Impact of the methodological changes to the estimation
of capital stocks and consumption of fixed capital
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Section 1: Executive summary

The Office for National Statistics (ONS) re-instated the publication of capital stocks and
consumption of fixed capital estimates on 2 July 2014. These statistics were withdrawn from
publication in 2011 after standard ONS quality assurance checks raised issues with the quality of
the data. As explained in a progress update published on 17 January 2013, ONS identified issues
which prevented publication – primarily around the transition from Standard Industrial Classification
(SIC) 2003 to SIC 2007.

To address these issues an extensive period of development and quality assurance has been
undertaken.

Between the 2010 and 2013 (released on 2 July 2014) publications, there have been numerous
changes to the methods used to construct capital stock and consumption of fixed capital estimates;
these were summarised in the article, ‘Methodological changes to the estimation of capital stocks
and consumption of fixed capital’. Although all of these methods changes are important, many
have had a small impact on the estimates. Consequently, this article highlights a selection of key
methodological changes that have had the greatest impact on the capital stocks and consumption
of fixed capital estimates released on 2 July 2014. In summary the key impact from methodological
changes are:

1. **changes to the chained volume measure of total capital stock**: the level of both the
gross and net capital stock is shown to be higher between 1997 and 2009 compared with
the previous publication, though the magnitude of this shift in the level varies;

2. **changes to chained volume measure of total capital stock growth**: prior to the
economic downturn, average growth in the current price gross and net stock are now
slightly higher compared with the 2010 publication. However on a chained volume measure
basis, average growth rates prior to the downturn are slightly lower in the 2013 publication.
In addition, the 2013 publication now shows that gross and net stock growth were more
adversely affected by the economic downturn compared with the previous publication (on
both a current price and chained volume measure basis); and

3. **changes to the composition of capital stock**: the asset, sector and industry composition
of gross and net capital stock have also changed, aligned to changes in the gross fixed
capital formation (GFCF) source data.

A comprehensive table that sets out the impact of all methodological changes is set out in Annex 2.
Section 2: Introduction

UK capital stock and consumption of fixed capital estimates are produced by ONS as part of the UK National Accounts. Internationally these estimates are defined in the European System of Accounts manual 1995 (ESA95), which is consistent with the System of National Accounts 1993 manual (SNA93). The UK, in line with other European countries, will implement the changes required for compliance with the updated ESA 2010 for the UK National Accounts 2014. The changes required for compliance with ESA10 are not covered in this article.

Quarterly estimates of the consumption of fixed capital are published in the quarterly UK Economic Accounts release. These estimates are also published annually, in the UK National Accounts (Blue Book), the UK Economic Accounts as well as in the Capital Stock, Capital Consumption release.

The publication of capital stocks and consumption of fixed capital estimates has been suspended since 2011 after an assessment of the quality of the outputs by ONS. ONS published a statement regarding the delay to the re-instatement of these estimates on its website in March 2012. An article, published in January 2013, provided a further update on progress.

ONS re-instated the publication of the capital stocks and consumption of fixed capital dataset on 2 July 2014. An earlier article, 'Methodological changes to the estimation of capital stocks and consumption of fixed capital', provided an overview of the methods used to compile estimates of capital stocks and consumption of fixed capital and explained the upcoming changes in the 2013 publication. This article examines the impact of those changes using the data released in the 2013 publication.

The remainder of this article is structured as follows:

- Section 3: definitions of terms
- Section 4: compiling the long time series source data
  - Section 4.1: overview of the process used to compile the long time series of GFCF
  - Section 4.2: the impact of the methods used to create the long time series for GFCF
    - Section 4.2.1: the impact on GFCF and capital stocks in current prices
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- Section 5: overall impact of the changes
  - Section 5.1: changes to the headline level of capital stock
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- Section 6: further information and contact details
- Annex 1: further information regarding the impact of other methods changes
- Annex 2: summary of key changes to the estimates of capital stocks and consumption of fixed capital

Section 3: Definition of terms

The System of National Accounts 1993 (SNA1993) and the European System of Accounts 1995 (ESA1995) manuals provide formal definitions of terms used within the National Accounts. The
Measuring Capital 2009 manual also describes some of the terms below. The following terms are used within this article:

- **Capital stocks** represent the value of all fixed assets used in production in the economy that are still in use, such as machinery, dwellings and intangible fixed assets such as software.

- **Economic assets** are a store of value representing the benefits that the economic owner will get by holding or using the asset over a period of time.

- **Fixed assets** are non-financial items which are used repeatedly in the process of production for more than one year, for example, a machine on a production line or software used in production.

- **Gross capital stocks** tell us how much the economy’s assets would cost to buy again as new, or their replacement cost. All of the fixed assets in the economy, that are still productive and in use, are added up to calculate this, regardless of how old they are or how much they may have deteriorated since they were first used. This measure shows the value at the end of the quarter or year. This is mainly calculated as an intermediate step towards net capital stocks but individually provides a broad indicator of the productive capacity of an economy.

- **Net capital stocks** show the market value of fixed assets. The market value is the amount that the assets could be sold for, which will be lower than the value of gross capital stocks. This reflects the fact that the assets will have had some wear and tear compared to a new asset. This measure is used in preference to gross capital stocks as it provides a valuation of assets in the economy after the removal of depreciation.

- The **consumption of fixed capital** is the decline in the value, or depreciation, of fixed assets in the economy over a time period. The decline in value can be due to wear and tear, assets no longer being used, or normal accidental damage. It can also be described as the quantity (or value) of the capital stocks which is used up in that period. Whilst these data are interesting in themselves, their primary purpose is to move from various gross measures of economic flows to the corresponding “net” variable, in particular for production and income (net domestic product, net value added) and a number of demand variables such as net investment.

- **Gross fixed capital formation** (GFCF) is the acquisition less disposals of produced fixed assets; that is assets intended for use in the production of other goods and services for a period of more than a year. Acquisitions include both purchases of assets (new or second-hand) and the construction of assets by producers for their own use. New buildings and dwellings, and major improvements to buildings and dwellings are included in GFCF, but the acquisition and disposal of existing buildings and dwellings are not.

- **Current prices** (CP), also known as nominal terms, are the value for an item expressed in terms of the prices of that period, for example the cost of a new machine bought in 1998 in 1998 prices.

- **Constant price** (KP) series have the effects of inflation or deflation removed by fixing the prices of goods and services in one period (the base year), so that only the volumes change. For example the cost of a new machine bought in 1998 in 2009 prices.

- **Chained volume measures** (CVM) are a series of economic data from successive years put in real terms by computing the production volume for each year in the prices of the preceding
year. The data are then chain linked together to obtain a time-series of production figures from which the effects of price changes (that is, monetary inflation or deflation) have been removed. In other words, a series is obtained from the raw data, which reflect only the production volume.

- **Institutional Sectors** are defined in the System of National Accounts (SNA) glossary as: units that are grouped together to form institutional sectors, on the basis of their principal functions, behaviour and objectives.

The institutional units of the UK that make up the total economy are grouped into five mutually exclusive sectors:

1. Non-financial corporations
2. Financial corporations
3. General government
4. Non-profit institutions serving households
5. Households

In the case of the non-financial sector, it can be further broken down into the private sector (those units controlled by private individuals or groups), and public corporations (units controlled by the state).

- A ‘vintage’ is the set of estimates of investment (GFCF) that are produced in a particular year.

**Section 4: compiling the long time series source data**

The Perpetual Inventory Model (PIM) requires a long time series to estimate the accumulated balance of capital stocks in the economy, by asset and industry. The PIM source data are gross fixed capital formation (GFCF) with some series, such as dwellings and buildings, going back as far as 1828.

Contemporary estimates of GFCF can be revised, in particular, following methodological and coverage changes. However, the UK National Accounts only fully implement these changes for estimates for the years 1997 onwards, so the pre-1997 GFCF estimates (the ‘historic’ series) need to be adjusted to take account of changes to the compilation of GFCF, which have occurred since the last publication of capital stocks estimates. These adjustments are made to ensure that the long series is consistent across the whole time period. The key changes to the estimation of GFCF since 2010 are: the changes to the methodology implemented for Blue Book 2013: the update of Standard Industrial Classification 2003 (SIC 2003) to Standard Industrial Classification 2007 (SIC 2007), which occurred in 2011; and the changes to GFCF for Blue Book 2014, excluding the changes which are legally required for compliance with ESA10. All these changes are discussed further in Section 5.a.

This section presents an overview of how the historic (pre-1997) GFCF estimates are compiled to give a long time series consistent with the 1997-onwards estimates, and the impact of this on estimates of GFCF, capital stocks and capital consumption.
Adjusting the historic GFCF time series in order to make it consistent with the post-1996 GFCF methodology has a relatively small impact on estimates of capital stocks. In 1997, the expected impact on total gross capital stock levels (current prices) is estimated to be less than 1%.

Section 4.1: Overview of the process used to compile the long time series of GFCF

To derive a time series of GFCF, in constant prices, by asset and industry, consistent across the whole time period required for input into the PIM, three methodological issues must be addressed:

- the conversion of the historic GFCF estimates (current price) from SIC 2003 into SIC 2007;
- linking the historical (pre-1997) and more recent (post-1996) GFCF series (current price) together, in order to account for post-1996 methodological changes in the pre-1997 series; and
- creating a set of asset-level deflators, for use across the whole time series (historic and post-1996), that are consistent with the deflators used in the currently published (post-1996) GFCF estimates.

Figure 1 provides an overview of the steps used to derive the GFCF constant price (KP) SIC 2007 time series for use in the PIM.

**Figure 1: overview of the steps used to derive GFCF KP asset by industry time series**

1. **Step 1**: reflate GFCF historic KP SIC 2003 time series to CP SIC 2003
2. **Step 2**: convert GFCF historic CP from SIC 2003 to SIC 2007
4. **Step 4**: create whole time series deflators by linking GFCF historic deflators to post-1996 deflators
5. **Step 5**: deflate GFCF whole time series CP SIC 2007 to KP for input to the PIM
Step 1: reflate GFCF historic constant price (KP) SIC 2003 time series to current prices (CP) SIC 2003

The historic GFCF SIC 2003 time series was only available in constant prices (KP, i.e. with the effects of price changes removed). The first step in the process (see Figure 1) was therefore to reflate the KP time series (at an asset by industry by sector level) to derive a current price (CP) series. The current price series are required because:

- the factors used to convert series from SIC 2003 to SIC 2007 are in current prices, as they are estimated using microdata collected in current prices; and
- we wish to use the new deflator methodology for GFCF in order to be consistent with recent methodological changes for GFCF, and because the deflators used in 2010 are not available for years after 2010.

To reflate the time series, the same (historic) deflators which created the KP series in 2010 were used, at the same level of detail (asset, industry and sector). This reproduces the CP estimates as they were in 2010.

Step 2: convert GFCF historic CP from SIC 2003 to SIC 2007

Users should note that this is not the first time that the historical GFCF capital stocks and capital consumption time series has been converted onto a revised SIC. Since its introduction as a classification system in 1948, and to ensure that the industrial classification system keeps up-to-date with economic changes, there have been seven SIC reviews and revisions (1958, 1968, 1980, 1992, 1997, 2003 and 2007). With each SIC revision, and/or with methodological or definitional changes, the time series will have been converted; this will have had an impact on the uncertainty (random and non-random fluctuations) in the GFCF time series used in the PIM.

The conversion of the GFCF historic CP time series was carried out (Step 2 in Figure 1) using a standard approach. The SIC 2003 industry and asset-level series were mapped to SIC 2007 using weights derived from turnover. These weights were estimated from a point in time (December 2009) where both SIC 2003 and SIC 2007 classifications were available for institutions at the microdata level, allowing the proportions of each SIC 2003 series in each SIC 2007 series to be estimated. Turnover was used as a weighting variable because capital expenditure is considered too volatile to be an appropriate variable for deriving conversion proportions.

Weights can only be estimated where the microdata are available classified by both SIC 2003 and SIC 2007, and this dual coding is only available for a limited time period, both because of the resource required, and because of the lack of availability of historic information from businesses, which would allow their individual SIC 2007 classifications to be accurately assigned across the back series. In addition, the weights are calculated from businesses registered on the Inter-Departmental Business Register, and do not take any account of changes to compilation methodology.


Once converted onto a SIC 2007 basis, the derived historic (pre-1997) GFCF CP time series needed to be linked to the published GFCF time series (post-1996) (Step 3 in Figure 1). To do this, linking factors between the converted (historic) series and the SIC 2007 (post-1996) series were
calculated. These were applied to the converted SIC 2003 data, and are intended to correct any remaining discontinuities.

Some discontinuities between the historic and post-1996 GFCF estimates are present, and this can be because:

- turnover rather than capital expenditure has been used to create the industry mapping;
- the weights (i.e. the proportion of a SIC 2003 industry in a SIC 2007 industry) may change over time; and
- the methodology for the compilation of GFCF has changed.

To estimate the linking factors, two options were considered:

- linking the lower level (asset by industry) time series, to preserve the asset by industry growth rates, or linking the aggregate level time series, to preserve the aggregate growth rates; and
- the impact of using a long or short overlap method to estimate the linking factors.

It was decided to link the lower level series to preserve the asset by industry growth rates. This preserves the detail of the lower level series. However, this has had some impact on the growth rates of the aggregate series.

The low level GFCF asset by industry time series were linked (pre-1997 to post-1996) by a linking factor based on the difference between 1997 GFCF asset by industry values in the pre-1997 and post-1996 series – the factor is equal to the ratio of the old to the new series in 1997. This 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 conversion and linking of the historic data is uncertain. As described above, the conversion to SIC 2007 was carried out using weights based on turnover, and these weights are fixed at a point in time, when in fact they might be expected to change over time. In addition, 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 uncertain compared with the 1997-onwards estimates.

**Step 4: create whole time series deflators by linking GFCF historic deflators to post-1996 deflators**

To deflate the linked, whole time period, CP GFCF industry by asset series to KP, for input into the PIM, a set of deflators for the whole time period had to be constructed. The asset-level deflators used to deflate GFCF since Blue Book 2013 are not available for all periods prior to 1997, and the more detailed deflators used in the 2010 publication have not been updated since that time, although they are available for the whole time period prior to 2010.

So that the deflators are consistent with the Blue Book 2013 deflation methodology, and can be updated, it was decided to link the historic deflators (pre-1997) to the new asset-level GFCF deflators (1997 onwards).

To do this, the historic deflators were first weighted to the asset level (consistent with the new deflation methodology) using the GFCF KP series asset and industry weights. These asset-level
historic deflators were then linked to the 1997-onwards deflators, using a linking factor which preserved the growth of the deflators, but linked them to the 1997 level.

**Step 5: deflate GFCF whole time series CP SIC 2007 to KP for input to the PIM**

Steps 1 to 4 create the long time series for GFCF, asset by industry, in current prices, and asset-level deflators, consistent with the Blue Book 2013 methodology. At the start of step 5, the current price data have been converted to SIC 2007, and, as far as possible, given the inherent uncertainty discussed in Step 3, have been adjusted to take account of changes to the methodology for compiling estimates of GFCF.

The final stage of preparation is simply to deflate the current price GFCF series by the deflators. Although this is carried out at the industry by asset level, the new methodology for GFCF makes no adjustment by industry to the asset-level deflators.

**Section 4.2: The impact of the methods used to create the long time series for GFCF**

In this section, the impacts of the new GFCF methodology, the SIC 2003 conversion and the approach to linking the historic series to the post-1997 GFCF series are discussed. The impacts on i) GFCF and capital stocks in current prices, ii) GFCF and capital stocks in constant prices are presented.

The following definitions are used in the text:

- **pre-linked** – this refers to the version of GFCF used in the 2010 publication of capital stocks. For the CP data, it has been converted to SIC 2007 (i.e. it is the version at the end of Step 2), so that comparisons with the post-linked version (see below) can be made at an industry and asset level. For the KP series, which has not been converted to SIC 2003, only comparisons between total GFCF can be made. At the total level, the coverage of SIC 2003 and SIC 2007 are the same; and

- **post-linked** – this is the long time series of GFCF, CP or KP, which is the current input into the PIM used to produce the estimates of capital stocks and capital consumption published on 2 July 2014. It includes the SIC 2003 conversion to SIC 2007, and linking the pre-1997 series to the post-1996 series – both CP and deflators. It is the output after all five steps described above have been completed.

**Section 4.2.1: The impact on GFCF and capital stocks in current prices**

Steps 1 to 3 above are intended to back cast the effects of the methods changes in the post-1996 estimates onto the pre-1997 series. A full description of the changes to GFCF and the impact on the 1997 onwards estimates can be found in Explaining UK Investment Estimates: past, present & future. The changes will have had an impact on the composition of total GFCF by asset and industry. For example, the improvements to the estimation of investment in artistic originals, implemented for GFCF in Blue Book 2013, has increased estimates of artistic originals.

Figure 2 presents a breakdown of the differences in the asset composition between the pre-linked GFCF estimates and the post-linked GFCF estimates. The new estimates include an increased contribution from artistic originals and an increased contribution from software, due in part to the inclusion of a mark-up for net operating surplus for own-account software implemented in Blue Book 2013. These changes are now reflected in the pre-1997 data, as expected. Further details of
the changes can be found in the article ‘Explaining UK Investment Estimates: past, present & future’.

Figure 2: difference in the asset composition of total GFCF for the pre-linked and post-linked series (CP, £m)

As described above, the linking process is inherently uncertain. In the absence of better information, a single point-in-time factor has been applied to the whole back series. This can have the effect of inflating (or deflating) levels in the historic estimates. This effect can be seen in Figure 2, where the difference between the pre- and post-linked series peaks between 1988 and 1991, and falls in 1997.

An examination of this effect by asset shows that between 1988 and 1991 the difference is primarily from the ‘plant’ asset, which moves from subtracting approximately £5-7bn per annum from GFCF to adding between £1-6bn per annum to GFCF. There are additional movements in the amount apportioned to the ‘buildings’ asset, but these are shown to have a much smaller impact on the increase in GFCF between 1988 and 1991 (adding around £4bn to GFCF in 1989).

The increase in the proportion of the plant asset in total GFCF during that period can be partly explained by the level of investment in plant taking place in industry 61 (telecommunications), where the linking process amplifies the sharp rise and fall in investment seen between 1987 and 1992 (see Figure 3). However, the increase in this industry is partially offset by decreases in other industries for the plant asset. Similar behaviour in the proportion of buildings in total GFCF occur from changes in investment in industry 41 and 68 (construction of buildings and real estate activities - see Figures 4 and 5 respectively).
Figure 3: Investment in plant in industry 61, consistent with both Blue Book 2010 and the current version (CP, £m)

![Diagram showing investment in plant for industry 61](image)

Industry 61 implied plant (link factor = 7.8)

Figure 4: Investment in buildings in industry 61, consistent with both Blue Book 2010 and the current version (CP, £m)

![Diagram showing investment in buildings for industry 61](image)

Industry 68 buildings GFCF historical (Link factor = 1.4)

Figure 5: Investment in buildings in industry 41, consistent with both Blue Book 2010 and the current version (CP, £m)

![Diagram showing investment in buildings for industry 41](image)

Industry 41 buildings historical (link factor = 1.9)
These changes to the historic GFCF data are likely to have a small effect on the composition of the capital stock in the published post-1997 data; higher historical GFCF in plant and buildings will ultimately result in a higher asset share of the capital stock for plant and buildings. The exact impact is difficult to quantify, but will be dependent on the average life length assumed for each asset.

For the plant asset, 80% of industry 61 (telecommunications) investment has an average life length of between 20-25 years, while 20% has a life length of between 5-8 years. This means that (without taking account of the life length coefficient of variation, insolvency and scrappage) 20% of the plant GFCF linking adjustment will have dropped out of the stock data by 1999 while a significant proportion of the remaining 80% will have dropped out by the end of the published period.

While the buildings GFCF linking adjustment is much smaller by comparison, it has a life length of 80-126 years so will entirely remain in the stock figures throughout the published period.

From Figure 2, it can also be observed that the difference between the pre-linked series and the post-linked series falls markedly in 1997, and that this can be wholly attributed to the 'artistic originals' asset. This arises from three industries in the artistic originals category (58, 59 and 60 publishing activities, motion picture, video and television programme production, sound recording and music publishing activities, and programming and broadcasting activities – see Figures 6, 7 and 8 respectively). These all have a much higher level of investment in the pre-1997 period, which is then seen to fall sharply in 1997.

It should again be stressed that this does not represent a calculation error, and the impact this has on the capital stock is also small. The change in artistic originals in GFCF is shown to be around £15bn in 1997, which equates to less than 0.5% of the total level of gross stock in 1997, though the artistic originals asset has a life length of 15 years, so this will affect capital stock estimates from 1997 to 2012.
Figure 6: Investment in artistic originals in industry 58, consistent with both Blue Book 2010 and Blue Book 2013 (CP, £m)

Figure 7: Investment in artistic originals in industry 59, consistent with both Blue Book 2010 and Blue Book 2013 (CP, £m)

Figure 8: Investment in artistic originals in industry 60, consistent with both Blue Book 2010 and Blue Book 2013 (CP, £m)
Section 4.2.2: The impact on GFCF and capital stocks in constant prices

Figure 9 compares the GFCF KP SIC 2003 time series (grey series) with the GFCF KP SIC 2007 time series (blue series). The level of GFCF in the ‘new’ time series (blue series) is higher than the Blue Book 2010 series throughout much of the period, and there are differences in the growth profiles for the total level of GFCF (see Figure 2). A further examination of this shows that growth in total GFCF in the linked data diverges from the pre-linked estimates (red series) at times where detailed industry by asset series experience sharp changes in investment up to and including 1997. Further explanation of this can be found in Section 5. Users should be reminded that, because of the methodological changes to GFCF since 2010, changes both in the levels and growth rates of GFCF (pre- and post-1997) are to be expected.

Figure 9: comparison of total GFCF under different methodologies. ‘Blue Book 2013’ estimates that start in 1997 are chained volume measures (CVM, reference year=2006), while all other series are KP (reference year=2006)
Section 5: Overall impact of the changes

Users can observe three primary changes to the capital stock data between the 2010 and 2013 publications:

1. changes to the chained volume measure of total capital stock: the level of both the gross and net capital stock is shown to be higher between 1997 and 2009 compared with the previous publication, though the magnitude of this shift in the level varies;

2. changes to chained volume measure of total capital stock growth: prior to the economic downturn, average growth in the current price gross and net stock are now slightly higher compared with the 2010 publication. However on a chained volume measure basis, average growth rates prior to the downturn are slightly lower in the 2013 publication. In addition, the 2013 publication now shows that gross and net stock growth were more adversely affected by the economic downturn compared with the previous publication (on both a current price and chained volume measure basis); and

3. changes to the composition of capital stock: the asset, sector and industry composition of the gross and net capital stock have also changed, aligned to changes in the gross fixed capital formation (GFCF) source data.

The following sections will set out how the estimates have changed and will explain the main methodological changes that have caused the changes.

Section 5.1: Change to the headline level of capital stock

Figures 11 and 12 compare the headline measures of gross and net capital stocks from the 2010 and 2013 publications, in both current prices and chained volume measures respectively. These show that there has been an increase in the level of both the gross and net capital stock, with the
latest current price data only starting to deviate from the 2010 publication in 2004, but the latest chained volume measure data showing a more constant level shift throughout the entire period.

The majority of the differences shown in Figures 11 and 12 can be attributed to changes in the source data – GFCF – and the way in which the source data are deflated. Users should be aware that the capital stocks model uses a historic GFCF time series dataset that runs from 1828 to 1997, as well as GFCF estimates post-1996. The changes to the capital stock data outlined above have been caused by changes to GFCF in both periods.

Figure 11: level of gross and net stocks; 2010 publication compared with 2013 publication (CP, £bn)

Figure 12: level of gross and net stocks; 2010 publication compared with 2013 publication, CVM (£bn, reference year=2006)

Changes to GFCF

Between the 2010 publication and the 2013 capital stocks publication, the level of GFCF was revised up throughout the post-1996 period, by an average of approximately 11% per annum (see Figure 13). This was a result of methodological changes implemented in Blue 2013, and also the changes which are being implemented for Blue Book 2014, excluding those changes which are required for compliance with ESA10. The key methods changes which have an impact on capital stocks and capital consumption estimates include:

- changes to the construction of the current price investment dataset - using assets as the building blocks and processing acquisitions and disposals of capital assets separately;
- changes to the construction of the chained volume measure investment dataset – removing the effects of prices (deflating) using lower level weighted product deflators and deflating and chain linking acquisitions and disposals of capital assets separately;
- new data sources for investment in artistic originals and the inclusion of an operating surplus mark-up for own-account software; and
• a review of the conversion of survey data from SIC 2003 to SIC 2007 for the 1997 to 2010 estimates.

In addition, cultivated assets were included in the estimates of capital stocks and capital consumption estimates for the first time in the latest release (see Annex 1).

For more information on recent changes to GFCF, see ‘Explaining UK investment estimates: past, present & future’, and ‘Gross Fixed Capital Formation (Investment) - Changes for Blue Book 2014 (excluding ESA10)’.

The upward revisions to GFCF in the post-1997 period meant that the historic dataset from 1828 to 1997, that was used in the 2010 publication, was inconsistent with the methodology of the most recent vintage. To resolve this break in the GFCF long time series estimates, the historic data were also revised to reflect changes in coverage and methods of collection using a set of linking factors (see Section 4). Figure 14 shows the impact of linking the historic estimates to the post-1996 GFCF estimates. The level of real GFCF is now estimated to be higher over the entire historical period between 1828 and 1997, by an increasing proportion that averages approximately 17% per annum since 1948. The methodology for and impact of this revision to the historic data is discussed in more detail in Section 4.

As the level of real GFCF is now estimated to have been consistently higher on average throughout the historic period, it follows that there should be a rise in the level of gross stock (by a broadly similar proportion compared to the increase in GFCF) and net stock (by a slightly smaller amount due to depreciation) in the 2013 publication.

Figure 13: Level of GFCF consistent with both the 2010 publication (KP, £m, reference year=2006) and Blue Book 2013 (CVM, £m, reference year=2006)

Figure 14: Level of GFCF consistent with the 2010 publication and the 2013 publication (both KP, 2006 reference year), alongside GFCF published at Blue Book 2013 (CVM, £m, reference year=2006)
Changes to deflators

While this shift in the level of the capital stock can be observed in the chained volume measure data (Figure 12), the rise in the level of capital stock can only be observed in the current price data from 2004 (referring back to Figure 11). This can almost entirely be explained by the change in the asset level price indices used to deflate GFCF.

In accordance with OECD guidelines, the capital stock data are constructed first on a constant price basis, before the current price capital stock data are compiled by reflating the constant price series using asset level GFCF deflators. In the 2010 publication, the constant price series were reflated using GFCF deflators consistent with data available at the time, while the most recent constant price capital stock data were reflated to current price using the latest GFCF asset level deflators.

In Blue Book 2013 the method for deflating investment changed. As a result, the GFCF implied deflator reflects prices rising at a faster rate than the implied deflator for GFCF published in 2010. This is explained in more detail in the recent article Explaining UK Investment Estimates: past, present & future. Capital stocks uses the same deflators and approach as GFCF, so the impact is also seen in the gross capital stock implied deflator, which is shown to rise at a faster rate compared with the 2010 implied deflator in Figure 15.

To show the impact that using the new deflator methodology has on the inflation of constant price gross stocks to current prices, Figure 16 plots a counterfactual level of current price gross stock that would be obtained had the latest chained volume measure of gross stock been reflated by the previous implied gross stock deflators (dotted blue line). The difference between the blue and dotted blue lines reflects the change in the deflator methodology. This in turn explains the change in the current price gross stock over this period; the difference due to inflation falls between 2004 and 2009, as changes to the source data become more important.

The consumption of fixed capital series has also been revised since the 2010 publication, as shown in Figure 17. The level of the CP series is now consistently higher by an amount ranging from 7% to 24% a year, with the largest absolute difference of +£25 billion in 2007. This can be primarily explained by the fact that higher investment in the historical source data will result in higher levels of asset retirement in the post-1997 period (this is discussed further in Section 5.b). Additionally, the level of GFCF transfer costs has also been revised up in the 2013 publication compared with the 2010 publication.
Figure 15: Implied gross stock deflators from the 2010 and 2013 publications (2006=100)

Figure 16: Current price gross stock in the 2010 and 2013 publications, alongside a counterfactual series that relates new CVM gross stock with old gross stock implied deflators to derive a counterfactual current price gross stock series (CP, £bn)

Figure 17: Level of the consumption of fixed capital; 2010 publication compared with 2013 publication, CVM and CP, reference year=2006
Section 5.2: Change in headline capital stock and consumption of fixed capital growth

The previous section explained how changes to the GFCF source estimates changed the level of capital stock over time. However, it is important to note that changes in the source data will also have had an impact on the capital stock growth estimates over time.

This is shown in Table 1, which presents average annual growth rates of the three key capital stock outputs in both the 2010 publication and the 2013 publication. The volumes of both gross and net stock are now shown to grow at a slightly slower rate between 1998 and 2007, as well as during the economic downturn. In contrast, the values of current price gross and net stock are shown to grow at a slightly faster rate prior to the downturn.

The changes in growth rates for both the real and nominal capital stock have been driven by two offsetting factors. First, the higher level of real investment that now enters the PIM between 1828 and 1996 has the effect of pushing down real capital stock growth during the post-1997 period. However in the subsequent process of converting real capital stock estimates to current prices, this first effect is more than offset by a change in the GFCF deflators used to inflate the real stock estimates to nominal estimates (which raises growth in the nominal capital stock).

Table 1: average annual growth in the capital stock, comparison of 2010 and 2013 publications

<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2010 publication</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross stock</td>
<td>4.9%</td>
<td>4.6%</td>
<td>Gross stock</td>
<td>2.5%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Net stock</td>
<td>5.0%</td>
<td>4.4%</td>
<td>Net stock</td>
<td>2.5%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Consumption of fixed capital</td>
<td>4.9%</td>
<td>1.3%</td>
<td>Consumption of fixed capital</td>
<td>3.2%</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>2013 publication</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross stock</td>
<td>6.1%</td>
<td>4.5%</td>
<td>Gross stock</td>
<td>2.1%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Net stock</td>
<td>6.0%</td>
<td>4.0%</td>
<td>Net stock</td>
<td>1.9%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Consumption of fixed capital</td>
<td>4.3%</td>
<td>-0.7%</td>
<td>Consumption of fixed capital</td>
<td>3.2%</td>
<td>-5.0%</td>
</tr>
</tbody>
</table>

The first factor has two effects: firstly a higher level of investment and capital stock in the historic estimates increases the assets available for retirement in future periods. All else being equal, an upward revision to the level and growth of investment in the historical 1828-1996 period will mean that there will be a greater level and growth of asset retirement during the post-1997 period, which will act to reduce the rate at which the capital stock accumulates over this period. Secondly, a larger capital stock requires a much higher level of investment to achieve a given growth rate.
This effect is shown in Figure 18, which plots the level of asset retirement under two different scenarios. The first scenario (grey line) shows the level of asset retirement that would have been observed using the 2010 GFCF data (equivalent to the grey line in Figure 14). The second scenario (blue line) shows the level of asset retirement that would be observed using the level of historical GFCF that is consistent with current GFCF estimates (blue and black lines in Figure 14). This shows that the level of retirement in scenario two is consistently higher compared with scenario one, and also rises at a faster rate during the pre-downturn decade (at an average annual rate of 8% as opposed to 3% in the 2010 publication).

Figure 18: Implied rates of asset retirement using different levels of GFCF as inputs (£m)

The rate of growth in both gross stock and net stock will be affected by this, with the latter affected to a slightly greater extent, as assets previously accumulated will also cause total depreciation to rise in the post 1997 period.

Higher asset retirement growth can help explain the lower rates of real capital stock growth between the 2010 publication and the 2013 publication, however growth in GFCF post-1997 has also contributed, as this is the rate at which new assets are added to the capital stock. Over the decade prior to the downturn, GFCF growth has been revised down on average (to 4.3% per annum compared with 4.9% per annum in the 2010 publication – see Figure 19), partly accounting for the lower capital stock growth in the pre-downturn period. Additionally, there has been a sharp downward revision to growth in 2008 (from -1.0% to -6.9%) that explains why the growth in capital stock has also been revised down during the downturn period, even though retirement levels are shown to fall in the 2013 publication and rise in the 2010 publication.

As explained above, the resulting real capital stock data are inflated using GFCF deflators, and it is this process that explains the higher rate of growth in the current price capital stock data compared with the previous publication. Figure 20 shows that over the pre-downturn decade, the price of fixed investment is now estimated to be rising at a consistently faster rate compared with the
previous publication, resulting in higher current price stock growth as a result of the ‘inflating process’.

This is supported by the fact that average current price stock growth is broadly similar during the downturn period; which coincides with the deflator rising at broadly similar average annual rates during the same period (3.0% per annum in the new publication compared with 2.2% in the old publication).

Figure 20: Gross stock implied deflator growth (%)

Section 5.3: Change in the composition of the capital stock

As with the 2010 publication, the ‘Capital Stocks, Consumption of Fixed Capital, 2013’ bulletin breaks down the level of the capital stock by headline sector, asset and industry. Methods changes have also resulted in slight differences in the overall composition of the capital stock; these, along with the explanation for these differences, are outlined below.

Section 5.3.1: Changes to asset composition

To show how the asset composition for capital stocks has changed between publications, Figure 21 shows the level of current price capital stock by asset in 2009. In current price terms, dwellings, other buildings and structures and intangible assets have all been revised up in the 2013 publication - by 7%, 5% and 100% respectively, while the level of capital stock held in other machinery and equipment and ‘other assets’ remains broadly unchanged.

This reflects the change in the asset composition of the GFCF estimates between the 2010 publication and the 2013 publication. Figures 21 to 23 show that the level of stock held in each asset has been revised up to the greatest extent in assets that now account for a larger proportion of the GFCF estimates compared with 2010. For example, the share of total GFCF attributable to intangibles more than doubled between 2010 and 2013 (to 14.4% from 6.8% over the 1997-2009 period), as a result of including artistic originals and the mark-up for net operating surplus on own...
account software as GFCF, as well as a change in the software deflator. This has resulted in intangible assets experiencing the largest proportional revision to the capital stock. Assets that did not experience an upward revision to the level of stock are shown to have falling GFCF shares; for example the ‘other machinery and equipment’ asset fell to 32% of total GFCF in the 2013 publication from 42% in the 2010 publication.

Further information regarding the change in the asset composition of GFCF between the 2010 and 2013 publications can be found in the article ‘Explaining UK investment estimates: past, present & future’.

**Figure 21: level of net capital stocks by asset, 2010 publication compared with 2013 publication, CP**

£ billion 2009

- Dwellings
- Other buildings and structures
- Other machinery and equipment
- Intangible fixed assets (a)
- Other Assets (b)

(a) Intangible fixed assets include software, entertainment and mineral exploration
(b) Other assets include transport equipment and cultivated assets. Cultivated assets were not included in the previous publication.
The growth profile of certain assets have also changed in the most recent publication, as shown in Table 2 that plots average annual growth rates in the capital stock by asset. As with the headline growth figures, changes in the GFCF estimates and asset retirement post 1996 can help to explain changes to capital stock growth by asset. To show the extent to which both factors are driving changes in capital stock growth, Figures 24 to 27 plot contributions to the change in capital stock growth between 2010 and 2013 for the headline assets, that can be attributed to changing retirement rates and changing levels of GFCF.

In Figures 24 to 27, blue bars represent the impact of changes to GFCF in the post-1996 period – positive values represent GFCF acting to push up capital stock growth in the post 1997 period, and negative represent a downward influence on capital stocks growth. Red bars represent the impact of asset retirement in the same way. For example, slower growth in intangible fixed assets can be attributed to slower GFCF growth during this period that is partially offset by lower asset retirement. In contrast, higher GFCF is seen to push up the growth of the dwellings capital stock prior to the downturn, partially offset by higher asset retirement.
Table 2: average annual growth in the net capital stock by asset, comparison of 2010 and 2013 publications, CVM

<table>
<thead>
<tr>
<th></th>
<th>2010 publication</th>
<th>2013 publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwellings</td>
<td>1.2%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Other buildings and structures</td>
<td>3.1%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Other machinery and equipment</td>
<td>5.0%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Intangible fixed assets</td>
<td>3.3%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

| Dwellings              | 1.4%             | 0.5%             |
| Other buildings and structures | 2.4%        | 2.4%             |
| Other machinery and equipment | 3.7%        | 1.0%             |
| Intangible fixed assets | -2.0%            | -2.5%            |

Figure 24: Contributions to the change in intangible fixed assets gross capital stock growth (CVM, %)

Figure 25: Contributions to the change in dwellings gross capital stock growth (CVM, %)
Figure 26: Contributions to the change in buildings gross capital stock growth (CVM, %)

Figure 27: Contributions to the change in plant/other machinery and equipment gross capital stock growth (CVM, %)

As with the total current price capital stock figures, current price growth at the asset level has also been revised as a result of changes to growth on a chained volume basis and changes to the asset level deflators used to inflate real data to nominal data. Table 3 shows that the current price capital stock now grows more strongly in the dwellings and other buildings assets compared with the 2010 publication, while other machinery and equipment are shown to grow at a slower rate. This reflects the changes to CVM growth shown in Figures 24 to 27 and changes to the asset level deflators shown in Figures 28 to 31.

For example, the growth of the current price capital stock held in intangible fixed assets has been revised down markedly over the 1998-2009 period. This has been driven by weaker CVM capital stock growth (shown in Figure 24) which is now inflated by a price index that rises at a slower rate (shown in Figure 31). In contrast, growth in the current price stock held in buildings was revised up markedly over the pre-downturn decade, with lower growth in the CVM figures being more than offset by an upward revision to growth in the buildings deflator (to approximately 4% per annum in the 2013 publication as opposed to 2% per annum in the 2010 publication).

Further information regarding the change in the asset level deflators can be found in the ‘Explaining UK investment estimates: past, present & future’ article.
Table 3: average annual growth in the net capital stock by asset, comparison of 2010 and 2013 publications, CP

<table>
<thead>
<tr>
<th></th>
<th>2010 publication</th>
<th>2013 publication</th>
<th></th>
<th>2010 publication</th>
<th>2013 publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwellings</td>
<td>5.6%</td>
<td>3.6%</td>
<td>Dwellings</td>
<td>8.1%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Other buildings and structures</td>
<td>5.6%</td>
<td>4.8%</td>
<td>Other buildings and structures</td>
<td>7.3%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Other machinery and equipment</td>
<td>2.5%</td>
<td>5.6%</td>
<td>Other machinery and equipment</td>
<td>1.8%</td>
<td>9.6%</td>
</tr>
<tr>
<td>Intangible fixed assets</td>
<td>5.4%</td>
<td>4.6%</td>
<td>Intangible fixed assets</td>
<td>-0.6%</td>
<td>-0.8%</td>
</tr>
</tbody>
</table>

Figure 28: Implied dwellings gross stock deflator (2009=100)  Figure 29: Implied buildings gross stock deflator (2009=100)
Section 5.3.2: Changes to Industry Composition

There are two key changes to the industry composition since the 2010 publication:

- in the 2010 publication, GFCF and consequently capital stock estimates were based on SIC 2003. For the 2013 publication the move to SIC 2007, in line with the UK’s legal requirements, has resulted in changes to the structure and classification of the industry breakdowns.
- in the 2010 publication, all of the dwellings capital stock was assigned to a single services industry. In the current publication, dwellings are assigned to four industries: construction of buildings (41), real estate activities (41), services to buildings and landscape activities (81), and public administration and defence (84, for the government sector only).

Neither change has an impact on the total levels of stocks. However, both of these changes have an impact on the lower-level industry breakdowns, and linking the converted historical data does have an impact on the pre-1997 total GFCF estimate (see Section 4).

Figure 32 shows how net capital stocks (CP) have been revised by industry group in 2009. The most significant change was in the construction industry, where the estimate of net stocks (CP) has been revised upwards by £225 billion (over 800%). This increase in the level of construction capital stock was primarily caused by the change in the allocation of investment in dwellings from residing entirely in the services industries, to including a proportion in the construction industry.

Net capital stocks in the services industry decreased by £44 billion (CP, 2%). This was in part because of the reallocation of stocks of dwellings out of the services industries. However, this is likely to be offset by the move of publishing (including software publishing) and recycling industries from the manufacturing sector to the services sector, one of the key changes in the update of SIC 2003 to SIC 2007. More detailed information on the changes to the industrial classification can be found on the Office for National Statistics’ web pages on Standard Industrial Classification 2007.
Table 4a and Figures 33, 35 and 37 show how the change in net capital stock growth on a constant price basis can be attributed to changes in underlying GFCF estimates as well as asset retirement. For example, constant price construction stock growth was revised down markedly in the pre-downturn decade, which was a result of lower GFCF estimates partially offset by lower retirement – see Figure 35.

Along with the asset level data, industry level capital stock growth has also been revised due to the changes to the deflation methodology introduced for GFCF (see table 4b). In the previous 2010 publication, detailed asset by industry level deflators were applied to the capital stock estimates whereas in the most recent method deflation is carried out at the asset level. The current GFCF asset deflators are constructed from product based PPIs, SPPIs, construction price indexes and some GDP implied deflators. These product-based deflators are weighted to assets using estimates from ONS’ annual Business Spending on Capital Items Survey (BCIS). BCIS collects detailed data on GFCF by product, which informs the weight of each product in each asset.

The impact of the change to the deflator methodology is presented in Figures 34, 36 and 38. These plot the implied deflator (that is, current price divided by the chained volume measure) for the current, industry-level estimates of gross stock, together with a constructed industry-level deflator using the deflators from the previous publication. The constructed deflator (grey line) is the weighted sum of all asset by industry deflators for the industry of interest. The weights are derived from the GFCF CP asset by industry proportions.
Table 4a: average annual growth in the net capital stock by industry, comparison of 2010 and 2013 publications, CVM

<table>
<thead>
<tr>
<th></th>
<th>2010 publication</th>
<th>2013 publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chained volume measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-0.7%</td>
<td>-2.1%</td>
</tr>
<tr>
<td>Construction</td>
<td>7.7%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Services</td>
<td>4.9%</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

Table 4b: average annual growth in the net capital stock by industry, comparison of 2010 and 2013 publications, CP

<table>
<thead>
<tr>
<th></th>
<th>2010 publication</th>
<th>2013 publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current prices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-0.3%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Construction</td>
<td>7.9%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Services</td>
<td>6.2%</td>
<td>5.4%</td>
</tr>
</tbody>
</table>

Figure 33: Contributions to the change in manufacturing gross stock growth (CVM, %)

Figure 34: 2013 implied gross stock deflator and a weighted 2010 asset deflator for manufacturing (2009=100)
Section 5.3.3: Changes to sector composition

The level of detail at which data are processed in the PIM and the output of the PIM has changed compared with the 2010 publication. Under the old methodology, the inputs to the PIM included a breakdown by institutional sector. This meant that the PIM produced outputs by industry, asset and institutional sector and no further work was needed to provide capital stocks outputs. In the latest publication, the GFCF data and PIM outputs are all on an industry by asset basis, which must then be disaggregated into the institutional sectors, such as non-financial corporations and households.
This is done using the sector proportions in each year from the last publication in 2010. Proportions for more recent years are carried forward.

However, the loss of sector detail in the PIM is a trade-off between the desirability of processing very detailed breakdowns, and the increase in uncertainty at the very detailed level, e.g. sector by asset by industry. Both the old and the new methods for sectorisation therefore have limitations, and the sectorisation methodology will be reviewed in the light of these limitations as part of the full review of capital stocks planned to begin in 2015.

In any case, this change has a small impact on the estimates for the total economy as well as the asset and industry breakdowns as the assumptions within the PIM model are now applied at a total economy level rather than for each sector individually. Crucially, it will keep the sector proportions similar to the previous publication, although the sector levels will be different from previous publications, where the total economy level changes as a result of the other methods changes described in this article.

For this reason, there have been smaller revisions to the composition of the capital stock by sector than to the asset, industry and total economy levels. Figure 39 shows how the net stocks for institutional sectors have changed between publications. Non-financial corporations have increased by £180 billion (14%), while the other headline sectors have seen broadly unrevised capital stock levels. Table 5 also shows that average annual growth follows the downward revision seen in the total capital stock growth figures across most sectors.

Figure 39: level of net stocks by institutional sector; 2010 publication compared with 2013 publication, CP

(a) NPISH stands for non-profit institutions serving households, such as universities and charities.
(b) General government (that is central and local government) sectors have been forecast based on historic trends; any updates to GFCF for these sectors are not reflected in the data in this release.
Table 5: Average annual growth in the net capital stock by institutional sector, comparison of 2010 and 2013 publications, CVM

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-financial corporations</td>
<td>3.1%</td>
<td>2.0%</td>
<td>Non-financial corporations</td>
<td>1.9%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Households and NPISH</td>
<td>2.0%</td>
<td>2.0%</td>
<td>Households and NPISH</td>
<td>1.6%</td>
<td>0.5%</td>
</tr>
<tr>
<td>General Government</td>
<td>2.1%</td>
<td>3.9%</td>
<td>General Government</td>
<td>2.6%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Financial corporations</td>
<td>3.2%</td>
<td>2.3%</td>
<td>Financial corporations</td>
<td>2.0%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

Section 6: Further information and contact details

An announcement about this release (March 2012)

Capital stocks and capital consumption releases

Quality and Methodology Information: Capital Stocks and Capital Consumption (March 2012)

UK Statistics Authority Assessment Report 234 ‘Statistics on UK Business Investment and Capital Stocks’

If you have any queries, please contact:

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E-mail: gcf@ons.gsi.gov.uk
Telephone: (+44) 01633 455250

Acknowledgements:
Thank you to all the contributors to this article including: Philip Wales, Sophie Danielis, Luke Weston and Gemma Rabaiotti.
Annex 1: Further information regarding the impact of other methods changes

Adjustments

All estimates are subject to a degree of uncertainty. For the GFCF estimates, this arises from the (quantifiable) uncertainty from the sampled surveys used as key data sources, as well as (less-quantifiable) uncertainty from assumptions made in the compilation of the estimates, and modelling of some components. The more detailed the breakdown of estimates is, the higher the uncertainty is as a proportion of the series. There is also uncertainty in estimating mean life lengths and in assumptions about the rate of depreciation in the PIM. At the detailed asset and industry level used to produce outputs from the PIM, this – unavoidable – uncertainty can lead to negative estimates of capital stocks, which are not conceptually possible. Small adjustments have therefore been made to some of the lower level series in order to correct this. The adjustments are constrained so that total GFCF is not altered, and no negative capital stocks are produced, even at the most detailed level of processing.

Cultivated assets

In the Capital Stocks publication in July 2014, ONS has included a new asset, cultivated assets. This added between £5 and £12 billion a year to gross stocks and between £2.5 and £6.5 billion to net stocks a year, which is equivalent to 0.2% of total gross and net stocks.

Unlike other assets, the consumption of fixed capital for cultivated assets is assumed to be zero\(^1\). While estimation is possible, it is difficult to estimate an adequate average life length as age is not a direct, regular and continuous function of productivity and the withdrawal of animals from the productive herd may be caused by external conditions such as a change in the price of foodstuffs. As a result, it will have no impact on the level of the consumption of fixed capital.

The industry breakdown for the non-for profit institutions serving households (NPISH)

As part of the Blue Book 2014 review of the not-for-profit institutions serving households (NPISH) sector, the industries to which NPISH estimates are assigned have been reviewed.

Please see the article ‘Revised methodology and sources for non-profit institutions serving households’ for more details about recent changes for NPISH.

Previously, NPISH was spread across a range of industries in the capital stocks dataset, however it is now limited to 13 industries (Table 6). This will have the effect of reducing the value of capital stocks held by this sector.

Table 6: List of the industries now covered by NPISH

<table>
<thead>
<tr>
<th>Code</th>
<th>Industry Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>68.1-2</td>
<td>Real estate activities</td>
</tr>
<tr>
<td>69.1</td>
<td>Legal activities</td>
</tr>
<tr>
<td>72</td>
<td>Research and Development</td>
</tr>
<tr>
<td>75</td>
<td>Veterinary services</td>
</tr>
<tr>
<td>81</td>
<td>Services to buildings and landscape activities</td>
</tr>
<tr>
<td>85</td>
<td>Education</td>
</tr>
<tr>
<td>86</td>
<td>Health Activities</td>
</tr>
<tr>
<td>87</td>
<td>Residential Care Services</td>
</tr>
<tr>
<td>88</td>
<td>Social Services</td>
</tr>
<tr>
<td>90</td>
<td>Creative, arts and entertainment</td>
</tr>
<tr>
<td>91</td>
<td>Libraries, archive, museums and other cultural activities</td>
</tr>
<tr>
<td>93</td>
<td>Sporting activities</td>
</tr>
<tr>
<td>94</td>
<td>Membership Organisations</td>
</tr>
</tbody>
</table>

Figure 40 below shows the comparison between the previous and new publications for NPISH. The series for the new publication are lower. At current prices, gross stock decreases by between 20% and 40% a year; for net stocks it decreases by between 30% and 55% a year. The decrease in gross and net stocks is 0.7% and 1.2% respectively. The consumption of fixed capital also decreases by between 50% and 75% a year. The decrease in the consumption of fixed capital is equivalent to up to 1% of the total economy figure.

**Figure 40: level of gross and net stocks for NPISH; 2010 publication compared with 2013 publication, CP**

![Graph showing comparison between 2010 and 2013 gross and net stocks for NPISH](image-url)
## Annex 2: Summary of key changes to the estimates of capital stocks and consumption of fixed capital

<table>
<thead>
<tr>
<th>Change</th>
<th>Previous publication</th>
<th>Current publication</th>
<th>Impact from changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes in the methods used to compile Gross Fixed Capital Formation (GFCF) – the key data source for capital stocks and the consumption of fixed capital</td>
<td>Estimates of GFCF based on pre-Blue Book 2013 methodology</td>
<td>Estimates of GFCF based on Blue Book 2013 methodology (no ESA10 changes implemented)</td>
<td>Impact on levels and growth rates, in real and nominal terms. See Section 5.1 for more details</td>
</tr>
<tr>
<td>Changes to GFCF data to comply with ESA95</td>
<td></td>
<td></td>
<td>Some impact: increase in total capital stocks.</td>
</tr>
<tr>
<td>Cultivated assets e.g. livestock, orchards</td>
<td>Not included</td>
<td>Included</td>
<td></td>
</tr>
<tr>
<td>Artistic originals</td>
<td>Included in entertainment</td>
<td>Estimates improved for Blue Book 2013</td>
<td></td>
</tr>
<tr>
<td>Mark-up for own account software</td>
<td>Not included</td>
<td>Introduced in Blue Book 2013</td>
<td></td>
</tr>
<tr>
<td>Linking pre-1997 (‘historic’) GFCF data, on a SIC2007 basis, to the SIC2007 series from 1997 onwards</td>
<td>Whole time series on SIC2003, no conversion or linking necessary (although there will have been previous conversion from earlier industry classifications)</td>
<td>Historical data (pre-1997) converted to SIC2007, and linked with new linking factors to SIC2007 GFCF data from 1997</td>
<td>Some impact on industry and asset breakdowns, as well as higher level aggregates</td>
</tr>
<tr>
<td>Change</td>
<td>Previous publication</td>
<td>Current publication</td>
<td>Impact from changes</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Industry breakdowns</td>
<td>a) dwellings only available for total industries;</td>
<td>a) dwelling assets disaggregated into four industries</td>
<td>a) no impact at total level</td>
</tr>
<tr>
<td></td>
<td>b) non-for profit institutions serving households (NPISH) estimates split across most industries</td>
<td>b) NPISH breakdown refined to reflect only those industries associated with NPISH</td>
<td>b) improved industry breakdowns and a decrease in total NPISH for capital stocks and consumption of fixed capital</td>
</tr>
<tr>
<td>War adjustment</td>
<td>original method (see section 5.7)</td>
<td>new method (see section 5.7)</td>
<td>Small impact</td>
</tr>
<tr>
<td>Level of detail at which capital stocks and consumption of fixed capital are estimated from GFCF</td>
<td>Industry by asset by institutional sector</td>
<td>Industry by asset</td>
<td>Trade-off between loss of detail and a decrease in uncertainty from processing at a higher level</td>
</tr>
<tr>
<td>Estimation of series by institutional sector</td>
<td>Aggregated up from industry by asset by sector series</td>
<td>Disaggregated from industry by asset series, using proportions</td>
<td>No change at total level</td>
</tr>
<tr>
<td>Deflators base year</td>
<td>Base year 2005=100</td>
<td>Base year 2010 =100</td>
<td>see Impact on National Accounts of Producer Price Index Rebasing for an analysis of the re-basing</td>
</tr>
<tr>
<td>Deflation methodology</td>
<td>Industry by asset by sector</td>
<td>Asset</td>
<td>Change caused by the different level of deflation and different deflators - see Explaining UK Investment Estimates: past, present &amp; future for a full discussion See Section 4</td>
</tr>
<tr>
<td>Publication format and contents</td>
<td>2 releases, PDF tables</td>
<td>1 release, Excel tables, extra tables</td>
<td>More data available; increased accessibility</td>
</tr>
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</table>