Methodological improvements and ESA 2010 changes to historic GDP datasets for Blue Book 2014

Authors: Tomos Davies, Hannah Denley, Simon Field and Louisa Nolan, *Office for National Statistics*

Date: 23 February 2015

1 Introduction

This article details the significant methods changes made for the publication of Blue Book 2014 with regard to the historic datasets (i.e. data for the period prior to 1997), both as a result of changes to the European System of Accounts (ESA 2010) and as part of a series of ongoing improvements to the historic data.

The article outlines the methods used to estimate the new data series for these changes and the impacts these have had on the component series and on the top-level GDP figure.

The main changes are:

- Improvement to the CPI-based deflator used to estimate chained volume measures of Household Final Consumption Expenditure (HHFCE)
- Changes to the pre-1997 estimates of Gross Fixed Capital Formation (GFCF)
- Updates to the long-run Household Saving Ratio, Gross National Income (GNI) and Real Household Disposable Income (RHDI) series.

Other revisions to the historic data, mostly as a result of ensuring consistency with ESA 2010 changes implemented for the 1997-onwards data, are summarised below, along with links to relevant methods papers.

- The coverage of illegal activities in the UK National Accounts has been expanded to include illegal drugs and prostitution activity.
- A number of key changes to the way in which pensions are classified and measured under ESA 2010 are described in Jones (2014) and Jones and Matthews (2014).
- Improvements to the reference rates used to estimate financial intermediation services indirectly measured (FISIM) and the removal of interbank FISIM.
- Changes to the classification and treatment of research and development (R&D) and military spending on weapons systems, moving from intermediate consumption to capital formation.

A summary of changes implemented at Blue Book 2014 for the period 1997-onwards can be found here.

2 Improvement to the deflator for historic HHFCE

2.1 Methods changes

One of the methods changes introduced at Blue Book 2011 (BB11) was the replacement of the Retail Price Index (RPI) with the Consumer Price Index (CPI) in forming the deflators from which the volume measures of household final consumption expenditure (HHFCE) are estimated.

For 1997 and later periods, products were deflated using CPI at the 4-digit COICOP level and aggregated to top level HHFCE. More detail on the 2011 change is available in Drew (2011) and Gittins and Clancy (2011). Pre-1997 in the time series, however, the volume measures of HHFCE remained on an RPI basis until Blue Book 2012, when the historic data were brought into line with the rest of the time series by deflating using CPI.

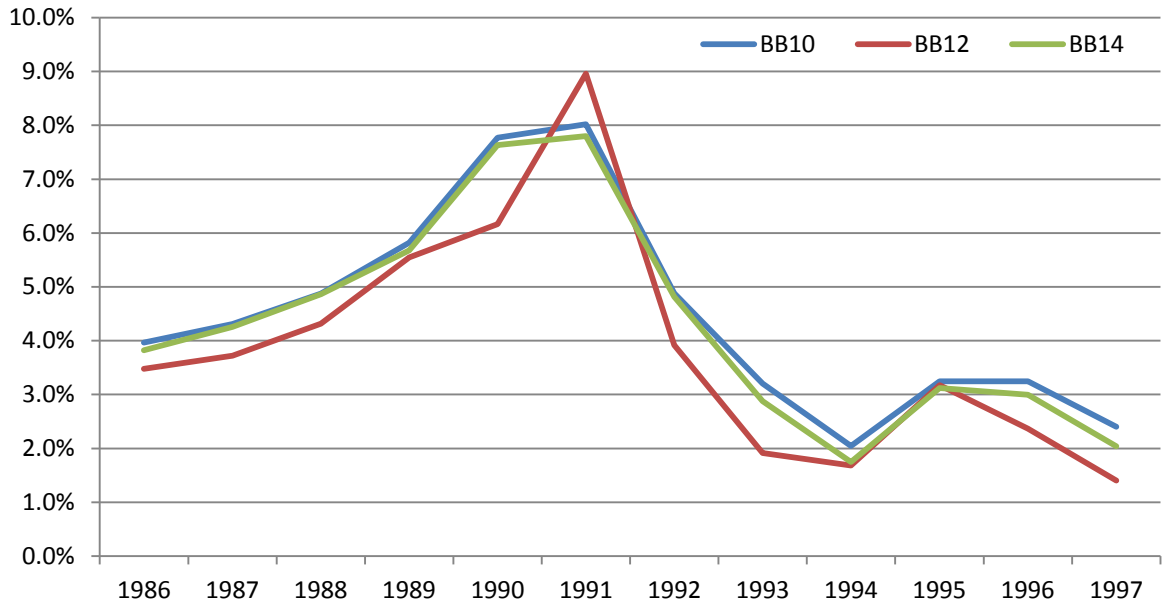
Rather than deflate the products separately and then aggregate, as was done for 1997-onwards, the change was processed using a deflator derived for the top-level HHFCE only. ONS has previously acknowledged that this top-down approach was not ideal from a methods perspective and, therefore, as part of the BB14 dataset, this has been revisited and the CPI change has been carried through at the product level back to 1985. Prior to 1985, the deflator has been re-modelled at the top level, based on the movements of the new implied deflator from 1985-96, resulting in an improved deflator growth series back to the start point of 1948.

2.2 Impact

Figure 1 shows the growth rates of the HHFCE implied deflator based on the RPI (BB10), CPI top-level approach (BB12) and CPI product-level approach (BB14). One criticism of the original move to CPI was that the CVM growth was too strong (which translates to a deflator growth which is too weak), leading to a GDP level which was lower than expected in the early part of the series.

Deflating using CPI at the product-level has strengthened the growth of the deflator in most years compared with the top-level approach, and brought its movements over time closer to that of the product-level RPI.

Figure 1: HHFCE implied deflator growth rate, 1986-1997



The deflator for the pre-1985 period was modelled based on the new product-level approach for 1985 to 1996, due to a lack of information available at a product level pre-1985. The deflator growth pre-1985 shows the same pattern as the period from 1985 to 1996, with a greater resemblance to the BB10 deflator (based on RPI) and a stronger annual growth than the top-level CPI approach published at BB12 (Figure 2). This results in a weaker annual CVM growth, raising the level of HHFCE in the early part of the series. This is shown in Figure 3, which compares the baseline BB14 level of HHFCE (i.e. before any revisions are processed) with HHFCE after the CPI change.

Figure 2: HHFCE implied deflator growth rate, 1949-1997

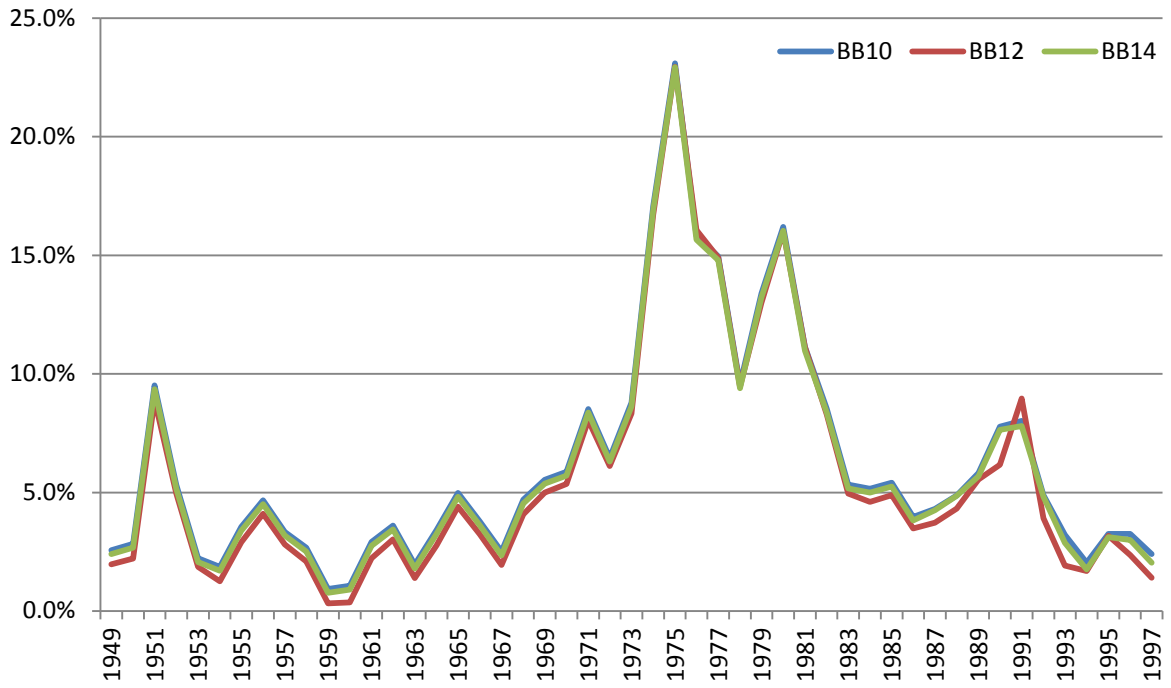


Figure 3: Total HHFCE, before and after CPI change, 1948-1996; CVM, 2011=100

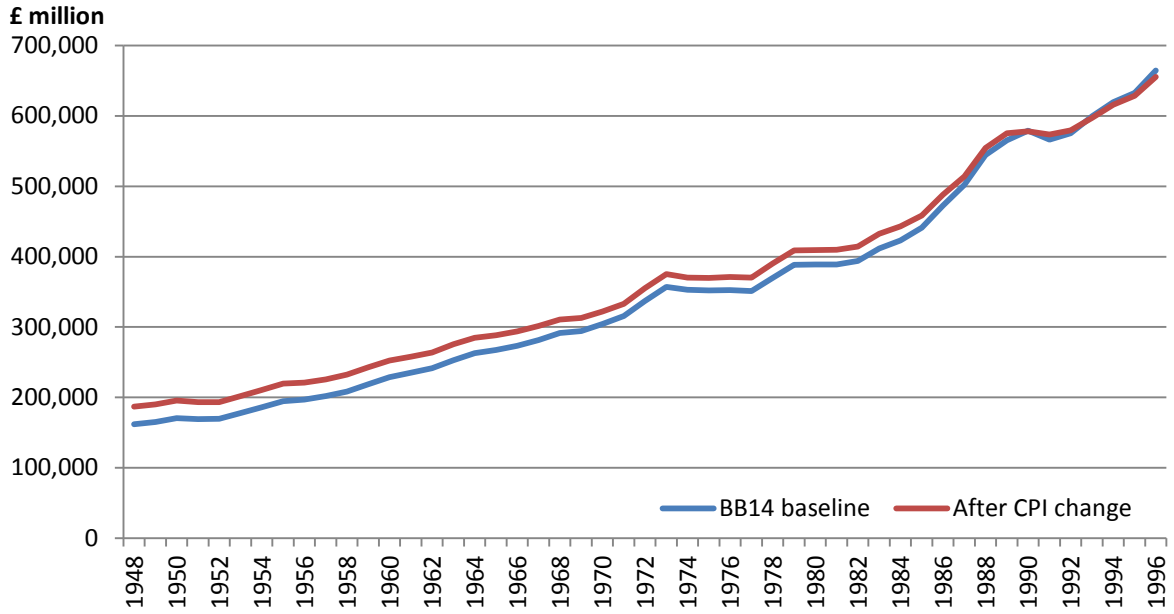
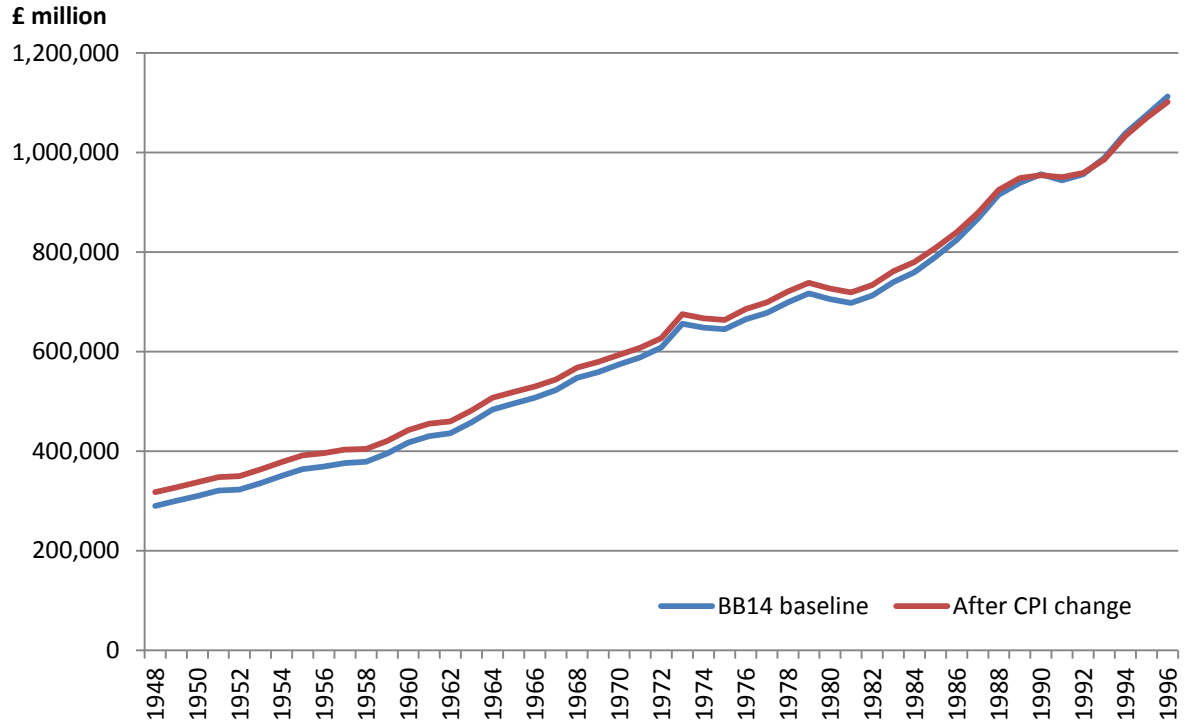


Figure 4 compares the baseline BB14 level of GDP with GDP after the CPI change. The weaker annual CVM growth in HHFCE caused by the now stronger growth in the deflator is reflected in the GDP series, leading to a higher level of GDP overall and a gradually widening gap looking from 1996 back to 1948.

Figure 4: GDP at market prices, before and after CPI change, 1948-1996; CVM, 2011=100



3 Changes to the estimation of the long time series GFCF estimates

The long time series of GFCF and its components (assets and sectors) consistent with Blue Book 2014 have undergone significant change compared with those consistent with Blue Book 2013. These changes have allowed publication of the full set of asset and sector breakdowns.

The changes arise from:

- changes implemented in the 1997-onwards series in Blue Book 2014, in order to meet the legal requirements of the European System of Accounts 2010 (ESA 2010), and other methodological changes to meet users needs. These changes and their impact have been documented in the article Investment - impact analysis of changes to the estimation of gross fixed capital formation and business investment for Blue Book 2014
- changes to the way the pre-1997 estimates are linked to the 1997-onwards estimates
- changes to the way that total GFCF has been allocated to institutional sectors in the pre-1997 estimates
- changes to the estimation of the pre-1997 chained volume measures.

3.1 Compilation of the pre-1997 GFCF estimates

The 1997-onwards estimates of GFCF and its components, including business investment, published in the Business Investment release, the Second Estimate of GDP, the UK Economic Accounts and the Quarterly National Accounts are available for time series from 1997 to the latest quarter. The compilation of these GFCF estimates from the source data to the final estimates is described in the article Business Investment - Explaining UK Investment Estimates: past, present & future.

The pre-1997 estimates are compiled from GFCF aggregated to the asset and industry level, rather than directly from the source data. Methodological changes in the 1997-onwards estimates must therefore be modelled in the pre-1997 estimates, in order to avoid discontinuities.

Significant methodological changes were implemented in the UK National Accounts consistent with Blue Book 2014, published on 30 September 2014. These included improvements to methods and data to meet user needs as well as changes made to meet the UK's legal requirements for compliance with ESA 2010. The changes for GFCF are documented here. The most significant impact was from the capitalisation of research and development, which accounted for nearly three quarters of the change between 1997 and 2013.

Much of the change to the pre-1997 estimates of GFCF arises from modelling the changes in the aggregate series, through the linking factor.

3.2 Linking the pre-1997 estimates to the 1997-onwards estimates

The historic (pre-1997) GFCF estimates, by asset and industry, are consistent with those used as the input into estimates of capital stock. For both capital stock and long time series GFCF, these current price series need to be linked to the 1997-onwards series.

The series were linked using a factor based on the ratio of the estimate of GFCF in 1997 in the 1997-onwards series to the 1997 estimate in the historic series. That is, the historic series was adjusted by a factor which forces the historic estimates for 1997 to be equal to the 1997-onwards estimates in the same year. The short overlap period was used as it produced more plausible results than a linking factor derived from a longer time period.

It should be noted that the linking of the historic estimates to the 1997-onwards series is uncertain. It is not possible to test how well the linking factor accounts for methods changes, as no information on the real impact is available. This means that the historic GFCF estimates are inherently more uncertain than the 1997-onwards estimates.

3.3 Changes to the allocation of total GFCF to asset and sector for the pre-1997 estimates

Unlike previous historic estimates which used linear modelling to break down the top level estimates into institutional sectors, the estimates consistent with Blue Book 2014 were derived from the sector proportions from previous Blue Books. The proportion of each sector in each asset was used to estimate the contribution of each sector in the new, Blue Book 2014-consistent assets for the whole economy.

3.4 Changes to the estimation of the chained volume measures for the pre-1997 estimates

The deflators used were also consistent with those used to compile estimates of capital stock. The deflators were available at the asset level, and were linked to the 1997-onwards deflators. To avoid discontinuities in the deflator series, the historic deflators were spliced onto the 1997-onwards deflators using their growth rates.

Current year's price (CYP) and previous year's price (PYP) estimates of historic GFCF and the asset and sector components were estimated using these deflators, weighted by the asset proportions. The CYP and PYP estimates were then used to produce the chained volume measures.

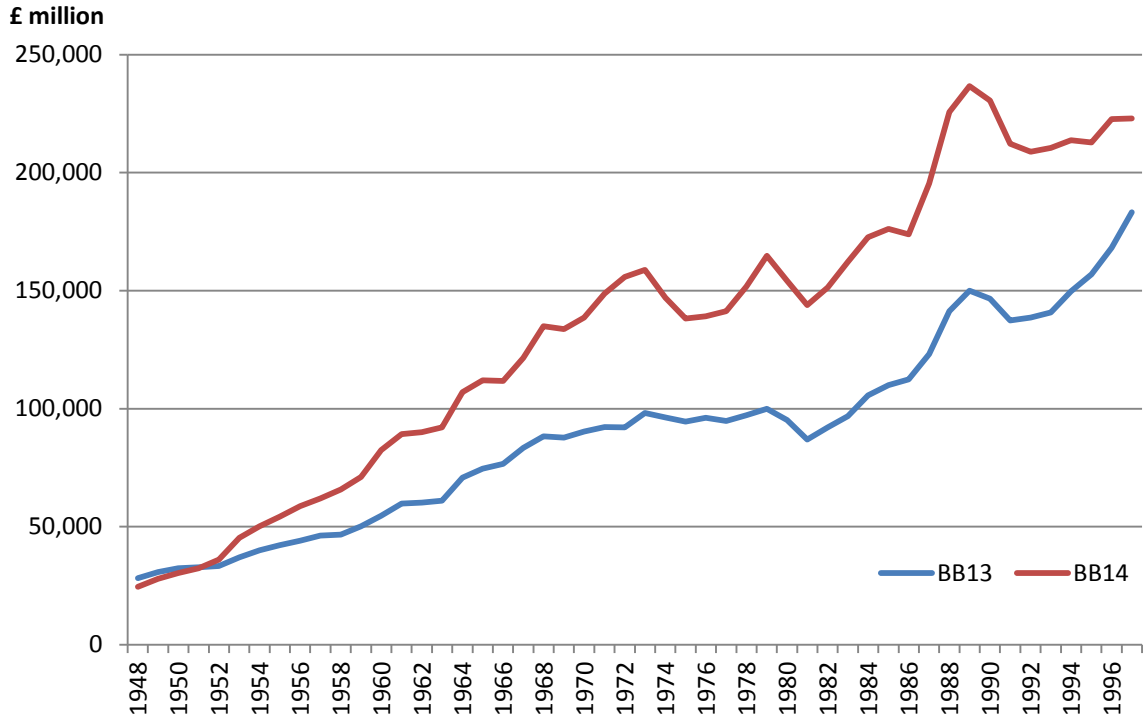
3.5 Modelling the quarterly estimates

The quarterly path of the Blue Book 14-consistent estimates was modelled from the previous publication's quarterly growths, benchmarked to the annual estimates.

3.6 Impact of the changes on estimates of GFCF

The inclusion of research and development in estimates of GFCF, in compliance with ESA 2010, is the most significant change to estimates of GFCF. It accounts for around three quarters of the increase in GFCF, in current prices, between 1997 and 2013. Figure 5 shows the impact of the changes on estimates of GFCF pre-1997.

Figure 5: Total GFCF, Blue Book 2014 compared with Blue Book 2013, 1948-1997; CVM, 2011=100



4 Update to Household Saving Ratio, RHDI and GNI

4.1 Household Saving Ratio

Changes to the treatment of Pensions in UK National Accounts resulted in major upward revisions to the household saving ratio from 1997-onwards as described in this article.

The pre-1997 estimates are linked to the 1997-onwards estimates and also take into account the increasing popularity of both newly introduced and other pension schemes.

4.2 Real Household Disposable Income

Improvements were made to the deflator for historic HHFCE, as mentioned above. This had an impact on the pre-1997 estimates for RHDI which were created using the household deflator on the current price series.

4.3 Gross National Income

The FISIM revision to GNI in Blue Book 2008 was previously taken back to 1987. For Blue Book 2014 this revision has now been carried back to the start of the series in line with the FISIM revision to GDP for Blue Book 2008. GNI has also increased due to the revisions applied to GDP for Blue Book 2014.

5 Future plans

For Blue Book 2016 all GDP series published in the Quarterly National Accounts will have a start date of 1995. Future work will take place to expand and improve the series pre-1987 in the Sector and Financial Accounts and we welcome feedback on any series you would like particular attention paid to. Please contact gdp@ons.gsi.gov.uk with any comments.

6 Contacts

Andrew Walton

National Accounts Coordination

Office for National Statistics

gdp@ons.gsi.gov.uk

+44 (0)1633 456408

Louisa Nolan

Gross Capital Formation Branch

Office for National Statistics

gcf@ons.gsi.gov.uk

+44 (0)1633 455250