prices. Figure 4 shows the quarter on same quarter a year ago growth rates for real GDP on both a previously published and Blue Book 2015 basis. Taking the period as a whole, the compound average quarterly growth rate of the UK economy is unchanged to one decimal place: averaging 0.5% per quarter between Q1 1997 and Q4 2013. The average growth rate in the decade prior to the downturn is also unrevised at 0.7% per quarter. However, growth has been revised notably lower in 2003 (from 4.4% to 3.3% per year) and 2010 (from 1.9% to 1.5%), and is now estimated to have been slightly stronger in 2011, 2012 and 2013. The causes of these changes are explored in more detail below.

Figure 4: Real GDP quarter on same quarter a year ago growth rates, Previously published compared with indicative Blue Book 2015, chained volume measure, seasonally adjusted



Source: Office for National Statistics

Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013.

The relatively small scale of the revisions through much of this time period is reflected in the annual growth rates of real GDP and the revisions presented in Table 1 below. While the compound average annual growth rate for the whole period is unrevised at 2.0%, the revisions for single years vary between -0.4 and +0.5 percentage points – excluding 2003, which is revised down by 1.0 percentage point. While the changes to earlier years are generally relatively modest, the revisions towards the end of the period tend to be larger, when the impact of both new data and recent methods changes is greatest. Real GDP growth in 2011, 2012 and 2013 are all revised upwards on an annual basis, by 0.4, 0.5 and 0.5 percentage points respectively, but 2010 is revised down by 0.4 percentage points.

Table 1: Revision to annual real GDP growth: Previously published compared with indicative Blue Book 2015, chained volume measure, seasonally adjusted

	%		Percentage points
	Previously published	Blue Book 2015	Difference
1998	3.5	3.4	-0.1
1999	3.2	3.1	-0.1
2000	3.8	3.8	0.0
2001	2.7	2.8	0.1
2002	2.5	2.5	0.0
2003	4.3	3.3	-1.0
2004	2.5	2.5	0.0
2005	2.8	3.0	0.2
2006	3.0	2.8	-0.2
2007	2.6	2.8	0.2
2008	-0.3	-0.5	-0.2
2009	-4.3	-4.2	0.1
2010	1.9	1.5	-0.4
2011	1.6	2.0	0.4
2012	0.7	1.2	0.5
2013	1.7	2.2	0.5
2014	3.0	-	-
Compound Average Annual Growth Rate	2.0	2.0	0.0

Source: Office for National Statistics

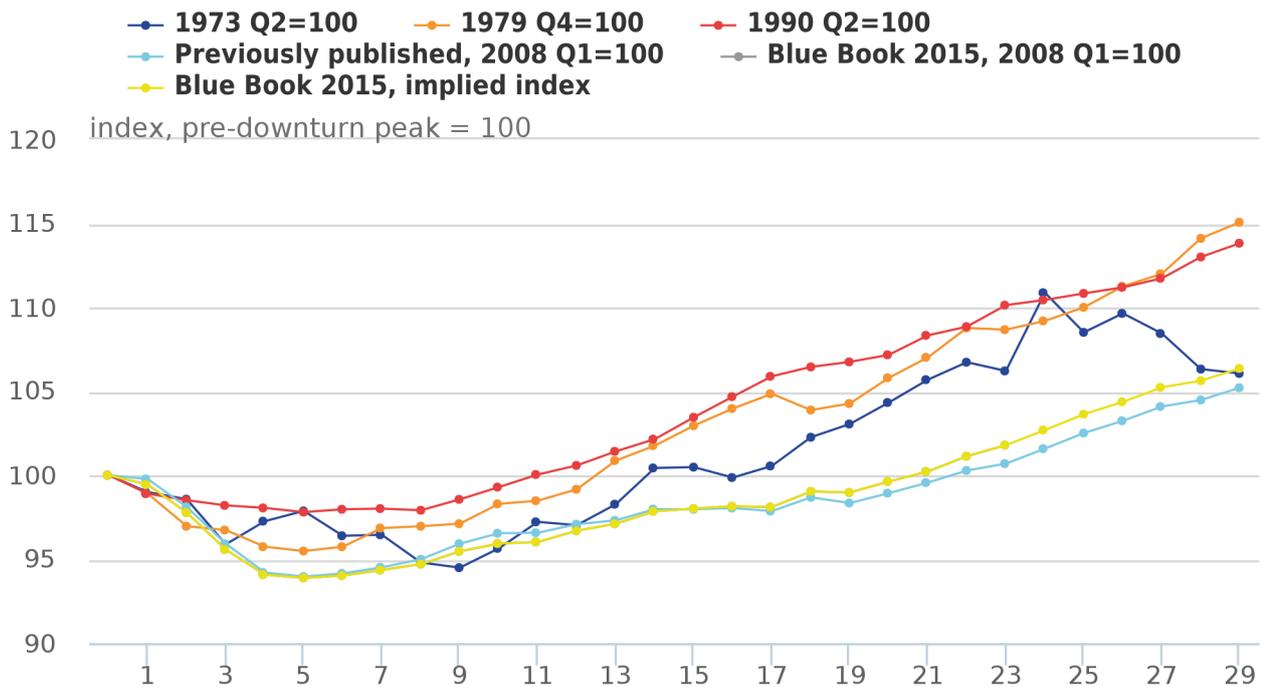
Notes:

1. Figures may not sum due to rounding. Indicative Blue Book 2015 estimates are currently only available to 2013.

5. The economic downturn and recovery: GDP and GDP per capita

As a consequence of these revisions, the profile of GDP following the most recent economic downturn has also changed. However, the timing and depth of the downturn in 2008-09 is broadly unchanged, and the recovery remains the weakest of the past half-century (Figure 5). The cumulative fall in output between the peak and trough of the economic downturn (Q1 2008 to Q2 2009), which was previously estimated to have been 6.0%, has increased slightly to 6.1%. The strength of the recovery has also been revised: suggesting a weaker initial recovery, followed by stronger growth between 2011 and 2013, enabling UK output to re-attain its pre-downturn peak in Q2 2013, one quarter earlier than previously estimated. The stronger growth during this later period means that the UK economy is estimated to have been 1.8% larger than the pre-downturn level by Q4 2013 compared with the 0.7% previously published. However, as shown in Figure 5, the recovery remains weak by historical standards.

Figure 5: Comparison of GDP growth following pre-downturn peaks: Previously published compared with indicative Blue Book 2015, chained volume measure, seasonally adjusted



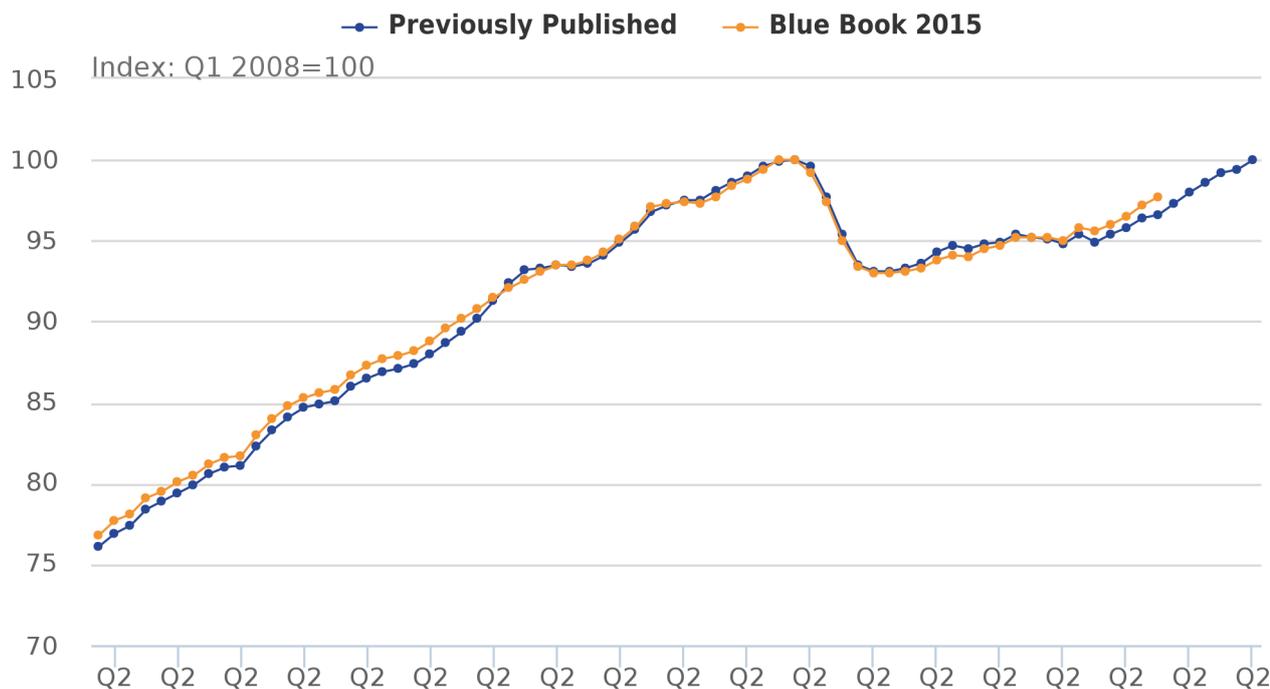
Source: Office for National Statistics

Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013.

These changes to the strength of the recovery also have a bearing on the level of real GDP per capita, which is an important indicator of living standards. On a Blue Book 2015 basis, output per capita in Q4 2013 was 2.3% below its pre-downturn peak – albeit slightly higher than on the previously published basis (Figure 6). The profile of this series will be updated to Q2 2015 in the QNA publication on 30 September 2015, in which Blue Book 2015 consistent estimates of GDP and revised population estimates will be published.

Figure 6: GDP per capita: Previously published compared with indicative Blue Book 2015: Q1 2008=100, chained volume measure, seasonally adjusted



Source: Office for National Statistics

Notes:

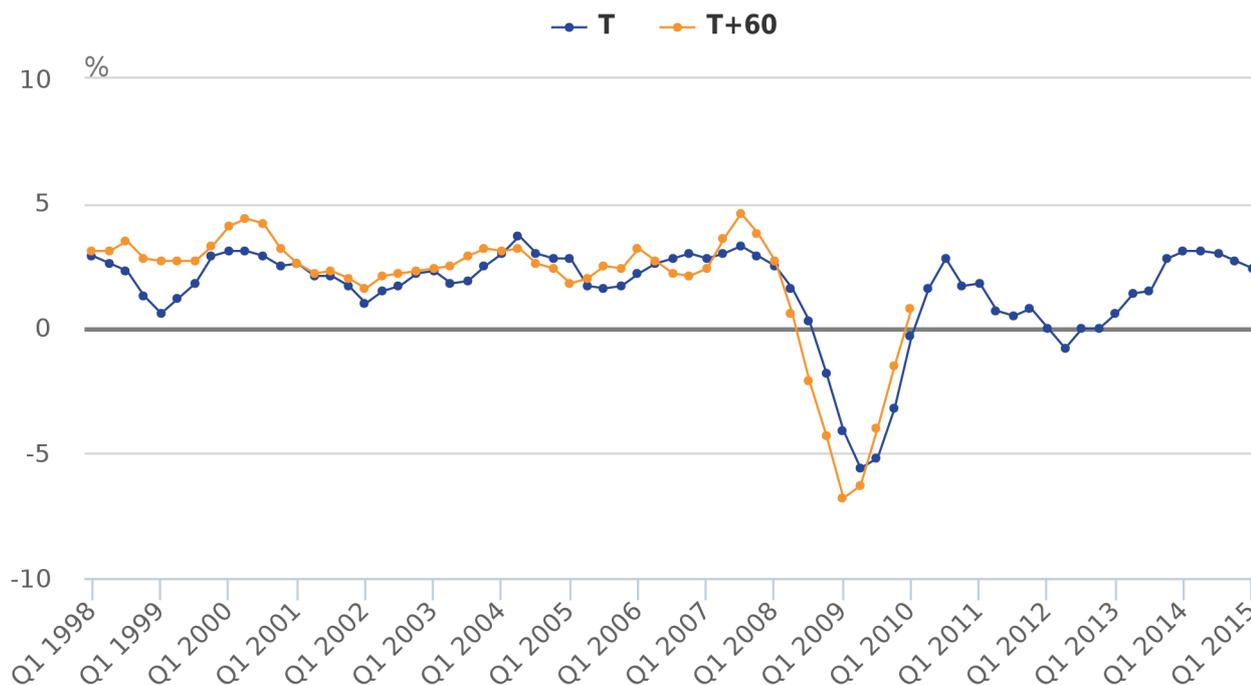
1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013.
2. Note that revised population estimates will be published in the QNA publication on 30 September.

6. Revisions

The introduction of new and improved methods, changes to the coverage of the National Accounts and the incorporation of newly available data all have an impact on current estimates of real GDP growth and can affect our understanding of the recent performance of the UK economy. These revisions reflect the results of a trade-off: Early estimates of GDP – which utilise all the information available at the time – provide users with a timely indication of current economic trends. Estimates compiled over a longer period – which can incorporate more complete, but less timely data sources utilising more comprehensive methods – can give users a more precise picture of the UK economy’s recent performance, albeit with a time-lag.

Figure 7 gives some sense of the scale of the revisions between the preliminary (T) estimate – compiled just 25 days after the end of the quarter to which it refers – and a more complete (T+60) estimate – published five years after the period to which it referred, by which time all changes due to new data have been incorporated. Comparing the preliminary estimate (T) and (T+60) measures over this period shows a relatively strong relationship between the initial estimate and the corresponding estimate five years later. While the magnitude of any single quarterly estimate may change over this period, the difference rarely alters the broad economic narrative.

Figure 7: GDP revisions, quarter on same quarter a year ago growth rate, T and T+60, chained volume measure, seasonally adjusted



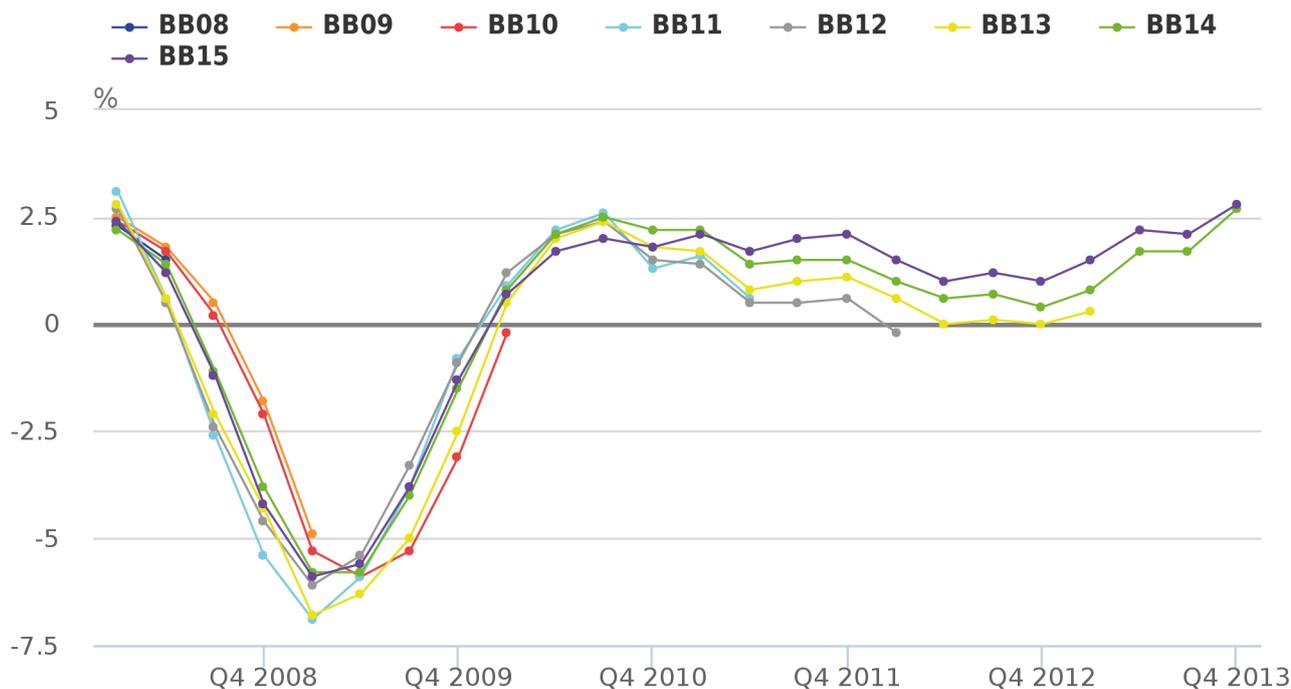
Source: Office for National Statistics

Notes:

1. 'T' shows the preliminary estimate and 'T+60' shows the estimate published five years after the period to which it refers.

While the preliminary and T+60 estimates of GDP growth have been quite similar over recent years, there is some evidence that revisions tend to be slightly larger around turning points in the economic cycle. This likely reflects the greater level of difficulty involved in estimating GDP growth as the economy is changing direction and in balancing sometimes conflicting sources of information. Figure 7 gives some indication of this effect – in particular in the downwards revisions introduced to the depth of the economic downturn in 2009. Figure 8 analyses this effect further by examining the profile of quarter on same quarter a year earlier GDP growth since Q1 2008 through recent Blue Book vintages. It shows that early estimates of GDP growth at the start of the economic downturn were subsequently revised down, and that the later estimates of the strength of the recovery have been gradually revised up. In particular, GDP growth in 2011 and 2012 has been revised up in successive Blue Books. Both the direction and size of these revisions suggest that measurement is more difficult around economic turning points.

Figure 8: GDP growth during the economic downturn, quarter on same quarter a year earlier, multiple Blue Book vintages, chained volume measure, seasonally adjusted



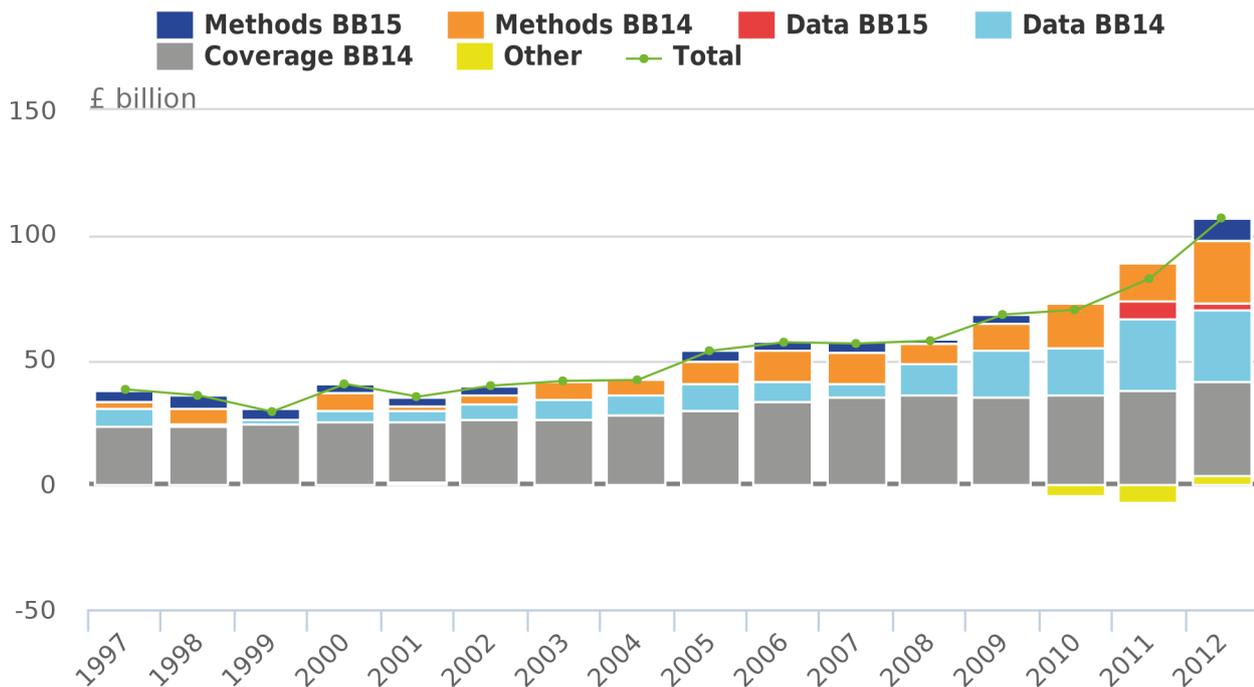
Source: Office for National Statistics

Notes:

1. Each line shows the estimates of quarter on same quarter a year earlier real GDP growth, published in the Quarterly National Accounts that was consistent with the respective Blue Book. For BB08 this was Q2 2008, for BB09 this was Q1 2009, for BB10 this was Q1 2010, for BB11 this was Q2 2011, for BB12 this was Q1 2012, for BB13 this was Q1 2013 and for BB14 this was Q2 2014.

Understanding the nature of these revisions – and in particular the balance between those arising from new methods and coverage, and those from newly available data – is important when analysing recent revisions to UK economic data. While the impact of individual changes on chained volume estimates of GDP for successive Blue Books is not available, it is possible to examine how the changes introduced in the two most recent Blue Books (2014 and 2015) have affected current price GDP. Figure 9 divides the changes introduced in both the 2014 and 2015 Blue Books into three broad categories – those arising from changes in coverage, new methods, and new data – and shows their respective contributions to the revision to annual current price GDP over this period.

Figure 9: Contributions of data, coverage and methods changes to the revision to current price GDP, pre-Blue Book 2014 estimates compared with indicative Blue Book 2015



Source: Office for National Statistics

Notes:

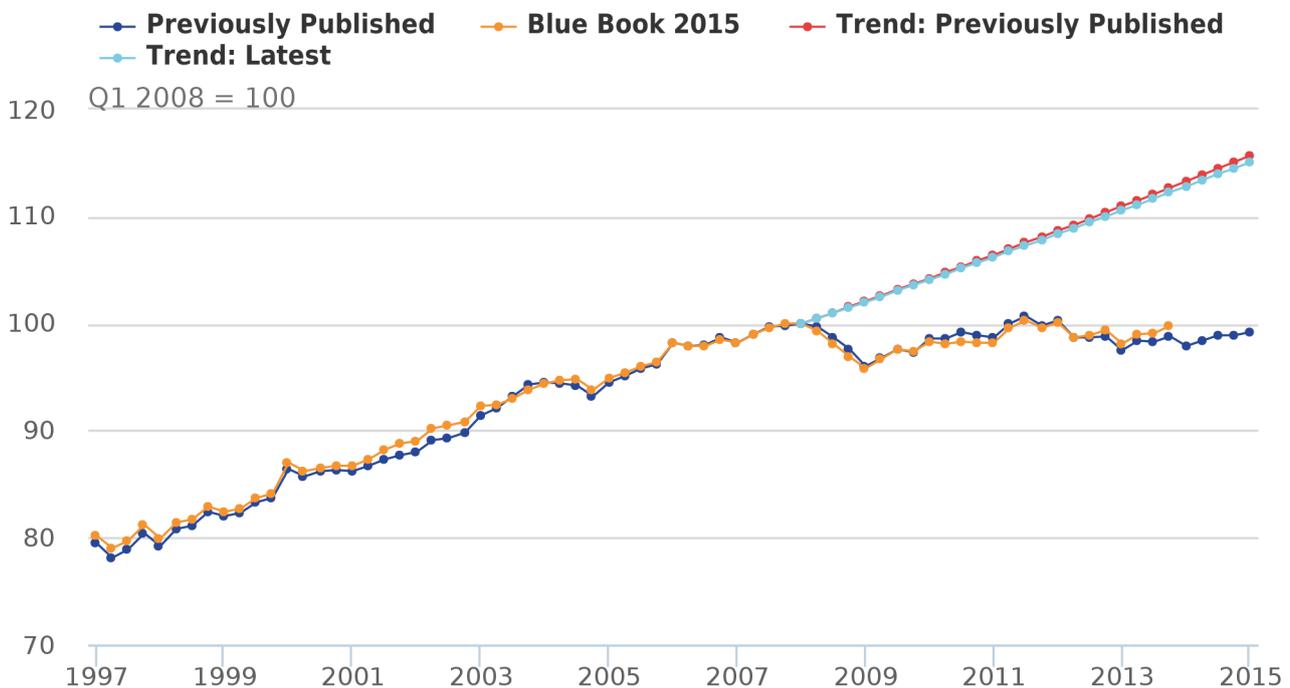
1. 'Other' includes the removal of the statistical discrepancy in BB14 and changes relating to insurance and narcotics in BB15. 'Coverage' includes the BB14 changes relating to illegal activities, research & development, and weapons. 'Methods' includes a number of changes in both BB14 and BB15: in BB14 the changes relating to Financial Intermediation Services Indirectly Measured (FISIM) and pensions are the most significant; in BB15 all changes were 'methods' changes apart from the incorporation of new data and insurance and narcotics, with the changes relating to exhaustiveness the most significant. 'Data' includes Review of NPISH units, GFCF and other changes (assumed to be ESA95) from BB14, and the new data changes in BB15.

Taking these two Blue Books together, the upwards revisions to recent years reflect a mixture of new methods, coverage and data. New methods and coverage account for around two-thirds of the upwards revision to the level of current price GDP in 2011 and 2012, rising to more than 80% between 1997 and 2008. The impact of new data – reflecting the long lags with which some detailed survey data become available – is concentrated in the final years of this period. Figure 9 also makes it clear that the magnitude of the changes introduced in Blue Book 2015 is considerably smaller than those introduced in Blue Book 2014.

7. Productivity

The revisions to GDP – in particular during the recent economic recovery – also have implications for the level of productivity, but do little to reduce the scale of the ‘productivity puzzle’. The recent weakness of output per hour growth – both in the UK and in other developed economies – is one of the defining features of the recent recovery, and is thought to be associated with slow earnings growth since 2008. The slightly higher estimates of GDP growth introduced in the Blue Book combine with unchanged hours worked data to produce a slightly higher profile for productivity (Figure 10). On a Blue Book 2015 basis, output per hour fell by just over 4% from Q1 2008 to Q1 2009, recovering its pre-downturn peak in Q3 2011: slightly later than previously estimated. However, despite the strengthened recovery of GDP, output per hour growth since the start of 2012 has broadly followed the previously published path. Productivity on a Blue Book 2015 basis was 11% below its pre-downturn trend (based on average quarterly growth in productivity in the decade between 1997 and 2007) in Q4 2013, compared with 12% below on a comparable, previously published basis. Both data series show a clear break in productivity performance in 2008. The pre-2007 productivity growth path is itself broadly unchanged using the latest indicative estimates.

Figure 10: Output per hour relative to trend: Previously published compared with indicative Blue Book 2015, Q1 2008=100, chained volume measure, seasonally adjusted



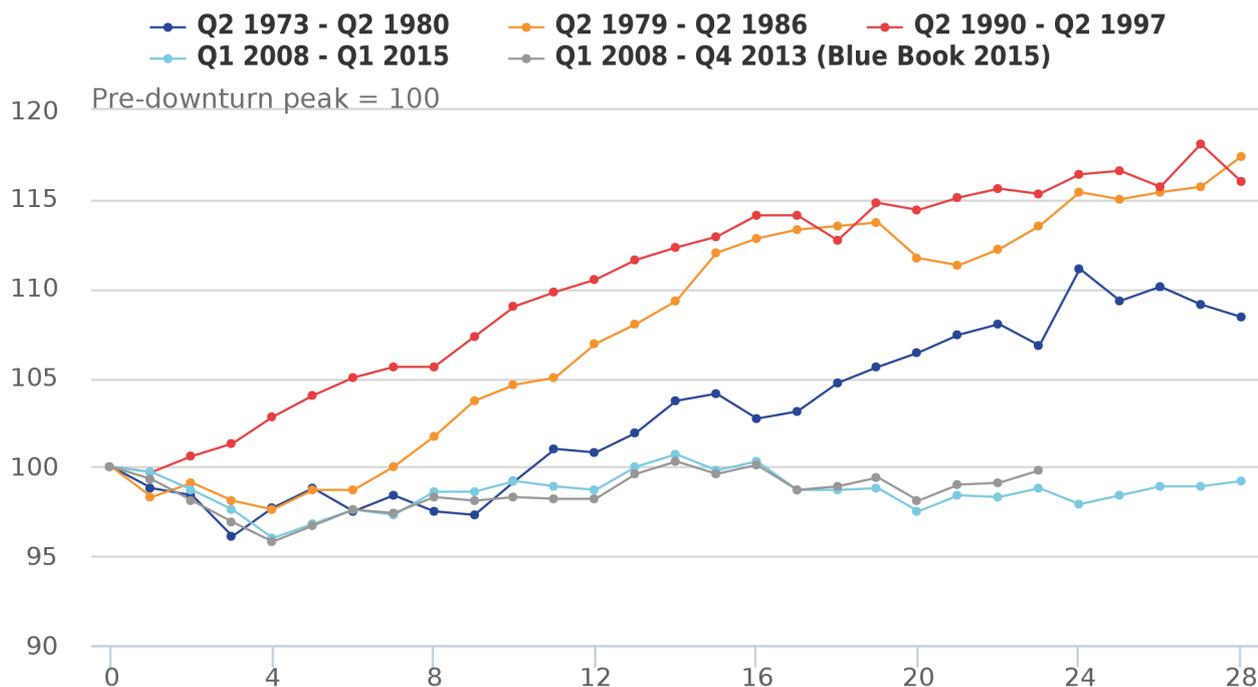
Source: Office for National Statistics

Notes:

1. Note that these estimates of Blue Book 2015 consistent productivity are indicative: A complete set of Blue Book 2015 consistent labour productivity data will be published on 1 October 2015. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.
2. The trend rate is calculated by taking a compound average growth rate of both series between Q1 1997 and Q4 2007. This is then applied to both series from Q1 2008 onwards.

The relatively small changes to the profile of productivity since 2008 mean that the weakness of output per hour growth during the recovery remains marked. Productivity is estimated to have been broadly flat throughout the period of recovery between 2009 and 2013: a phenomenon unprecedented in the UK since the Second World War. According to the latest estimates, productivity approached pre-downturn levels at the end of 2013. However, at the same stages of the 1990s and 1980s recoveries, productivity was 15.3% and 13.5% above the respective pre-downturn levels (Figure 11).

Figure 11: Comparison of output per hour following pre-downturn peaks: Previously published compared with indicative Blue Book 2015, chained volume measure, seasonally adjusted



Source: Office for National Statistics

Notes:

1. Estimates of Blue Book 2015 consistent productivity are indicative: A complete set of Blue Book 2015 consistent labour productivity data will be published on 1 October 2015. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.

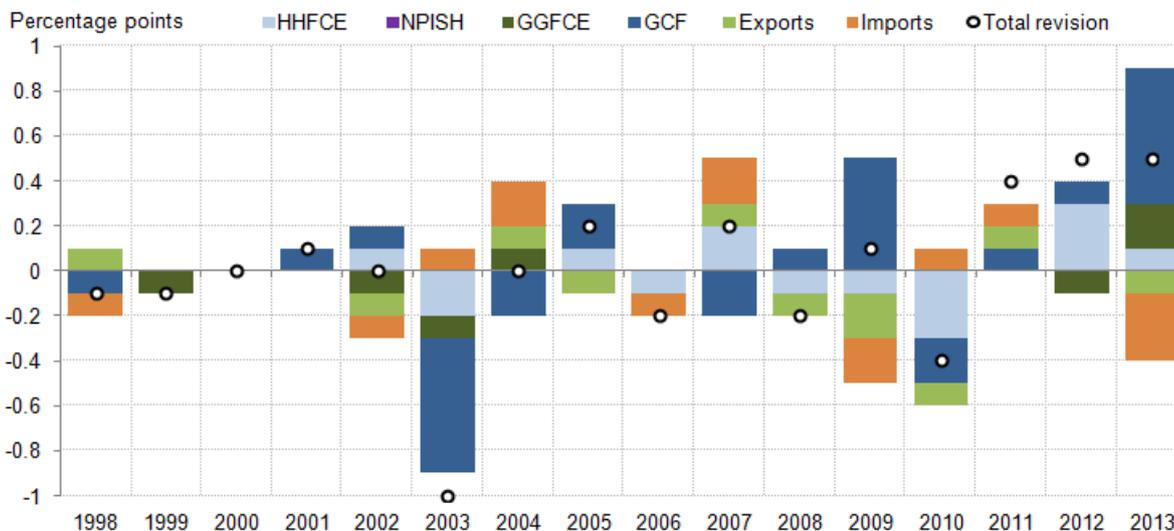
8. Revisions to the expenditure components of GDP

This section examines the impact of improvements to the National Accounts in Blue Book 2015 on the components of the expenditure measure of Gross Domestic Product (GDP). Key findings are:

- estimates of Household Final Consumption Expenditure (HHFCE) are affected relatively little by the Blue Book 2015 changes. This reflects the relatively small changes which are related to this series, including adjustments to alcohol & tobacco consumption, estimates of the imputed rentals for homes owned overseas and the alignment of domestic owner occupier housing costs with CPIH in 2010
- Gross Fixed Capital Formation (GFCF) has been more affected by Blue Book 2015 revisions. These changes include a revised deflator for software investment, a new treatment of transfer costs associated with non-produced assets and changes to the treatment of expenditure on major dwelling repairs. Changes to valuables and inventories have an impact on the other components of Gross Capital Formation (GCF), and in 2003 in particular
- estimates of exports, imports and net trade have all been affected slightly by the changes introduced in Blue Book 2015. In particular, changes to the treatment of non-monetary gold, the revised treatment of imputed rent on properties held overseas, and the correction relating to the insurance industry affected both imports and exports of services, leading to revisions to the contribution of net trade to GDP

The changes introduced in Blue Book 2015 affect some of the expenditure components of GDP to a greater degree than others. Figure 12 gives some sense of the drivers of these revisions to annual GDP growth. It highlights the importance of GCF to the aggregate revisions. It makes the largest or joint largest contribution to the revision in 12 of the 16 years presented, and has a notable impact on 2003, 2009 and 2013. In 2003, much of the change arises from processing changes to the acquisitions and disposals of valuables series, while in later years it arises from several changes to investment data. This accounts for much of the additional growth recorded in 2013, while stronger household consumption also plays a role – especially in 2012. These effects are partially offset by a drag from net trade during 2013, whose contribution to GDP growth has been revised down in this year.

Figure 12: Contributions of the components of the expenditure measure of GDP to aggregate GDP revisions: Blue Book 2015 compared with Previously published, chained-volume measure, seasonally adjusted



Source: Office for National Statistics

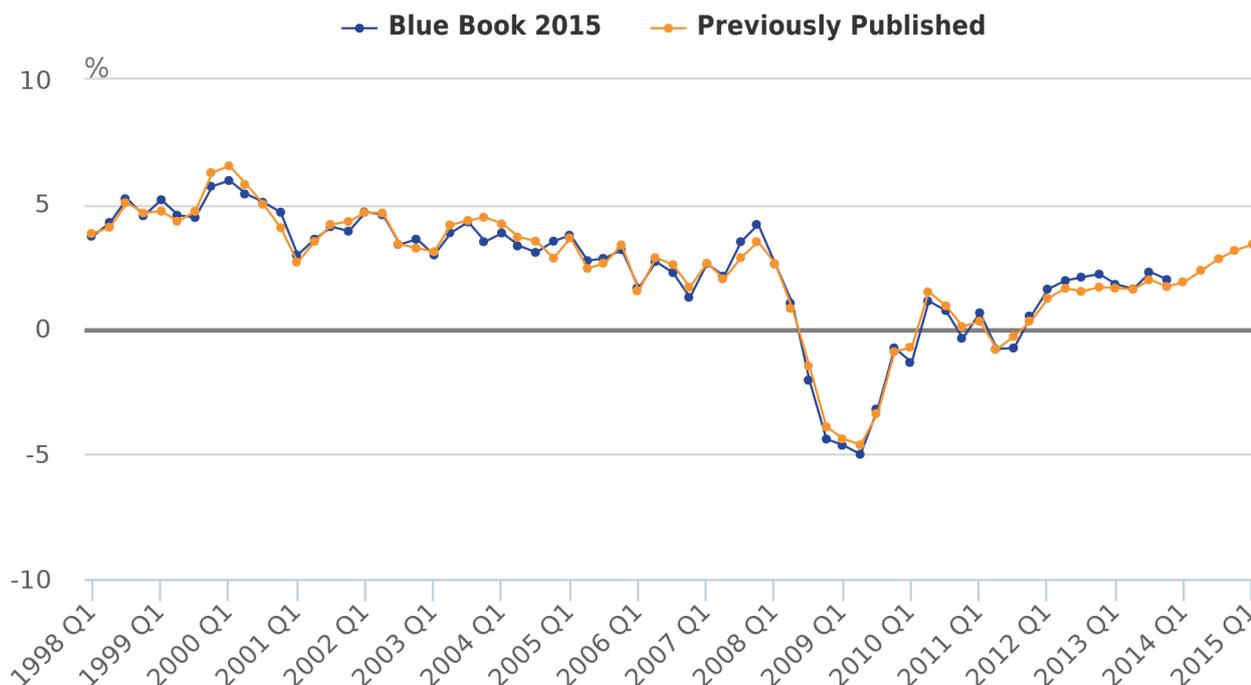
Notes:

1. Figures may not sum due to rounding. Indicative Blue Book 2015 estimates are currently only available to 2013. HHFCE stands for household final consumption expenditure, GGFCE stands for general government final consumption expenditure, GCF stands for gross capital formation, and NPISH stands for non-profit institutions serving households.

Household spending

The new methods and data introduced in Blue Book 2015 had a relatively small impact on the recent growth of HHFCE – the largest component of the expenditure measure of GDP. As is shown in Figure 12, HHFCE makes a relatively small contribution to the overall revision to GDP, and this modest effect is presented in Figure 13, which shows the quarter on same quarter a year ago growth rates for real HHFCE on both a previously published and Blue Book 2015 basis. The similarity of the growth rates of the two series suggests that the broad economic narrative of household consumption is little changed by the annual National Accounts. Taking the period as a whole, the compound average quarterly growth rate of real household consumption is unchanged at 0.6%, with both the fall in consumption during the downturn and the subsequent recovery marginally revised up in size.

Figure 13: Real households' final consumption expenditure, quarter on same quarter a year ago growth rates: Previously published compared with indicative Blue Book 2015, chained volume measure, seasonally adjusted



Source: Office for National Statistics

Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.

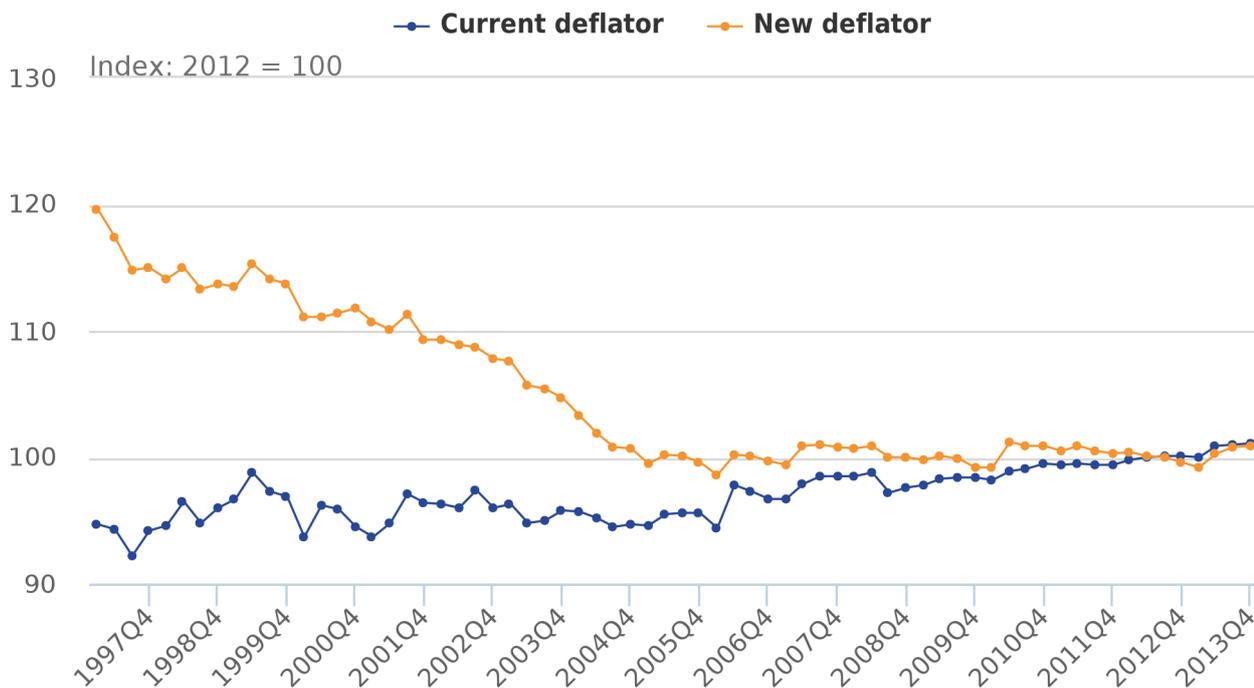
While the overall revision to the growth of HHFCE is very modest, changes in particular years highlight the impact of some of the specific changes introduced in Blue Book 2015. In particular, HHFCE growth during 2010 has been revised down from 0.5% to 0.0%, partly reflecting the alignment of the growth in the price measure for owner occupiers housing costs in the National Accounts with the respective series in CPIH in that year. Smaller changes throughout the series reflect the impact of adjustments to the treatment of alcohol, tobacco and narcotics, as well as changes related to the value of imputed rentals paid on properties held overseas.

9. Gross Capital Formation

GCF comprises investment (GFCF), the acquisition and disposal of valuables and changes in inventories. Together these components accounted for 16% of current price GDP in 2013. GCF was subject to a number of changes which affected both the current price level of investment (including addressing several [Gross National Income \(GNI\) reservations](#), and the volume of investment (the same current price changes, as well as [a new deflator for investment in software \(522.5 Kb Word document\)](#) . These changes mean that GCF and its component parts account for a large fraction of the changes to aggregate GDP growth in recent years (Figure 12), although the magnitude and impact of these effects is considerably less than in [Blue Book 2014](#).

One of the main changes to the investment data included in the National Accounts concerns the deflation of investment in software, affecting the GFCF component of GCF. Software accounts for around 10% of total GFCF and 15% of business investment in current price terms between 1997 and 2013. It is divided between 'purchased' software – which companies buy either 'off the shelf' or from bespoke producers – and 'own-account' software – which companies develop in-house. The change introduced in Blue Book 2015 concerns the deflation of the purchased software component: moving from a services producer price index to a quality-adjusted US producer price index for purchased software. This change – recommended by a panel of expert independent stakeholders convened by ONS – is shown in Figure 14. It indicates that the price of purchased software on the new estimates fell quite sharply compared with the previously published series.

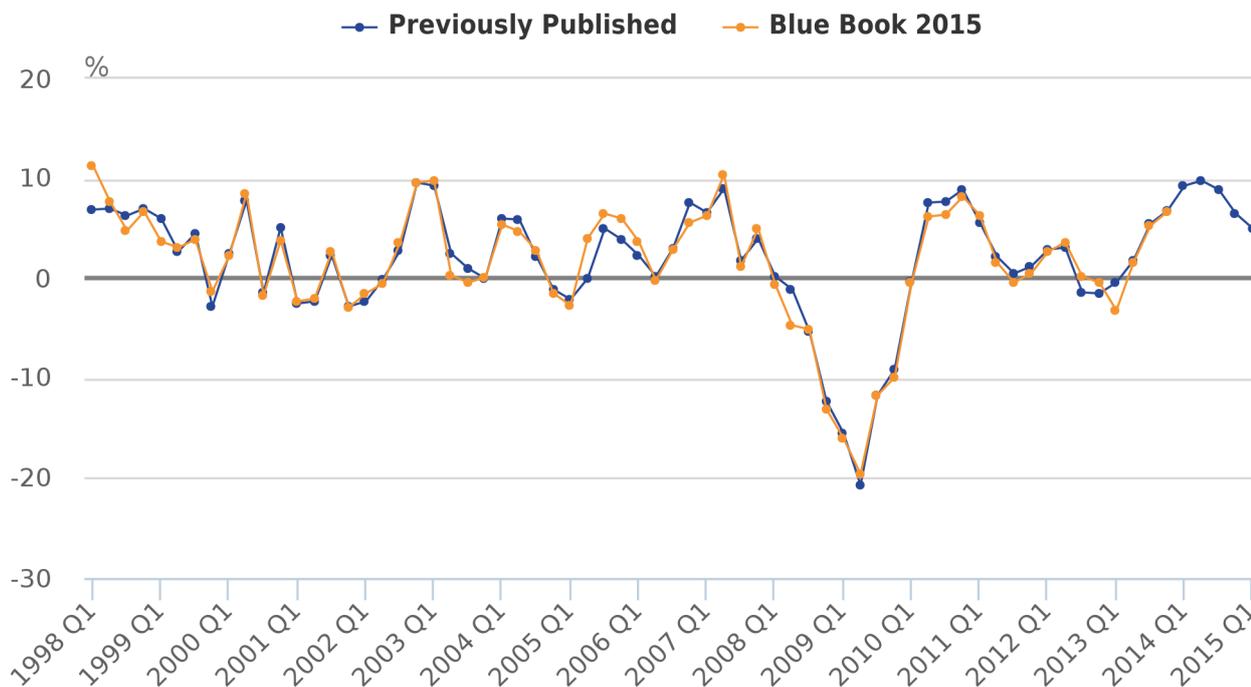
Figure 14: Own account and purchased software deflators: Previously published compared with indicative Blue Book 2015, 2012=100, seasonally adjusted



Source: Office for National Statistics

In addition to the change to the deflator for software – which slightly increases growth in the volume of investment – GFCF was also subject to several smaller changes, including (a) the costs associated with the transfer of non-produced assets and (b) the treatment of spending on major repairs to dwellings and (c) the consumption of fixed capital on roads. The resulting profile of quarter on same quarter a year ago GFCF growth is shown in Figure 15. It indicates some relatively large revisions in 2005 (up from 1.6%, to 3.4% in the year as a whole), 2008 (down from -4.7% to -5.9%), 2012 and 2013 (up by 0.8 percentage points and down by 0.8 percentage points respectively).

Figure 15: Quarter on same quarter a year ago growth rate of Gross Fixed Capital Formation: Previously published compared with indicative Blue Book 2015, chained volume measure, seasonally adjusted



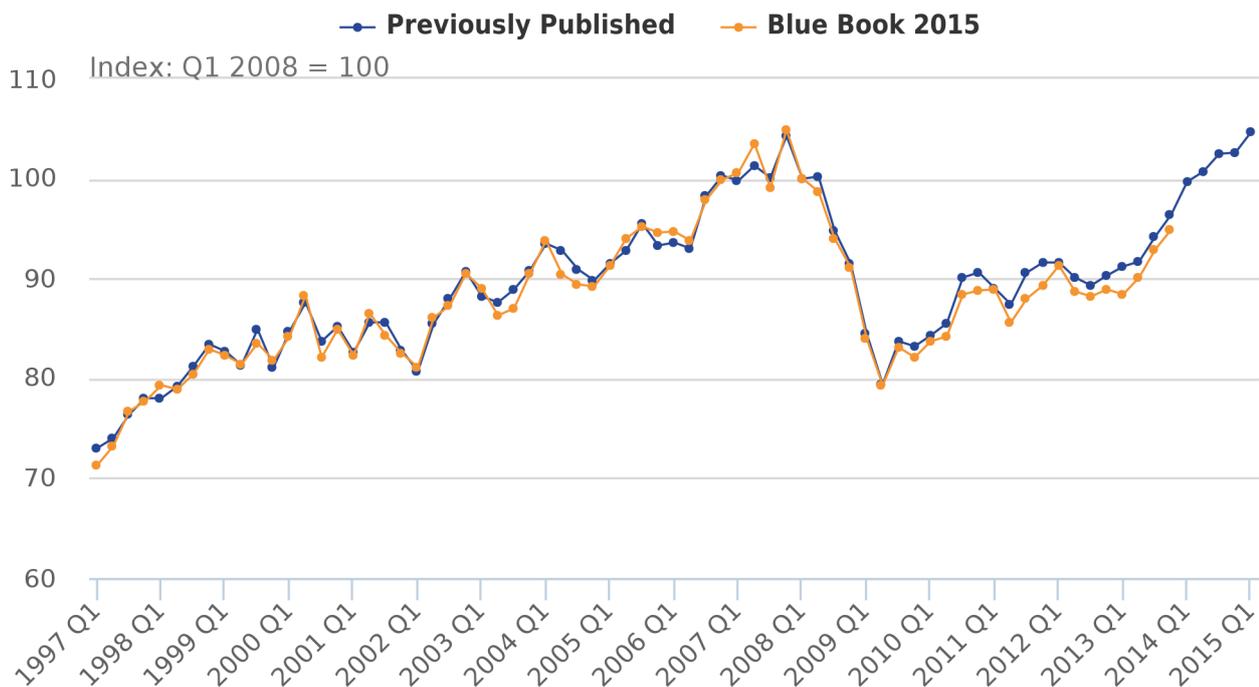
Source: Office for National Statistics

Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.

However, the cumulative impact of these changes does little to change the broad narrative of investment in recent quarters. In the lead up to the economic downturn, GFCF grew marginally more quickly, but has recovered more slowly (Figure 16). On a Blue Book 2015 basis, at the end of 2013 GFCF was 5.1% below its pre-downturn peak, compared with just 3.6% on a previously published basis.

Figure 16: Gross Fixed Capital Formation (GFCF), Previously published compared with indicative Blue Book 2015, Q1 2008=100, chained volume measure, seasonally adjusted



Source: Office for National Statistics

Notes:

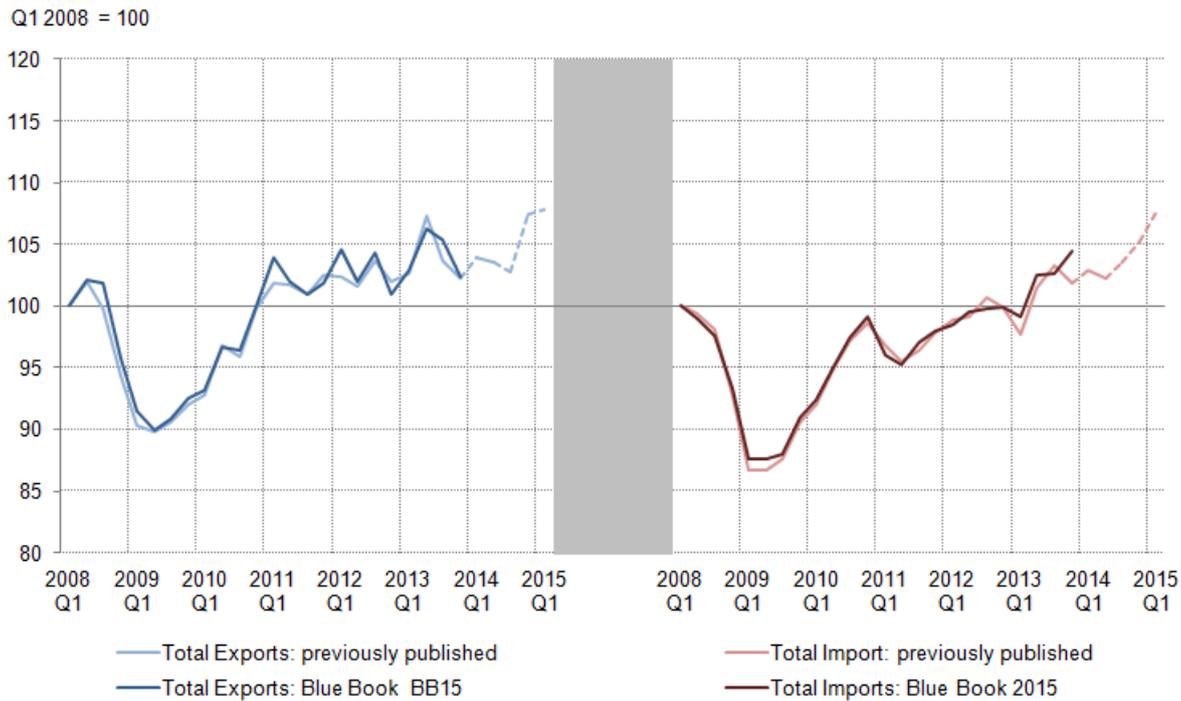
1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.

A further set of changes – relating to the treatment of valuables and non-monetary gold, and including the impact of exhaustiveness adjustments for under-coverage of small businesses – complete the impact of GCF on headline GDP. Changes to the methods of aggregating the expenditure measure of GDP – and to the component previous year and current year price series for valuables in particular – account for the remainder of the negative contribution to GDP growth in 2003. Further information on this effect is included in the annex.

10. Net Trade

Alongside these revisions to household consumption and investment, the changes introduced in Blue Book 2015 also affect estimates of exports, imports and net trade. In particular, a revised treatment of non-monetary gold and changes to the measurement of cross border property income flows affect estimates of both imports and exports². The impact of these changes is shown in Figure 17, which presents the levels of exports and imports on an indicative Blue Book 2015 and previously published basis, indexed to their respective values in Q1 2008. It suggests that the magnitude of these effects is larger on the profile of exports, although imports have also been revised up – in the later part of 2013 in particular.

Figure 17: Exports and Imports: Previously published compared with indicative Blue Book 2015, Q1 2008=100, chained volume measure, seasonally adjusted



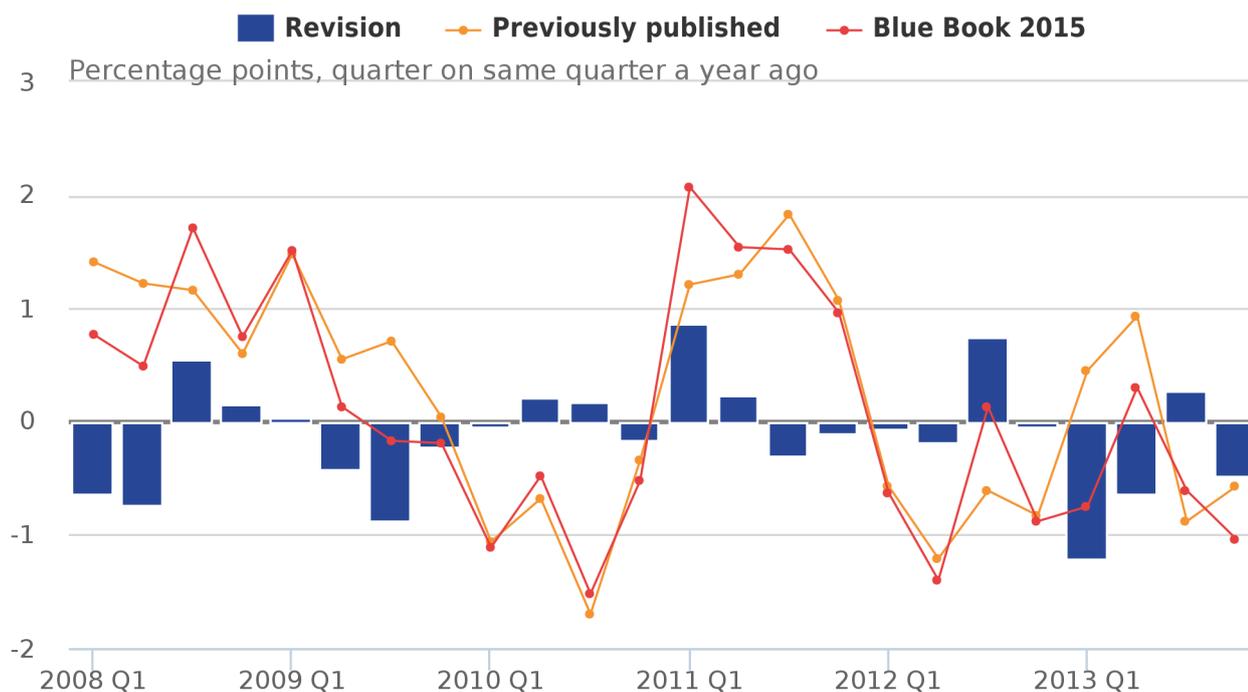
Source: Office for National Statistics

Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.

The Blue Book 2015 changes to imports and exports result in revisions to the contribution of net trade to GDP over this period. Figure 18 shows the contribution of net trade to quarter on same quarter a year ago growth, on both a previously published and an indicative Blue Book 2015 basis, as well as the revision between the two. It reflects the modest changes to growth rates presented in Figure 17, but also suggests that the contribution of net trade was smaller than previously thought in 2009 and 2013, and stronger in 2007 and 2011 in particular. These revisions – and the impact of the improved treatment of non-monetary gold in particular – will be the subject of a future article.

Figure 18: Net trade contribution to GDP growth: Previously published compared with indicative Blue Book 2015, percentage points, chained volume measure, seasonally adjusted



Source: Office for National Statistics

Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.

Notes for Net Trade

1. Note that changes to the treatment of cross-border property income are neutral in current price GDP terms, as increased exports (imports) of services are offset by a corresponding reduction (increase) in household final consumption. Change to estimates of non-monetary gold will be the subject of a forthcoming article on National Accounts methods.

11. Revisions to the income components of GDP (in current prices)

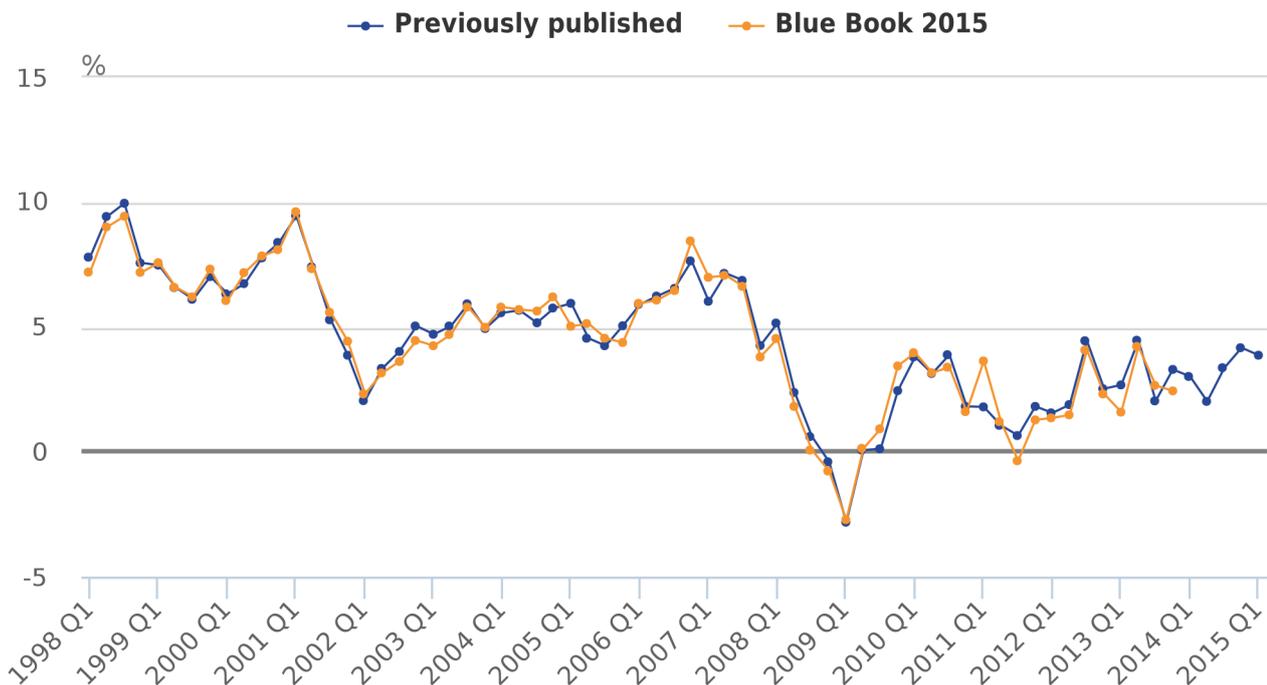
This section presents the impact of Blue Book 2015 improvements on the income components of GDP. The key findings are:

- Compensation of Employees (COE) – which represents more than half of the income measure of GDP – has only changed modestly between the previous and indicative Blue Book 2015 estimates
- estimates of the operating surplus of Private Non-Financial Corporations (PNFCs) have been affected by exhaustiveness changes. Estimates of the operating surplus of financial corporations are not affected by these changes; consequently there are only modest changes in this component
- ‘other income’ – including the mixed income component – has been affected by the set of exhaustiveness changes in recent years in particular, including improved estimates of unincorporated small business and concealed income

Compensation of employees

The largest component of the income measure of GDP is COE – which comprises wages and salaries and the social contributions that firms make on behalf of their employees (such as national insurance contributions and payments into occupational pension schemes). The main changes affecting this component in Blue Book 2015 are improvements to the way ONS capture the non-reporting of employee income, improved estimates of local government pension contributions and updated data on wages and salaries from Her Majesty's Revenue and Customs (HMRC). Despite these changes, revisions to the growth of COE have been relatively modest. Figure 19 compares estimates of quarter on same quarter a year ago growth in COE, both on a Blue Book 2015 consistent and previously published basis. In particular, the changes introduced in the Blue Book have not altered the relatively weak growth of COE observed since the onset of the economic downturn in 2008; average quarter on same quarter a year ago growth between Q1 1998 and Q4 2007 also remains unchanged at 6.1%. However, the improvements have raised the overall level of COE, by approximately 0.3% on average per annum.

Figure 19: Compensation of employees: Quarter on same quarter a year ago growth rates: Previously published compared with indicative Blue Book 2015, current price, seasonally adjusted



Source: Office for National Statistics

Notes:

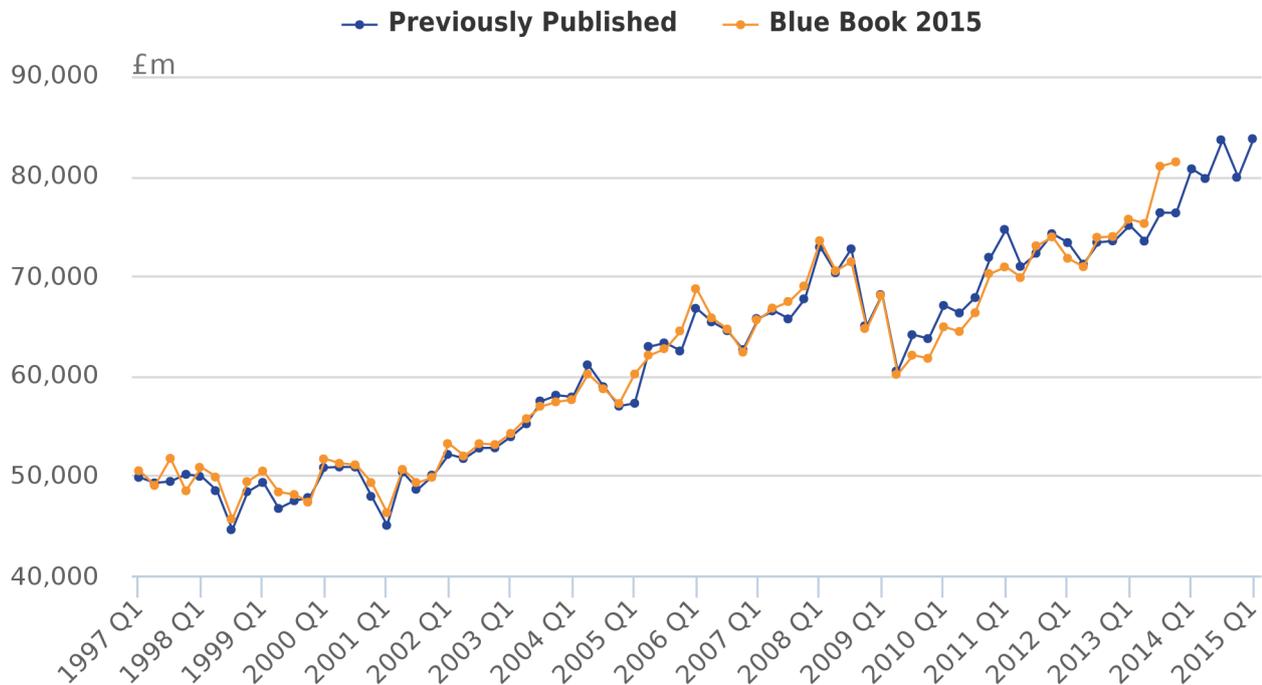
1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.

Gross operating surplus: PNFs

The gross operating surplus of PNFs has been affected by both of the changes introduced in Blue Book 2015 to improve the exhaustiveness provisions in the National Accounts. These improvements relate to the coverage of the income of firms which fall below the Value added tax (VAT) and Pay as You Earn (PAYE) reporting thresholds, and to estimates of income concealed from the tax authorities. The new estimates of under-coverage are based on updated HMRC administrative data for sole traders and partnerships, while improvements to concealed income are obtained from a more comprehensive model based, in part, on HMRC analysis of evaded corporation and income tax.

The improved estimates of both under-coverage and concealed income have affected the level of PNFC profits, primarily in the period following the economic downturn in 2008. Figure 20 shows that in 2010 and 2011, the levels of profits have been revised down by £7.1bn and £4.4bn respectively. However, in 2013 the methods changes and new data started to raise the level of profits, to the extent that the calendar year revision for 2013 totalled just over £12bn.

Figure 20: Gross operating surplus: Private non-financial corporations: Previously published compared with indicative Blue Book 2015: current price, seasonally adjusted



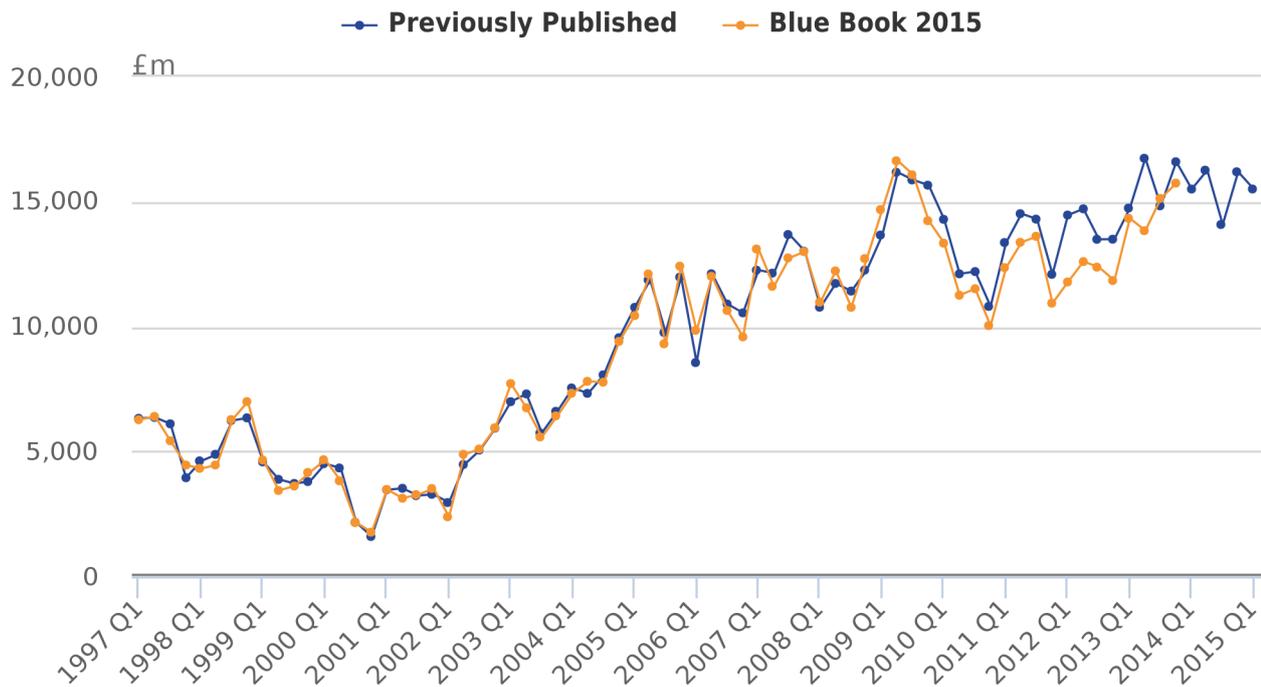
Source: Office for National Statistics

Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.

By contrast, the exhaustiveness changes did not affect estimates of financial corporations' income, and revisions to this series are consequently smaller (Figure 21). However, consistent downward revisions can be observed in the period following the economic downturn. This is primarily attributable to the correction of an error identified in the input data from regulatory insurance data returns. This affected insurance estimates for the calculation of output and the subsequent consumption of insurance services, as well as the profits associated with those services. New data also plays a role in the most recent years.

Figure 21: Gross operating surplus: Financial corporations: Previously published compared with indicative Blue Book 2015: current price, seasonally adjusted



Source: Office for National Statistics

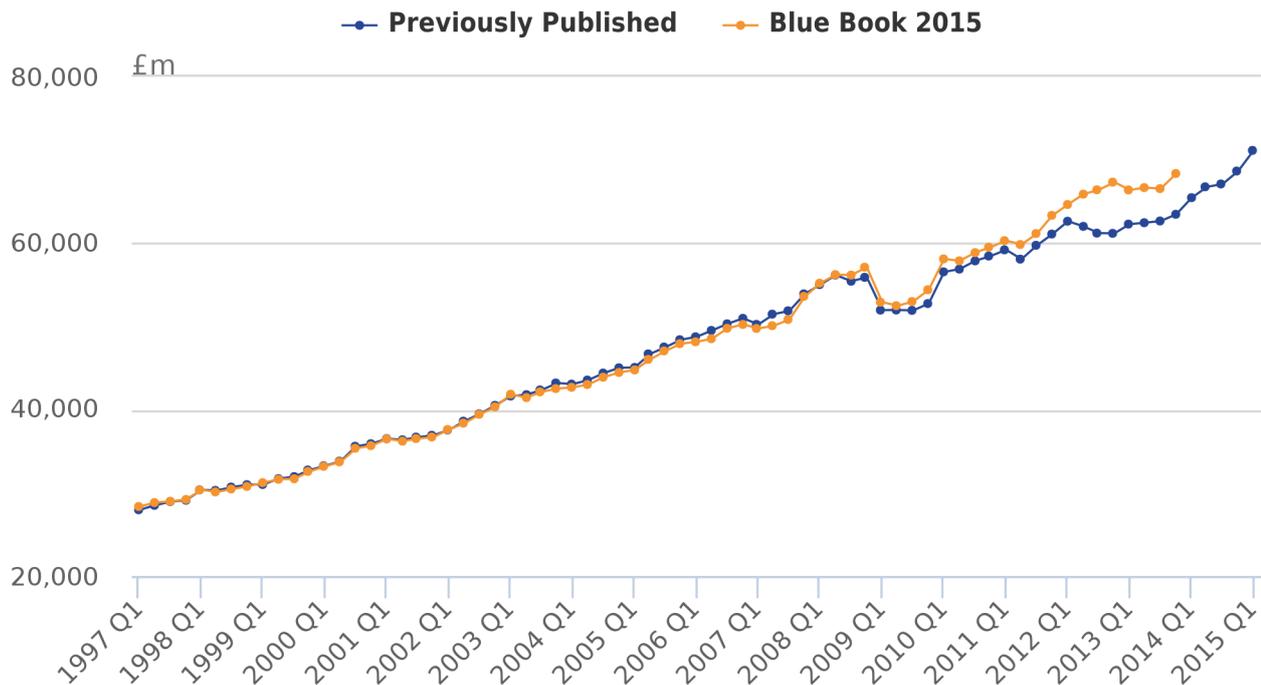
Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.

12. Other income

Finally, the change relating to the under-coverage of unincorporated small businesses has a particular impact on estimates of the income of the self employed. This income – which has been subject to upwards revisions because a notable proportion of small businesses are accounted for by the self employed – accrues to the ‘mixed income’ component of other income. Figure 22 shows the level of other income (which also includes the operating surplus of the non-corporate sector) in current prices. During the downturn in 2008 and 2009, mixed income is now estimated to have been £2.2bn and £4.2bn higher respectively, with revisions to subsequent calendar years becoming larger, reaching just over £17bn in both 2012 and 2013.

Figure 22: Other income (includes mixed income and the operating surplus of the non-corporate sector): Previously published compared with indicative Blue Book 2015: current price, seasonally adjusted



Source: Office for National Statistics

Notes:

1. Indicative Blue Book 2015 estimates are currently only available to Q4 2013. Previously published estimates are consistent with the Quarterly National Accounts published on 30 June 2015.

Impact articles published

26 March 2015 - [Changes to National Accounts for Blue Book 2015: the deflation of investment in software \(522.5 Kb Word document\)](#)

15 January 2015 - [Changes to be implemented for Blue Book 2015 and Pink Book 2015](#)

19 May 2015 - [Methodological improvements to National Accounts for Blue Book 2015: Vehicle Registration Tax, treatment of roads and spending on repairs and maintenance of dwellings](#)

19 May 2015 - [Methodological improvements to National Accounts for Blue Book 2015: Cross-border property income](#)

19 May 2015 - [Methodological improvements to National Accounts for Blue Book 2015: Exhaustiveness \(225.9 Kb Pdf\)](#)

19 May 2015 - [Methodological improvements to National Accounts for Blue Book 2015: Non-profit institutions serving households \(185.9 Kb Pdf\)](#)

19 May 2015 - [Impact of ESA 1995 changes on current price Gross National Income estimates, 2002 to 2010](#)

12 June 2015 - [Impact of Blue Book 2015 changes on current price Gross Domestic Product estimates, 1997 to 2010](#)

17 July 2015 - [National Accounts articles. Methodological improvements to National Accounts for Blue Book 2015: Gross Fixed Capital Formation \(1997 to 2010\) \(357.1 Kb Pdf\)](#)

17 July 2015 - [Impact of Blue Book 2015 changes on chained volume measure Gross Domestic Product estimates, 1997 to 2010](#)

5 August 2015 - [Impact of Blue Book 2015 changes on chained volume measure Gross Domestic Product estimates, 1997 to 2013](#)

13. Annex: Changes to valuables and the impact on GDP

Figure 12 shows that there was a downward revision to GCF growth in 2003, which made a 0.6 percentage point downward contribution to real GDP growth in the same year (Figure 4). The components that make up Gross Capital Formation (GCF) are Gross Fixed Capital Formation (GFCF), 'Change in Inventories', and 'Acquisitions less disposals of valuables'. However looking at these individual series on a chained volume measure (CVM) basis shows that there have been minimal revisions to all three components, that combined could not explain such a large downward revision to headline GDP. The reason for this lies in the way that GDP is processed, aggregated and chain linked from the lower level series. This is set out further below:

Calculation of Previous Year Prices (PYPs)

A [flow chart \(80 Kb Excel sheet\)](#) has been provided to detail the National Accounts data processing system, as well as the aggregation and chain linking process. It shows that once current price (CP) data have been finalised, the data are deflated to produce constant price (KP) estimates. Estimates of each component in PYPs are then derived from the CP and KP data as follows (see Step 1 in the flow chart for more information):

$$\text{Equation A1} \quad \text{PYP}_t = \frac{\text{KP}_t}{\text{KP}_{t-1}} \times \text{CP}_{t-1}$$

To derive total GCF, estimates of the three components (GFCF, change in inventories and 'acquisitions less disposals of valuables') in PYPs are aggregated. GCF in PYPs is then aggregated further with the corresponding series for net trade, household consumption and government consumption, to produce GDP in PYPs. Finally, GDP in chained volume measures is calculated from the PYP and CP estimates of GDP as follows (see Step 4 in the flow chart for more information):

$$\text{Equation A2} \quad \text{CVM}_t = \frac{\text{CVM}_{t+1}}{\text{PYP}_{t+1}/\text{CP}_t}$$

This process is suitable for series that have consistently positive, large CP and KP estimates (e.g. household consumption or trade in goods). However, PYP estimates for a series such as acquisitions less disposals of valuables - a net concept where values may be negative as well as near to zero - could yield large PYP estimates. Table A1 shows an illustrative example of how a very large PYP value can be obtained by calculating hypothetical CP and KP estimates into Equation 1.

Table A1: Example of a PYP Calculation

£ million	CP	KP	PYP
T	2000	-44	-
T+1	1540	-2760	125455

To address this phenomenon in the treatment of inventories, in September 2014 ONS introduced the best practice of chain linking on the level of inventories, rather than the change in inventories. However, at present this has not been implemented for the 'acquisitions less disposals of valuables' series. The methodological change of allocating non-monetary gold to estimates of trade as opposed to 'acquisitions less disposals of valuables'

resulted in revisions to the latter in both CP and KP terms, as shown in Table A2. On the face of it, these revisions do not seem large enough to result in a large effect on GDP growth in 2003, as the level of the series in CVM changes by approximately £1 billion between 2002 and 2003 in both vintages.

Table A2: Acquisition less disposals of valuables

£million	2001	2002	2003
Current prices (CP)			
Previously published	94	-735	-865
Blue Book 2015	492	1197	1256
Revision	398	1932	2121
Chained volume measure (CVM)			
Previously published	55	-187	920
Blue Book 2015	-489	-878	168

However, calculating the corresponding PYP estimates for both vintages in the 2002 and 2003 calendar years shows that the impact on the level of GDP is actually very different to the CVM estimates. Rearranging Equation A2 shows that the PYP estimates can be backed out of the CVM and CP estimates as follows:

$$\text{Equation A3} \quad PYP_t = \frac{CVM_t}{CVM_{t-1}} \times CP_{t-1}$$

Using the previously published CP and CVM data for acquisitions less disposals of valuables, the previous year price estimates for the previously published series can be obtained as follows:

$$\text{Equation A4} \quad \begin{aligned} PYP_{2003} &= \frac{CVM_{2003}}{CVM_{2002}} \times CP_{2002} = \frac{£920m}{-£187m} \times -£735m = £3616.0m \\ PYP_{2002} &= \frac{CVM_{2002}}{CVM_{2001}} \times CP_{2001} = \frac{-£187m}{£55m} \times £94m = £319.6m \end{aligned}$$

The change in the 'acquisitions less disposals of valuables' series in the previously published series between 2002 and 2003 is therefore:

$$=£3616m - (-£319.6m) = £3935.6m$$

In the latest dataset, acquisitions less disposals at previous year prices can be obtained as follows:

$$\text{Equation A5} \quad \begin{aligned} PYP_{2003} &= \frac{CVM_{2003}}{CVM_{2002}} \times CP_{2002} = \frac{£168m}{-£878m} \times -£1197m = -£229.0m \\ PYP_{2002} &= \frac{CVM_{2002}}{CVM_{2001}} \times CP_{2001} = \frac{-£878m}{-£489m} \times £492m = £883.4m \end{aligned}$$

So for the most recent estimates, the change in the 'acquisitions less disposals of valuables' series between 2002 and 2003 is:

$$=-£229m - £883.4m = -£1112.4m$$

The revision to the change in the level of GDP between 2002 and 2003 equates to:

$$=-£1112.4m - £3935.6m = -£5048.0m$$

This shows that the impact on the level and growth of GDP can be different compared to what would be implied from the 'acquisition less disposals of valuables' CP and CVM data. In fact the £5.0 billion downward revision can help account for over half of the 0.6% downward revision to GDP growth in 2003). Unusually large PYP estimates can conceptually occur throughout the period prior to the base year. To prevent this from occurring, adjustments have been applied to PYP estimates for some components of GCF in Blue Book 2015. Specifically these adjustments were applied to the 'acquisition less disposals of valuables' series in several years and changes in inventories in 2009. Further analysis will accompany the publication of the Quarterly National Accounts.

Future work for Blue Book 2016 will continue on reviewing the method used to chain link the estimates of both inventories and 'acquisitions less disposals of valuables'.

14. Background notes

Details of the policy governing the release of new data are available by visiting www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html or from the Media Relations Office [email: media.relations@ons.gsi.gov.uk](mailto:media.relations@ons.gsi.gov.uk)