

# Improvements in the production of UK Purchasing Power Parities data: December 2016

This article explains the improvements to UK data sources and methods used in the calculation of Purchasing Power Parities (PPP).

Contact:  
Andrew Banks and Christopher  
Jenkins  
andrew.banks@ons.gov.uk and  
christopher.jenkins@ons.gov.uk  
+44 (0)1633 456486 or +44 (0)  
1633 455474

Release date:  
13 December 2016

Next release:  
To be announced

## Table of contents

1. [Executive summary](#)
2. [Introduction](#)
3. [Revising Purchasing Power Parities](#)
4. [Focus on improvements to UK rental prices](#)
5. [Impact of revisions](#)
6. [Conclusions](#)

# 1 . Executive summary

This article explains the improvements to UK data sources and methods used in the calculation of Purchasing Power Parities (PPP). These improvements, along with changes to data from other [Member Countries of the European Comparison Programme](#) were incorporated into the latest set of PPP results published by [Eurostat on Tuesday 13 December 2016](#).

PPPs are primarily cross-country price indicators rather than time series price indices, and therefore are not open to revision beyond the latest 3 years as part of the ongoing production process. However, recent improvements in the measurement of national accounts, driven by the introduction of the [European System of National Accounts 2010 \(ESA 2010\)](#), has presented an exceptional opportunity to revise historic PPP data back to 1995 to improve the overall coherence and alignment with national accounts.

The largest revision to UK PPP data comes from the revision of the component imputed rental price series, where the methods and sources used in PPP calculations have been aligned with the improvements recently introduced in the UK National Accounts.

This article provides an overview of the key improvements, along with an assessment of the revision to the UK PPP series and the impact this has on comparable measures of volume such as gross domestic product (GDP) per capita.

## Notes for executive summary

# 2 . Introduction

To obtain a true comparison of gross domestic product (GDP) volumes between countries, GDP estimates in national currencies need to be converted to a common currency (for example, the Euro or the dollar), via an appropriate exchange rate. Purchasing Power Parities ([PPPs](#)), rather than market exchange rates are often used for international comparisons as they better reflect differences in the level of prices between countries thus allowing “real” comparisons of GDP volumes. PPPs are calculated for all the main aggregates of GDP. In Europe, the exercise is co-ordinated by Eurostat and PPPs are derived from the prices of comparable and representative goods and services. Each member country is responsible for the collection and provision of PPP price data, whilst Eurostat are responsible for the calculation and publication of aggregate PPP results.

In essence, PPPs are spatial price level indicators, and thus primarily suitable in the comparison of geographical locations at a given point in time. The methodologies behind the collection of PPP data are not designed to capture price change over time, but rather price differences across countries or other geographies. If necessary, methodologies may change from one period to the next, if this is deemed necessary to improve spatial comparison. Therefore, the coherence of PPP data over time can diverge as new methods and data sources are introduced and historic PPP estimates are not fully revised.

There is scope for an exceptional general revision to PPP data should circumstances, such as the introduction of ESA 2010, dictate that the introduction of revisions improves the coherence of disseminated data. When such opportunities occur, it is natural that other improvements to historic data should be made, in particular to incorporate changes in methodologies or improved data sources.

# 3 . Revising Purchasing Power Parities

The decision was taken by Eurostat to revise the Purchasing Power Parities (PPP) time series (back to 1995) for the following main reasons

- to incorporate the latest national accounts data that was produced under ESA 2010 by all Member States and other countries
- to harmonise, to the maximum extent, the methodology used in calculating the PPPs for all reference years

The introduction of ESA 2010 has had a significant impact on the level of gross domestic product (GDP) in many countries and hence this triggered the general revision of the PPP time series. In simple terms, GDP expenditure data is used to derive the weighting structure used to aggregate PPP data. This new GDP expenditure on an ESA 2010 basis has been used to re-aggregate the PPPs from 1995 to 2015.

Further revisions to PPP data have been made due to:

- the availability of new data on housing from the introduction of 2011 Census data and new national accounts data (affecting imputed and actual rental)
- the introduction of new methodology for the measurement of education
- implementation of new data sources for electricity and gas prices
- the introduction of a new output based approach for measuring health services

The introduction of these revisions by Member States improves the coherence of early PPP data with methods used to produce PPPs in later years and also aligns the PPPs with important changes made in the national accounts.

## 4 . Focus on improvements to UK rental prices

Whilst the UK implemented all the revisions detailed above, by far the largest impact has come from the improvements made in the measurement of imputed rental prices. Since the [System of National Accounts \(SNA\)](#) 1993 was introduced, there has been a requirement for National Statistics Institutes to incorporate owner-occupiers' imputed rental into the national accounts. These are the housing services that accrue to households which own a property and reside in it: therefore avoiding the cost of renting an equivalent property.

This activity is not directly observable, as it does not involve a financial transaction, but it is important to capture. For example, if the measure were not included, a shift away from owner occupation toward the private rental sector would (all else equal) act to raise GDP. Similarly, it would be more difficult to compare GDP levels across countries with different rates of owner-occupation if this measure were not taken into account.

As might be expected, given the relatively high levels of owner-occupation in the UK, imputed rental has a weight of around 10% to 15% of the total PPP aggregate, so even minor changes to imputed rental prices would likely have a big impact.

In 2013, the UK revised the methodology for providing PPP imputed rental price data (which covered data for 2010, 2011 and 2012). This revision was required to improve the source data we use for providing this data to Eurostat, and to align the PPP data with planned improvements to the measurement of imputed rental in the UK National Accounts. These changes to the national accounts were made in 2016 when a revised treatment for the value and volume of imputed rental in GDP was introduced.

The main improvements made to the PPPs were consistent with the national accounts changes, notably:

- new, more robust sources of rental price data from the Valuation Office Agency (VOA) and similar data from devolved administrations; these sources have much larger sample sizes (for example, around 500,000 properties for the VOA data annually) than the previous source which was the Living Costs and Food (LCF) survey – LCF has an approximate sample size of 400 properties per quarter
- updated dwelling stock data was available following publication of the 2011 Census data; while the source of data remains the same for this purpose (dwelling stock tables from the Department for Communities and Local Government), the level of data changed to bring earlier estimates in line with the latest, more accurate picture of dwelling stock levels provided by the 2011 Census

The introduction of these PPP improvements in 2013 led to a large step increase in the UK PPP price for imputed rental. This relative increase in imputed rental price was consistent with the relative increase in current price expenditure seen for imputed rental in the national accounts, given that the methods were now aligned. This revisions window has been used to remove the discontinuity in the PPP series, and bring the full imputed rental PPP series in line with the improved data sources, back to 1995<sup>1</sup>.

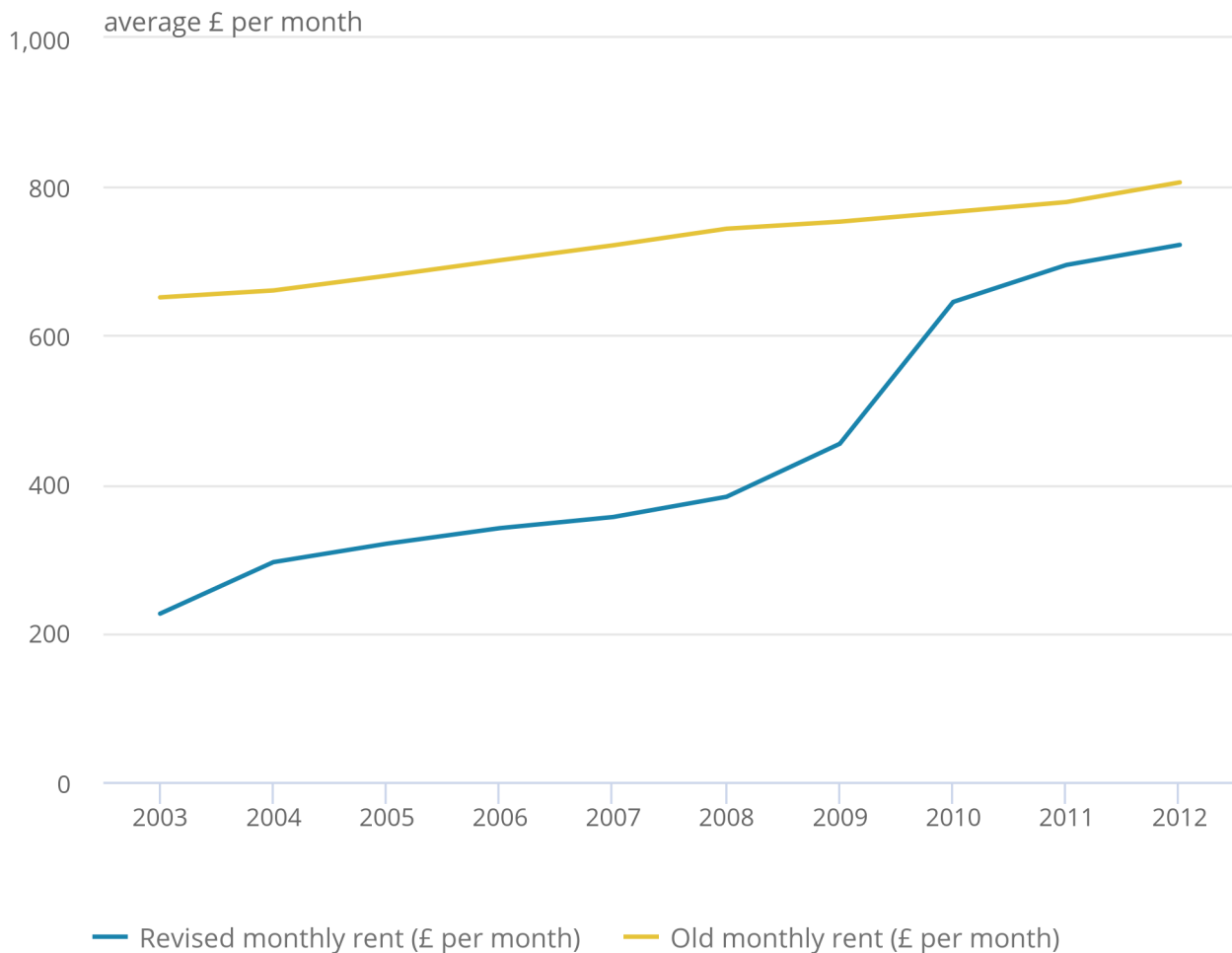
These revisions also align to GDP deflator revisions that occurred at Blue Book 2016. Prior to 2010 growth in the deflator was revised down by 0.3% per annum, while there was also a more substantial downward revision of 1.6% in 2010. The latter was caused by removing a similar discontinuity in methods. Full details on the benefits of using these new sources of data were covered in March 2016 article [Changes to National Accounts: Imputed Rental](#).

The effect of these improvements is to increase the UK price of imputed rental across the history of the PPP time series. Figure 1 presents a high-level summary of the impact the improvements have on the UK PPP price series for imputed rental. The increase in price can be attributed mainly to the improved source of data used for rental prices, where the old source of data from LCF (400 properties per quarter) has been replaced with a much more comprehensive set of data from VOA and devolved administrations (over 500,000 properties per annum):

**Figure 1: Average UK monthly imputed rental price (£ per month) used in PPP calculations, before and after revision, 2003 to 2012**

2003 to 2012

Figure 1: Average UK monthly imputed rental price (£ per month) used in PPP calculations, before and after revision, 2003 to 2012



Source: Office for National Statistics

Source: Office for National Statistics

**Notes:**

1. The title of this chart was updated in June 2017 to provide clarity regarding the content. The chart represents a high-level summary of the average UK monthly imputed rental price (£ per month) that feeds into the calculation of PPPs, before and after revision.

## 5 . Impact of revisions

The increased imputed rental price (and the relatively large weight this has) has increased the aggregate UK Purchasing Power Parities (PPP) (on a GDP basis). This section takes a look at the impact these revisions have on the main relative estimates published using PPP data.

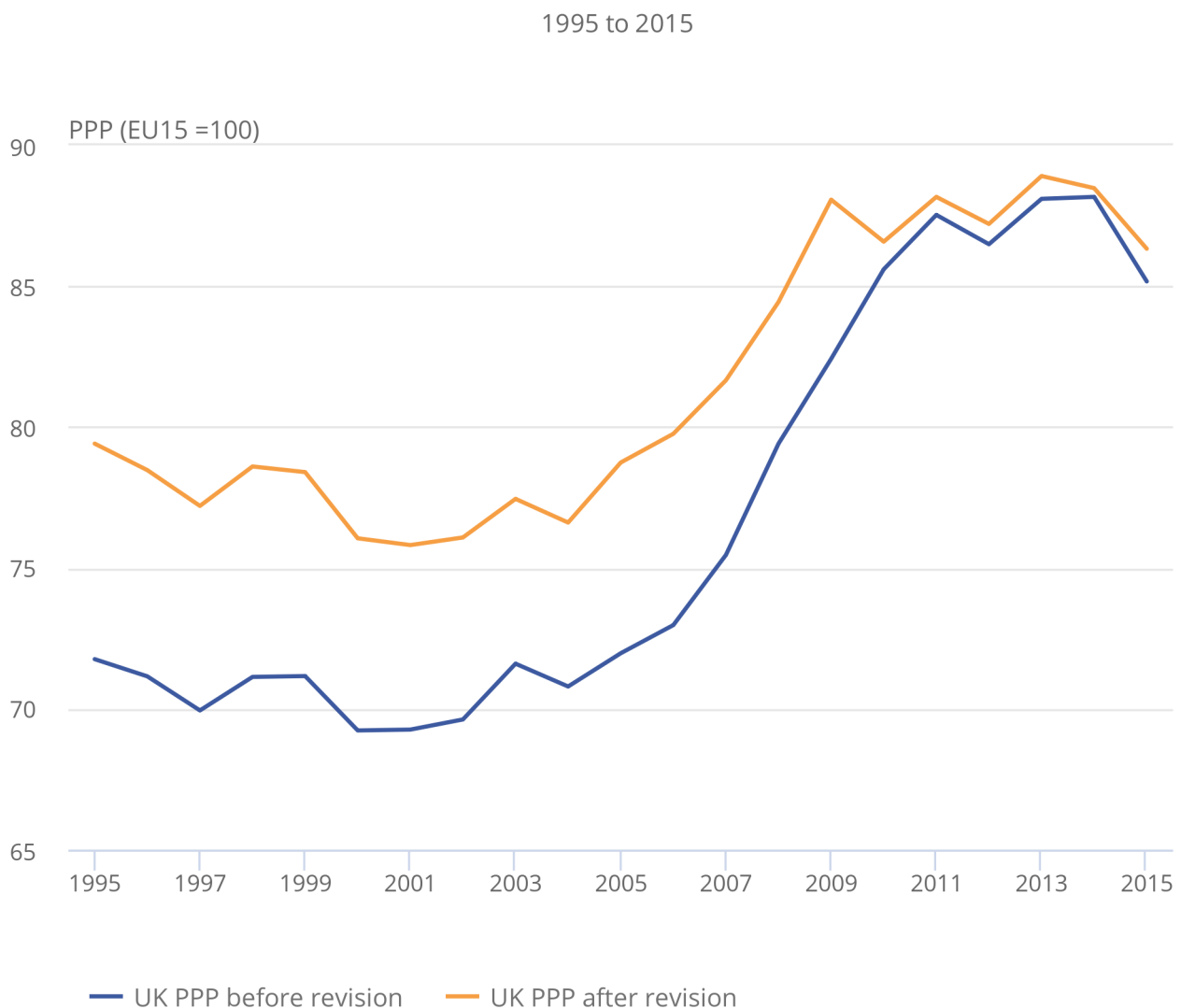
Figure 2 presents the revised headline UK PPP (as published by Eurostat), along with the previously published data. PPPs are constructed to show the ratio of prices in national currencies for a representative basket of goods and services. For example if the basket cost €200 across the EU and £140 in the UK, the UK PPP in relation to the EU would be 70. As both the previously published and revised series have been referenced to 100 against the EU15 countries (which take Euros as the national currency) – values below 100 imply that the representative basket costs fewer pounds to buy in the UK compared to the number of Euros required to buy the basket in the EU country set.

Figure 2 shows that the relative price level has been revised up in each year between 1995 and 2009, with much smaller revisions to successive years. For example in 2005 previous data suggested that a basket of UK goods would cost 72 pence for every euro required to buy the same basket in the EU15 countries. The new data suggests that UK prices were instead more expensive, costing 79 pence for every euro required, a reduction in the difference of approximately 7 percentage points.

**Figure 2: UK PPP before and after revision, EU15=100**

1995 to 2015

Figure 2: UK PPP before and after revision, EU15=100



Source: Eurostat

**Source: Eurostat**

It is important to note the distinction between PPP statistics and “price level indices”. Figure 2 does not show that it is cheaper to buy a basket of goods in the UK, as the PPP does not correct for the discrepancy in national currencies. Price level indices – the ratio of PPPs to domestic exchange rates – do control for these differences, with values greater than 100 indicating that the country is relatively more expensive compared to the EU average.

All else equal the revised PPPs would act to raise the level of the UK PLI during the 1995 to 2009 period (again there is likely to be little impact in subsequent years). Revised PLIs consistent with the new PPPs are also published by Eurostat on 13 December 2016.

## 5.1 Relative national accounts deflators

Another price measure typically used by National Statistics Institutes to control for price changes are national accounts deflators. These can be used to compare differences in price changes over time and across countries. While users are advised to avoid the use of Purchasing Power Parities (PPP) statistics to make time series (temporal) price comparisons, the latest revised PPP data are shown to move more closely in line with relative national accounts deflators over time.

Figure 3 plots the two data series shown in Figure 2, re-indexed to 100 at 2005, while the additional line presents the ratio of the UK National Accounts deflator to the EU15 deflator (again re-indexed to 100 at 2005). This shows that the new PPP profile more closely follows relative deflator movements, which can in part be attributed to the alignment of methods for imputed rent, along with other ESA methods changes.

There are however a number of reasons why the two lines will not equate to each other, ranging from differences in data sources, to the nature of the index number formulae used to produce each measure. Further details can be found via the article '[Space-Time \(In\)consistency in the national accounts: Causes and cures](#)' (Oulton, 2015).

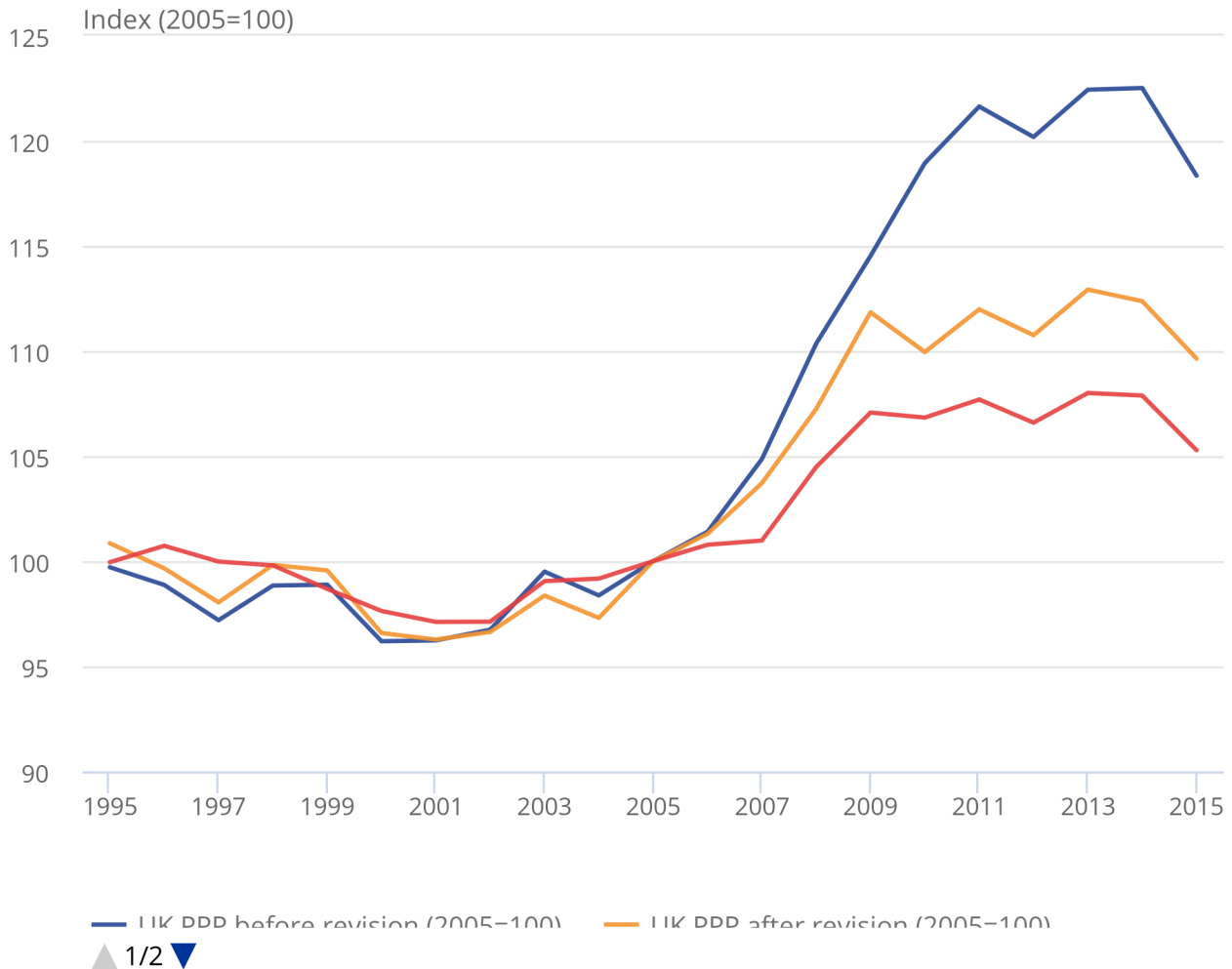


**Figure 3: Comparison of UK PPP on GDP basis with relative growth of national accounts deflators (indexed to 100 at 2005)**

1995 to 2015

Figure 3: Comparison of UK PPP on GDP basis with relative growth of national accounts deflators (indexed to 100 at 2005)

1995 to 2015



Source: Eurostat, Office for National Statistics

Source: Eurostat, Office for National Statistics

## 5.2 GDP per capita

Purchasing Power Parities (PPP) statistics are used widely to compare the economic performance of countries, by converting a range of economic indicators such as gross domestic product (GDP) or GDP per capita into Purchasing Power Standards (PPS) as opposed to the national currency. By controlling for price level differences across countries, the resulting volume of UK activity can be expressed relative to another country or set of countries such as EU15. As UK GDP per capita in PPS terms is derived by dividing the national currency equivalent by the UK PPP, an upward revision to the PPP will, all else equal, lead to a downward revision to the GDP per capita measure.

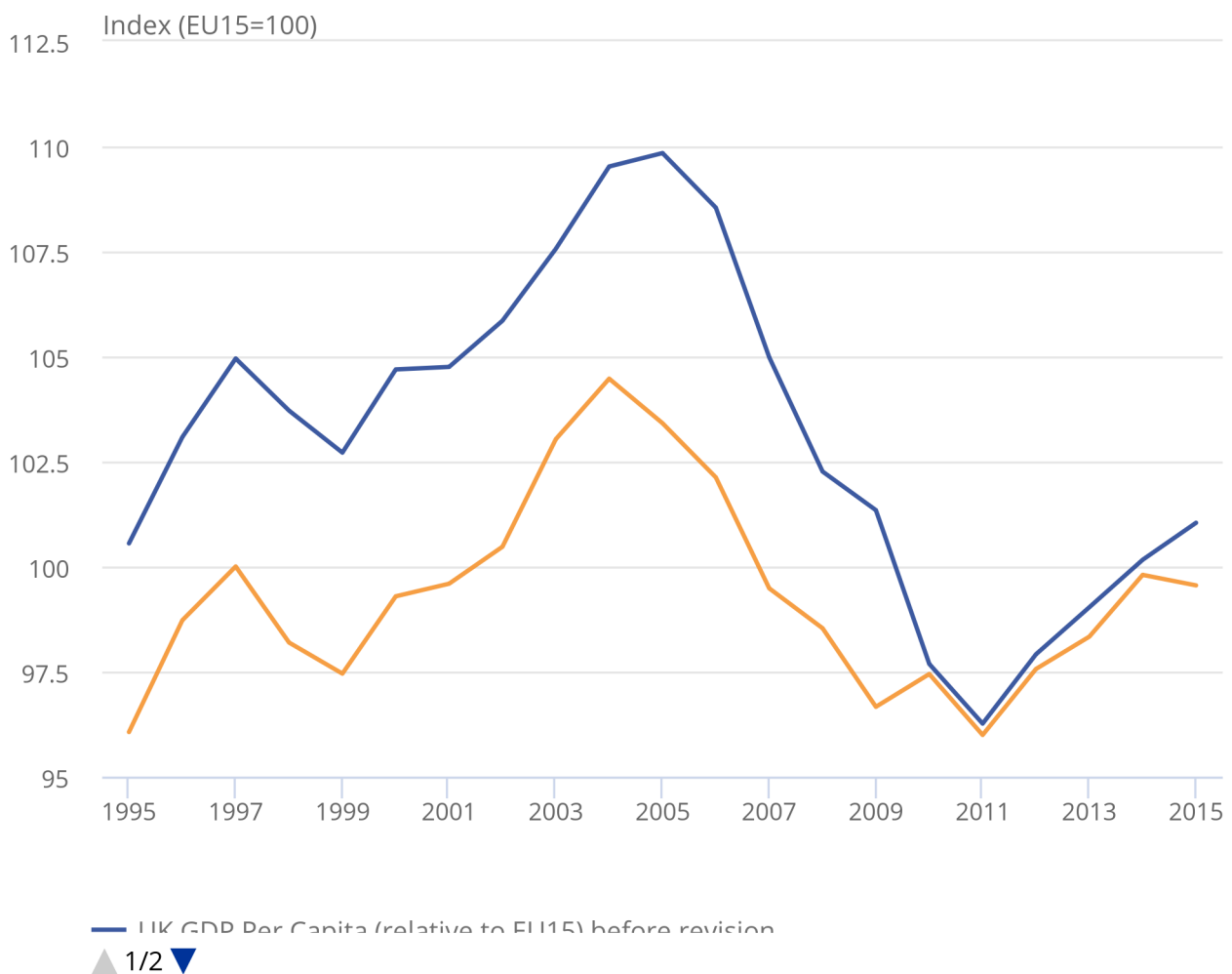
For example, Figure 4 compares the level of UK GDP per capita with the EU15 set of countries, derived from the previously published and newly revised PPPs (values above 100 indicate that UK GDP per capita exceeded the EU15 average). In 2005, the previously published data showed UK GDP per capita to be 10 percentage points higher than the EU15 average, while the new data suggests a difference of just 3 percentage points. The new data shows a relatively more stable profile over time, suggesting more aligned performances across countries, especially during the period 2006 to 2009.

**Figure 4: Comparison of UK GDP per capita on a PPP basis, before and after revision (EU15=100)**

1995 to 2015

Figure 4: Comparison of UK GDP per capita on a PPP basis, before and after revision (EU15=100)

1995 to 2015



Source: Eurostat

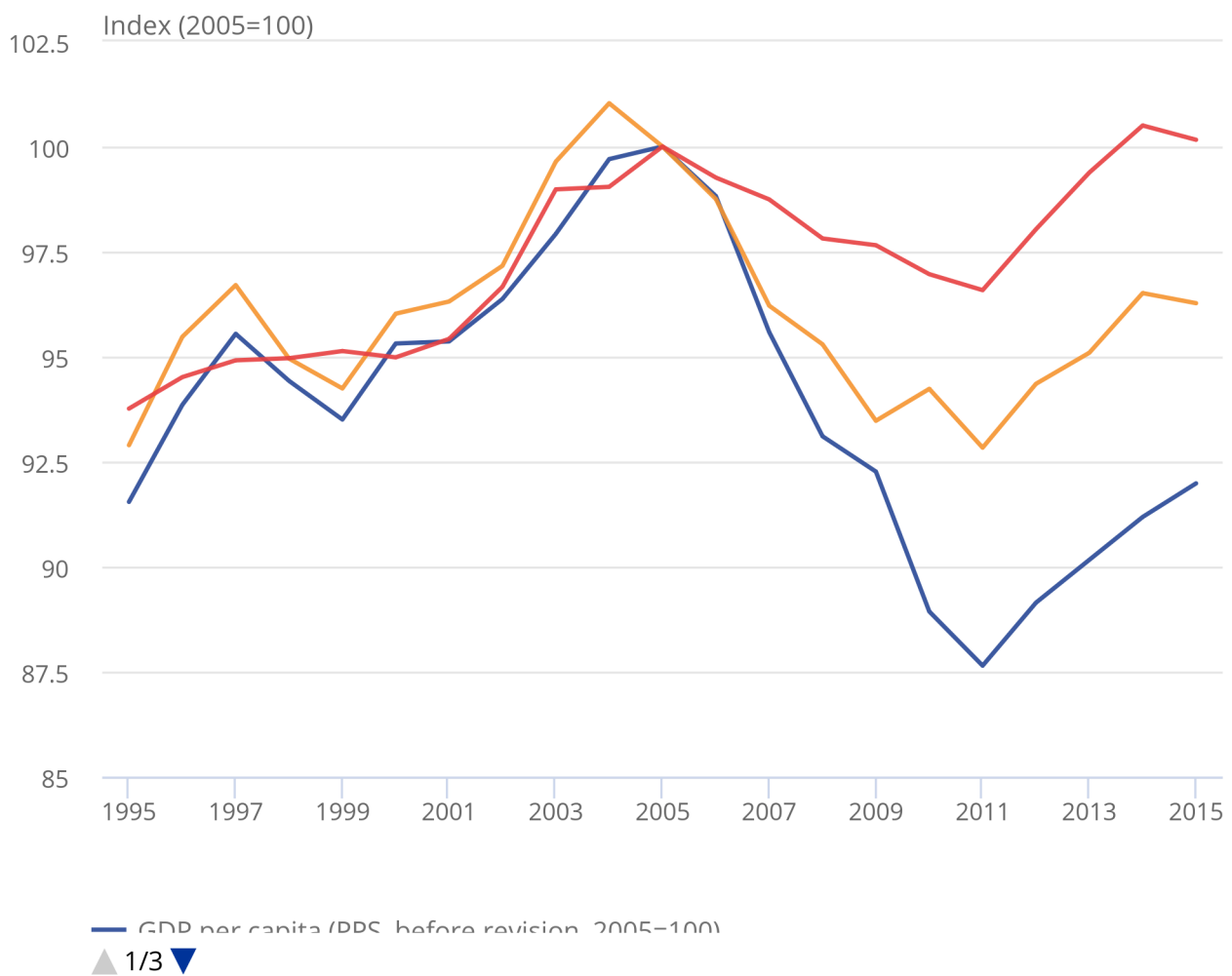
Source: Eurostat

While this measure is again only recommended for spatial comparisons, Figure 5 also shows that the new GDP per capita measures are more aligned to the relative performances of GDP per capita in chained volume measures (that is, obtained from deflating GDP using a national accounts deflator). These revisions will have acted to partially offset the corresponding upward revisions to UK GDP in value terms arising from the Blue Book 2016 imputed rental changes.

**Figure 5: UK GDP per capita on a PPP basis before and after revision, and relative GDP per capita in CVM terms (2005=100)**

1995 to 2015

Figure 5: UK GDP per capita on a PPP basis before and after revision, and relative GDP per capita in CVM terms (2005=100)  
1995 to 2015



Source: Eurostat, Office for National Statistics

Source: Eurostat, Office for National Statistics

Notes:

1. CVM = Chained Volume Measure.

## 5.3 Further measures using PPP statistics

Purchasing Power Parities (PPP) statistics are used in a wide range of other economic indicators, including those to assess the relative sizes of economies, as well as relative levels of productivity.

Figure 6 shows the impact that the previously published PPPs have on the level of nominal gross domestic product (GDP) over the period 1999 to 2015, relative to the value in national currency. All else equal, the upward revisions to PPP data would place downward pressure on the level of current price GDP in Purchasing Power Standards (PPS) terms in the period 1995 to 2009, but with minimal revision to subsequent periods.

Estimates of nominal productivity are published by Eurostat and OECD in both national currency and PPS terms. The impact of PPP revisions on nominal GDP in PPS terms would again act to reduce the level of productivity (derived by dividing nominal GDP by total labour hours worked), but only in the period 1995 to 2009. Hence the overall picture of weak UK productivity levels relative to G7 economies in the most recent years will be broadly unaffected by these revisions.

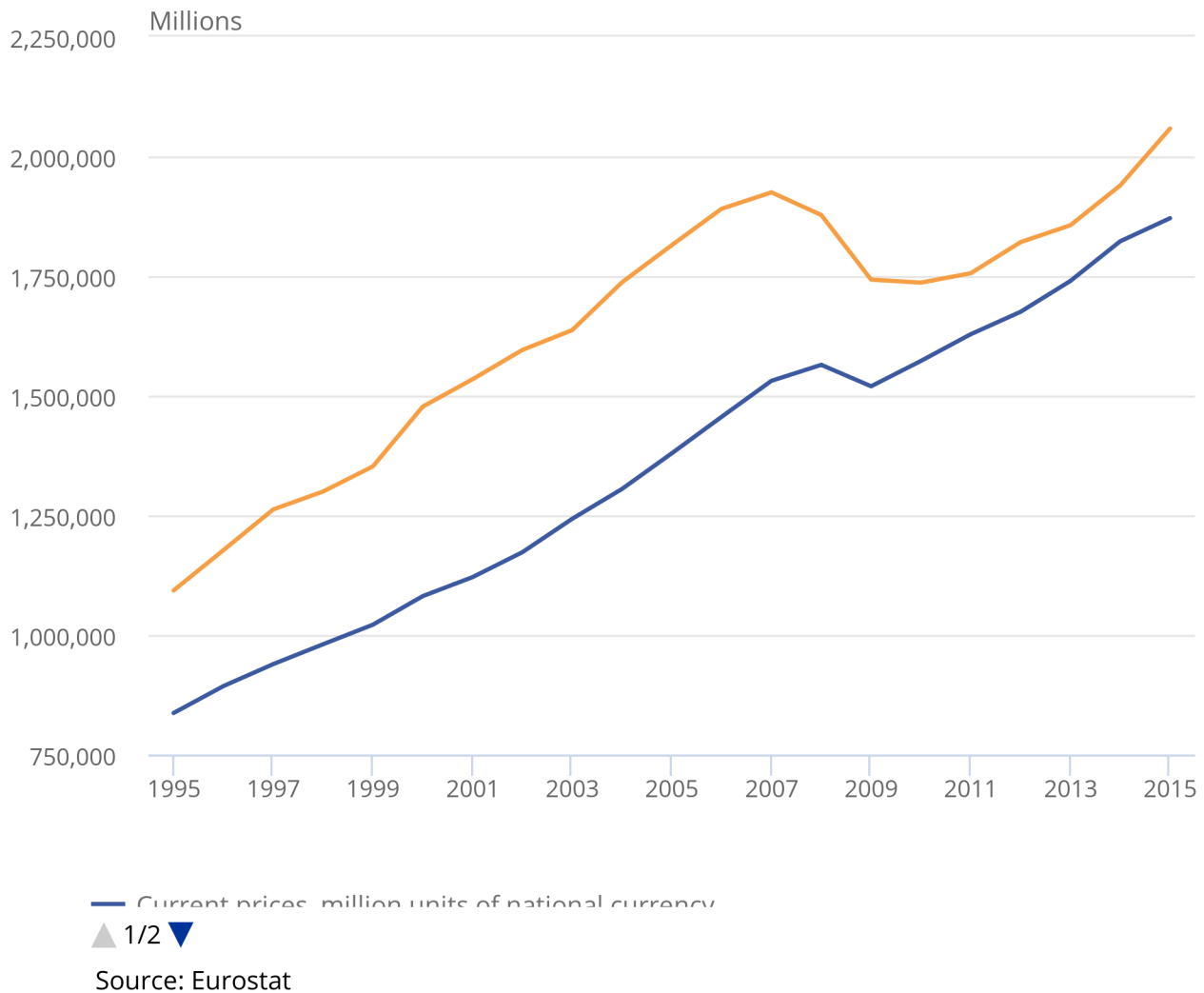
We publish an international comparison of productivity on a biannual basis drawing from PPP data published by OECD. New estimates of international comparisons of productivity will be available in early 2017.

**Figure 6: Comparison of UK nominal GDP (£millions) and GDP (million PPS) on previously published PPPs**

1995 to 2015

Figure 6: Comparison of UK nominal GDP (£millions) and GDP (million PPS) on previously published PPPs

1995 to 2015



Source: Eurostat

## 6 . Conclusions

The availability of improved data sources and methods is a natural process in the production of statistics. Temporal statistics are better placed to handle these improvements as regular revision windows allow improvements to be implemented, for example, in national accounts estimates. The production of spatial statistics (such as PPPs) however, doesn't provide the same opportunity and therefore this can lead to a lack of coherence when comparing the latest estimates with earlier periods.

A unique opportunity has arisen to revise historic estimates of Purchasing Power Parities (PPPs). This has allowed the UK to improve the measurement of imputed rental used in the PPPs and to ensure (amongst other improvements) updated national accounts expenditures, consistent with ESA 2010, are also implemented.

The largest impact on UK PPP data is from the improvement of imputed rental. Whilst the revisions are large, it has allowed the UK to make better use of more robust data sources that were previously unavailable, align the measurement of imputed rental with UK National Accounts and to improve the coherence across the full length of the PPP time series.