

# Updated Analysis of Revisions to Quarterly GDP

**Andrew Walton and Gary Brown**

This short article updates the analysis first published in the article '[Understanding the quality of early estimates of Gross Domestic Product](#)', Brown et al, Economic and Labour Market Review 2009, and subsequently updated in a short note '[Analysis of revisions to quarterly gross domestic product](#)' 2011, Lee.

This update is timed to coincide with a series of presentations being given on GDP revisions, the Productivity Puzzle and the GDP Improvement Programme.

The data analysis contained in this article, as per the previous articles, is based on the [Real Time GDP database](#), which is published on the ONS website. This database contains all quarterly estimates of GDP from 1961 to the latest data, which was published on 27 September 2012 with reference to the second quarter of 2012. The charts updated in this article show various maturities of GDP data and how they have evolved over time, as well as comparing revisions over different historical periods.

## Why is GDP revised?

Earlier this year ONS published an article on the reasons why GDP is revised ('[Why is GDP revised](#)', 2012, Walker, Walton and Georgiades). That article set out the reasons for revisions to GDP in detail, and these can be summarised as:

The first estimate of quarterly GDP is published approximately 25 days after the end of the quarter. This is then updated when the second estimate of GDP is published, containing more detail on the output approach and some aggregate income and expenditure data. Just over four weeks later detailed information on income and expenditure components is published as part of the Quarterly National Accounts (QNA). As further data become available there are potential revisions to the quarterly GDP figures in subsequent QNA releases, as well as in the annual national accounts Blue Book publication. The Blue Book process enables annual data to be balanced at a much more detailed level and is also the opportunity for major methodological changes to be introduced. Both of these annual revisions can potentially lead to changes in the quarterly profile of GDP.

## GDP revisions in the last two years

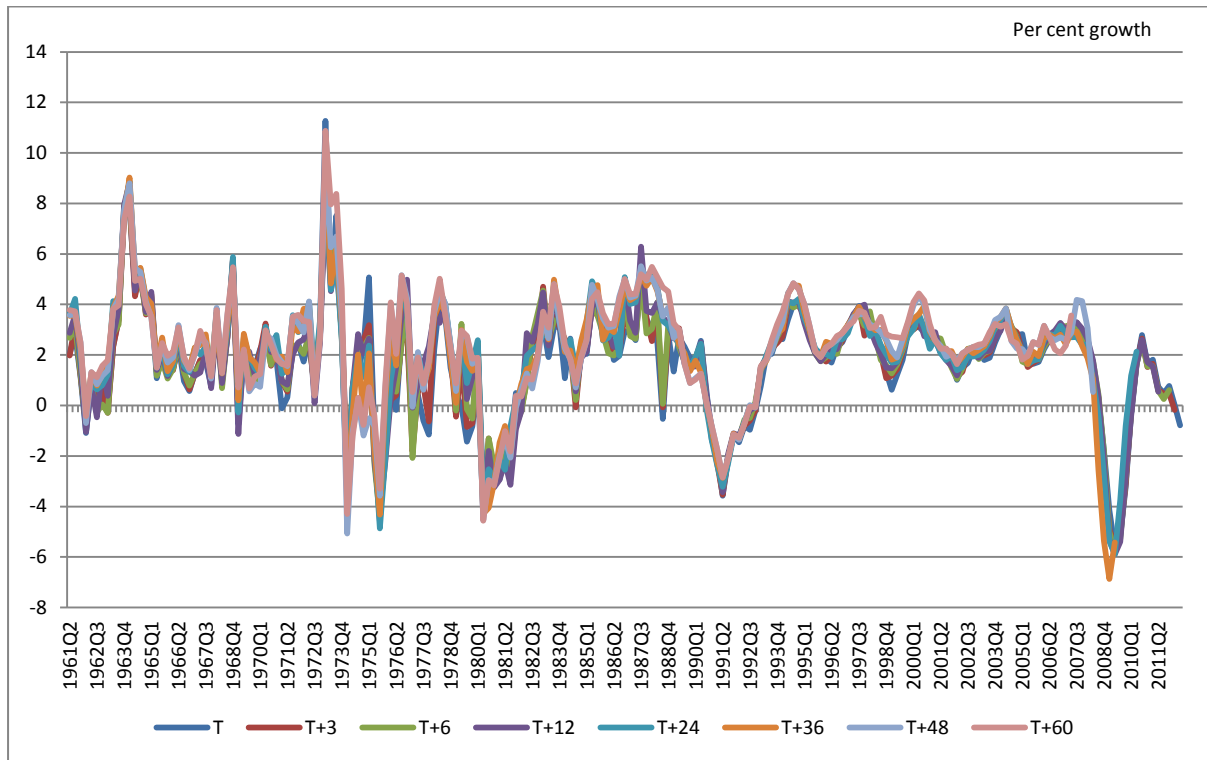
Since the previous analysis there have been two Blue Book publications, both of which saw significant methodological improvements. [Blue Book 2011 improvements](#) moved the National Accounts from a Standard Industrial Classification (SIC) 2003 basis to a SIC 2007 basis, and also changed the method of deflation from being predominantly based on Retail Prices Index (RPI) series to using Consumer Prices Index (CPI) series. Blue Book 2012 saw the introduction of [Improvements to the measurement of insurance services](#), in order to bring the Accounts into line with international guidelines. Both of these Blue Books had the impact of revising the level and growth of GDP, with the deflator revisions being applied back to the start of the GDP series (1948 annually and 1955 quarterly) and the insurance revisions being applied from 1992 to the present.

The two distinct types of GDP revision (see Walker et al for the detailed discussion); revisions as further data become available and revisions due to methodological changes; mean that it is important to look at various vintages of the data in order to avoid drawing the wrong conclusions regarding the quality of the early estimates of GDP. As a general rule, early revisions are due to data revisions as more information becomes available, whereas later ones are due to improved methodology.

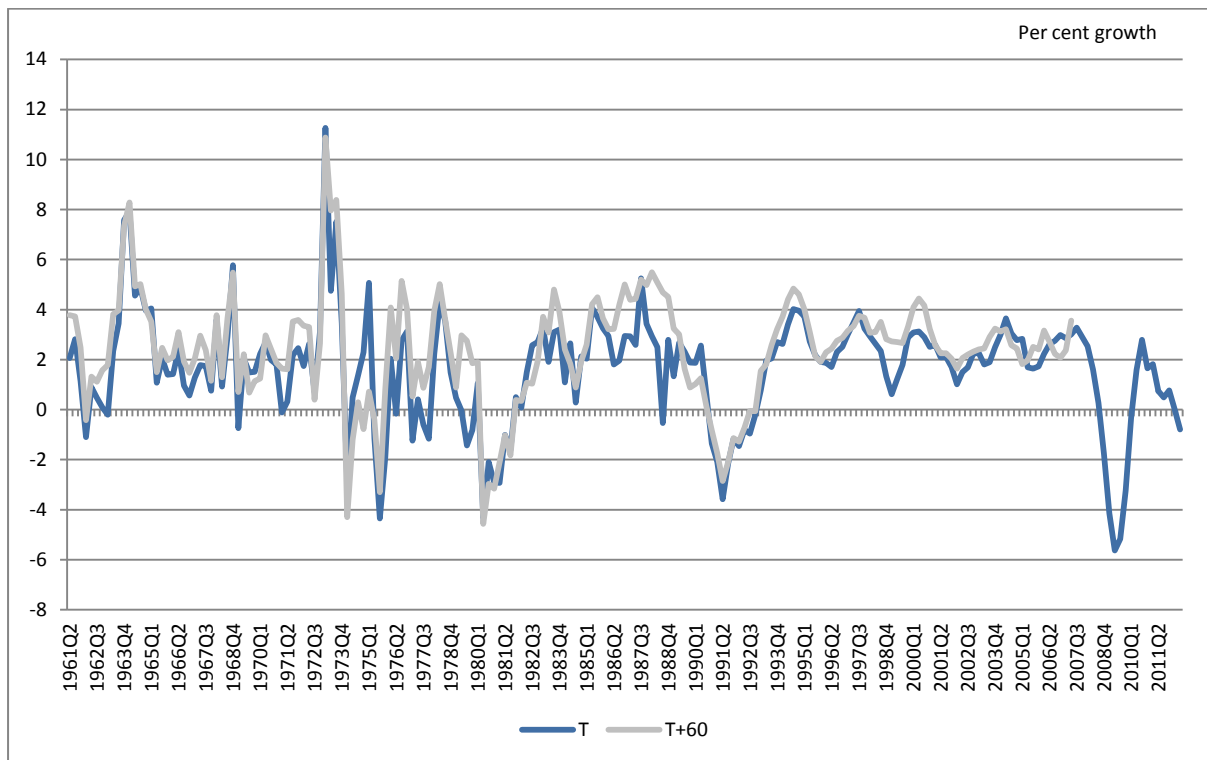
Chart 1 shows GDP growth rates (based on the growth between the latest quarter and the same quarter of the previous year) at various maturities, with the initial estimate shown as 'T' and

subsequent estimates after three, six, 12, 24, 36, 48 and 60 months, subject to the data having reached that vintage. The second chart strips out the intermediate estimates and just focuses on the initial estimate and the estimate produced 60 months later.

**Chart 1 - GDP percentage growth, quarter on same quarter 1 year ago**



**Chart 2 - GDP percentage growth, quarter on same quarter 1 year ago, T and T + 60 months**



## Periods, maturities and vintages

Period - the period is the quarter to which any given estimate relates, for instance, there is a series of different estimates for the period 2012 quarter two, starting with the preliminary estimate published in July 2012

Maturity - the maturity is the 'age' of a given estimate, so the preliminary estimate is the estimate at age one month

Vintage - the vintage is the release of data at a given point in time. This release will be a temporary 'snapshot' of the quarterly GDP time series composed of estimates which all have different maturities.

Charts 1 and 2 allow the user to draw the same conclusions as both previous articles demonstrated, namely that in broad terms the picture of growth in GDP over the period from 1961 to 2012 quarter two is similar, irrespective of the maturity of data, although there are some exceptions. In particular the differences caused by revisions in the late 1980s were previously discussed in Brown et al, where a period of consistent upward revisions led to the Pickford Review (1989). The review implemented a number of methodological changes including the publication of a single measure of GDP.

Standard statistical tests show no evidence of bias in revisions to GDP growth (calculated as the average revision over the last five years) between:

- the preliminary estimate and the second annual balance (T + 24 months)
- the second estimate and the second annual balance
- the Quarterly National Accounts estimate and the second annual balance.

As well as the last five years, this result also holds in the 1980s and the 2000s as a whole, but there remains evidence of a small positive bias in GDP revisions in the 1990s. The second annual balance was chosen for the comparison period because the majority of data revisions are incorporated by this time, leaving mainly methodological revisions for later vintages.

## Other metrics to assess the quality of GDP

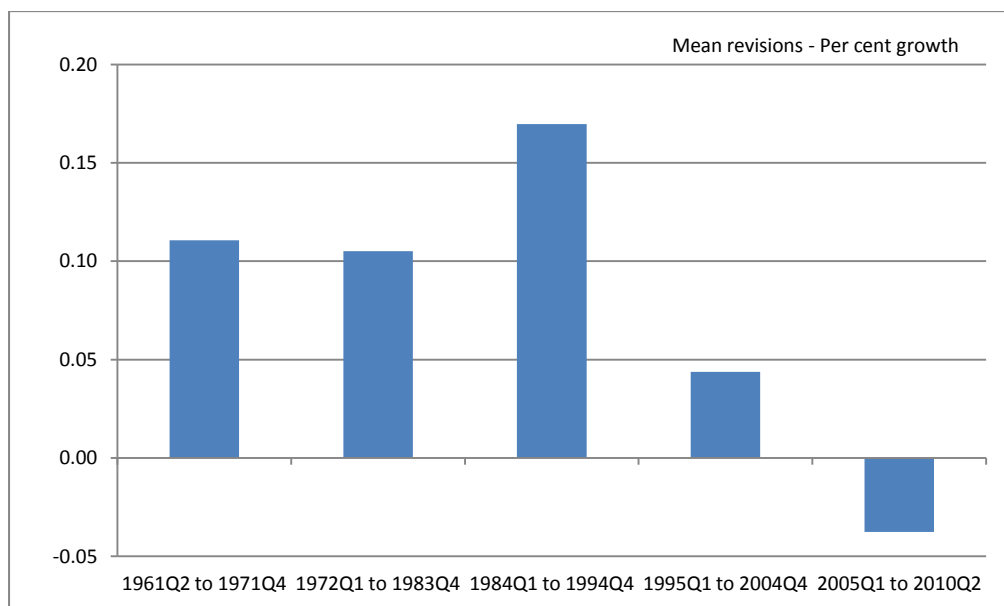
The dimensions of National Accounts quality were previously discussed in Brown et al. with the conclusion that the key quality issues relating to the preliminary estimates of GDP are accuracy and timeliness. Information on revisions therefore remains firmly at the centre of the quality assessment. Many different approaches can be used to summarise revisions, and this analysis updates three of the previous methods, all of which are defined in more detail in the original Brown et al paper.

### i) Mean revisions

This is a simple mean (arithmetic) average revision for the estimate of GDP for period T, between the maturity T + i and the maturity T + j.

Chart 3 presents the mean revisions between the first published estimate and those published 24 months later over five sub-samples from the long-run dataset. These are calculated as quarter on quarter growth rates for GDP.

**Chart 3 - Mean revisions between T and T + 24 months**



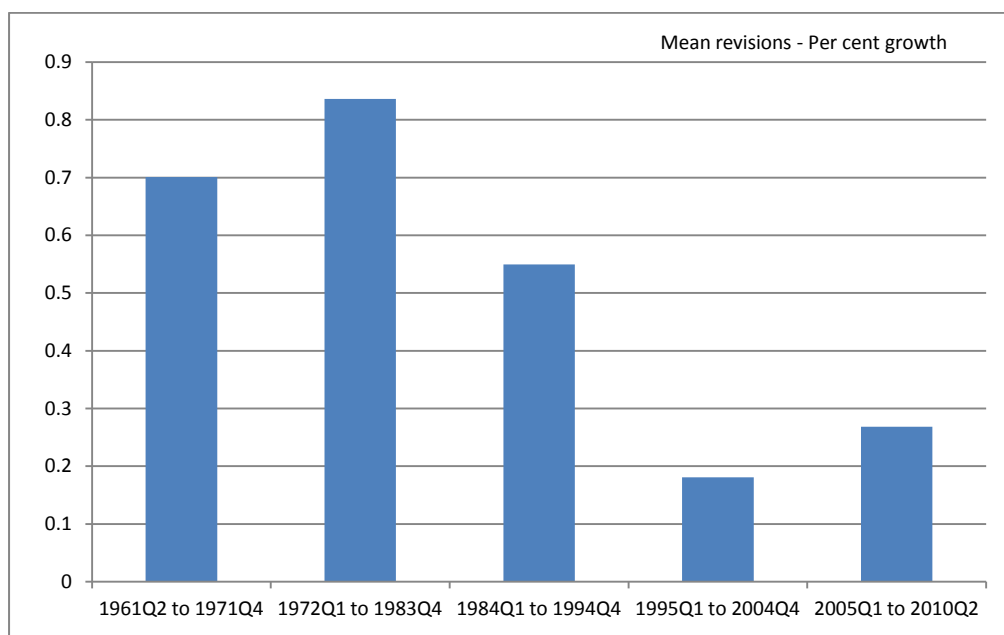
The key observations which can be made from this analysis are:

- Mean revisions for all periods except 2005Q1 to 2010Q2 are positive
- Mean revisions have fluctuated over time. In the period 1995Q1 to 2004Q4 they were lower than in earlier periods and, at under 0.05 per cent, insignificantly different from zero. This may be because the economy grew at a steady rate in this period and revisions due to data rather than methodology are likely to be smaller when the economy is performing in a predictable manner
- The negative mean revisions in the latest period reflect the difficulties in forecasting the period when the UK entered the period of negative growth, and in particular of picking up turning points in the economy. It was only when the full datasets were available at the second Blue Book that the true extent of the downturn could be measured.

It must be acknowledged, however, that mean revisions are of limited value for judging the size and significance of revisions. By the very nature of average revisions, large downward revisions may be offset by large upward revisions, giving a false picture to the true extent of revisions.

This effect can be removed by making all revisions positive and looking at the absolute level of average revision, as shown in Chart 4.

**Chart 4 - Mean absolute revisions between T and T + 24 months**



Although Chart 4 is to a different scale, the key point to notice is that whereas the mean revisions for the two latest groupings were similar in magnitude but of different signs in Chart 3, when the impact of the negative revisions is removed in Chart 4 the scale of revisions is larger in the more recent period which includes the latest economic downturn. This supports the view that it has been more challenging to predict economic growth during the recent unprecedented period than during the previous ten years of steady growth.

Another way of avoiding the issue of negative revisions offsetting positive ones is to produce an analysis which uses mean squared revisions (MSR).

## ii) Mean squared revisions (MSR)

By taking the mean squared revision for the estimate of GDP for period T, between the maturity T + i and the maturity T + j the difficulties of having both positive and negative revisions is removed. Squaring revisions also gives more weight to large revisions than to smaller ones, which is in line with the user perspective where a few large GDP revisions are more likely to disrupt the reading of the economy than a preponderance of smaller ones.

Chart 5 shows the mean squared revisions with respect to T + 60 month maturity, using the same periods as Chart 3.

**Chart 5 - Mean squared revisions over different periods at T + 60 months**

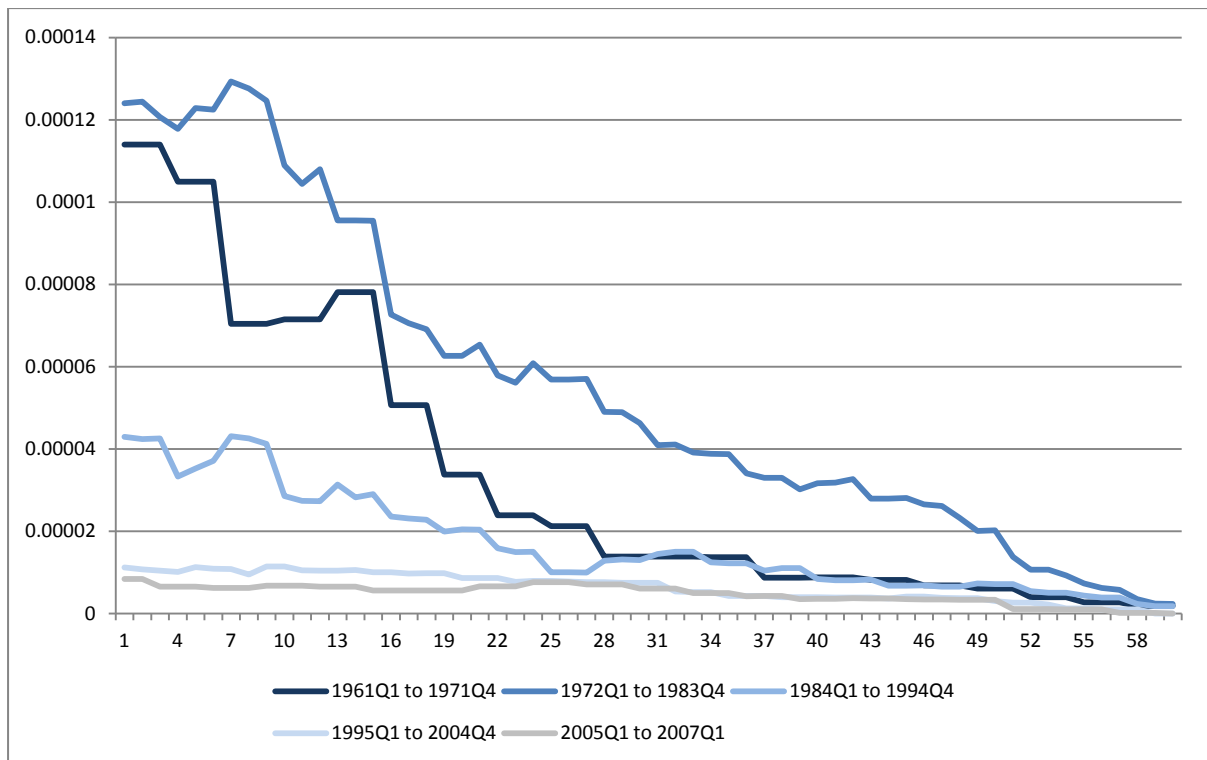


Chart 5 is a harsh test as it includes all revisions up to five years after the initial estimate, and hence includes the effects of revisions due to methodological improvements. Despite this, the chart clearly demonstrates a marked improvement in the quality of early GDP estimates in the most recent time spans (both 1995Q1 to 2004Q4 and 2005Q1 to 2007Q1). This reflects both lower revisions in the most recent periods and also a much smaller incidence of large revisions. For the period between 1995Q1 and 2004Q4 this will, in part, reflect the stability of the economy over this time. Early estimates of GDP might be expected to perform better in relation to later maturities when the economy is growing smoothly than at times when there are sharp swings in the pace of economic growth.

The fact that this analysis is at T + 60 months does have another significant limitation as it excludes any analysis from the 2008/2009 economic downturn. For this reason the same analysis has been recreated in Chart 6 but for mean squared revisions at T + 24 months.

**Chart 6 - Mean squared revisions over different periods at T + 24 months**

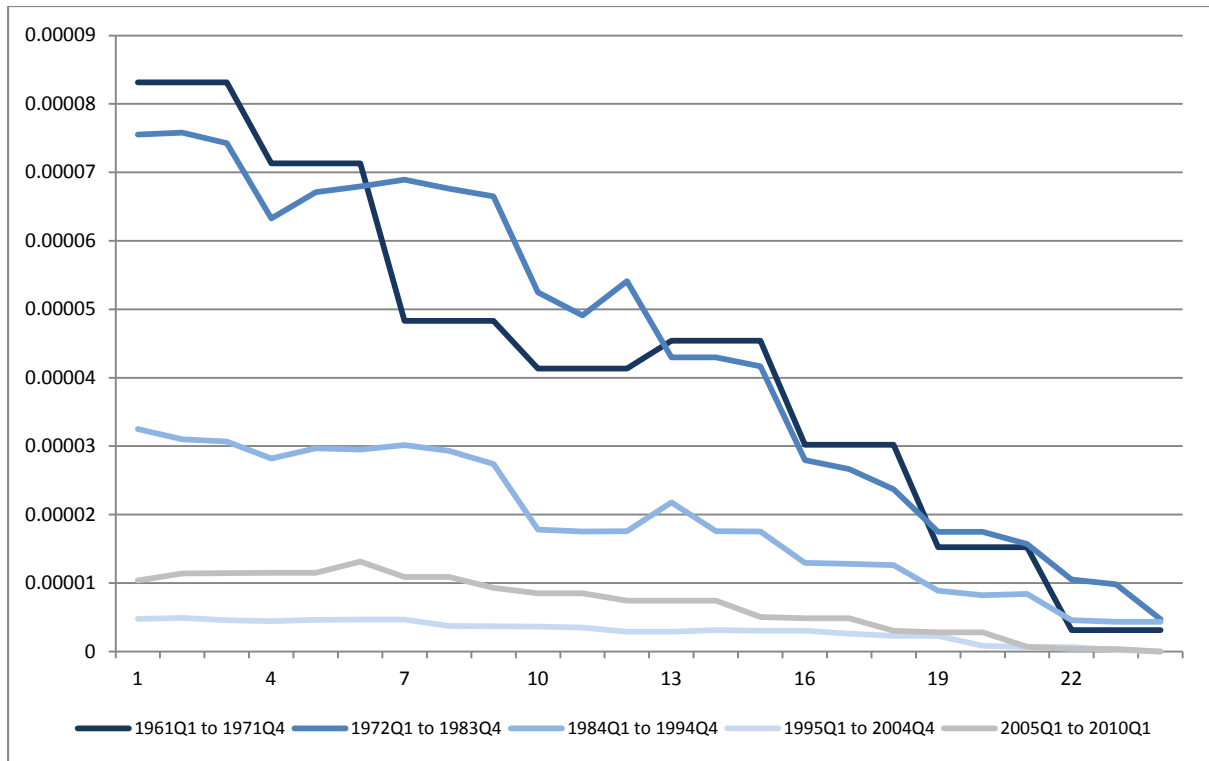
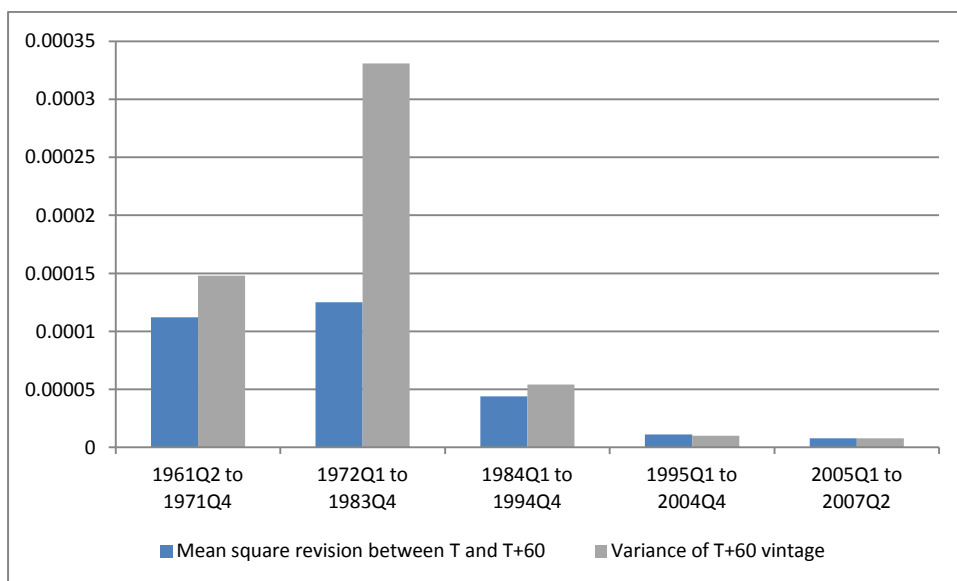


Chart 6 highlights that although recent GDP revisions performance has continued to be much better than in the periods pre-1995, increased uncertainty in the estimates caused by the downturn has led to slightly larger revisions in the period from 2005Q1 to 2010Q1 than was seen in 1995Q1 to 2004Q4.

Chart 7 is a comparison of the T to T + 60 month MSR with the variance of the T + 60 month maturity.

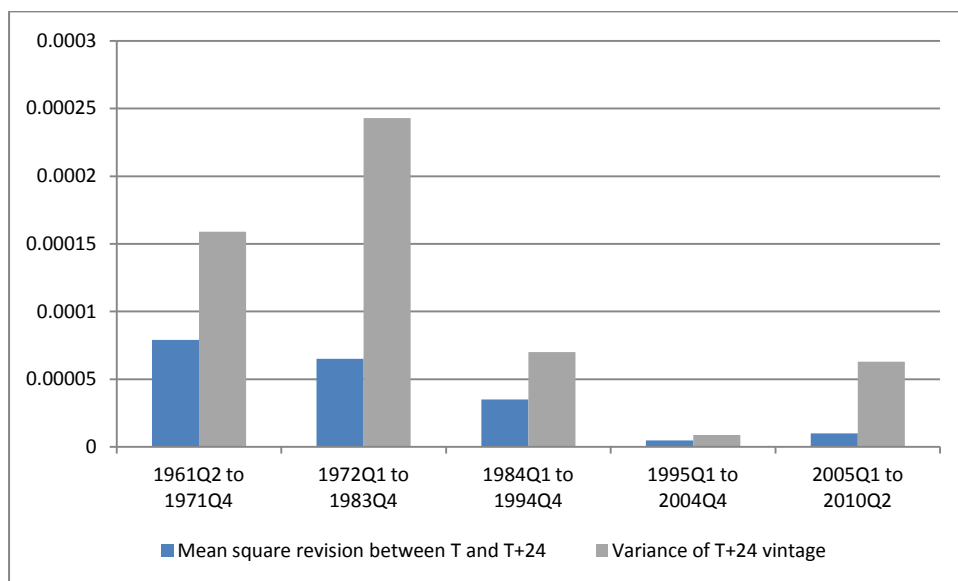
**Chart 7 - Comparison of the T to T + 60 MSR with the variance of the T + 60 maturity**



This appears to support the hypothesis that in periods when the economy is more stable (shown by smaller variance bars on the chart) then the mean squared revision is also smaller. Or to put it more simply - it may be easier for early estimates to predict accurately the later data maturities when the economy is less prone to volatile movements or shocks.

Again, by looking at T + 24 months rather than T + 60 months the analysis is able to include the recent downturn, and focus on short term data revisions rather than long term methodological changes.

**Chart 8 - Comparison of the T to T + 24 MSR with the variance of the T + 24 maturity**



This chart shows that the period from 2005Q1 to 2010Q2 has had an increased level of variance compared with the stable period from 1995Q1 to 2004Q4, but this variance is still low by historical standards.

## Conclusions

In summary, it is still too early for the revisions between T and T + 60 to cover the period of the recent downturn and recovery, and so ONS will continue to regularly update these analyses. However, by looking at the revisions between T and T + 24, there is an emerging picture suggesting that, whilst revisions continue to be unbiased and considerably smaller than in periods up to the early 1990s, there is some evidence that in the latest periods, the size of revision has increased [although not significantly]. This is further evidence to support the tentative conclusion in Walker et al, that it is possible that the assumptions and methods underpinning the early estimates of GDP may not be as robust in periods of greater volatility or at turning points in the economy as they were during the long period of stability from 1992 to 2007.

Revisions after the second balanced year continue to be for methodological changes, and there is no reason to suppose that any future revisions as a consequence of methodological improvements will be of either the same size or direction.

ONS will continue to monitor revisions and make this information available to all users of the data. ONS will also look to expand the range of information available on revisions, including the feasibility of more precisely identifying revisions due to methodological changes, and the means by which this is communicated in the wider public forum.



ONS would welcome the views of all users of GDP data on both this article and any further developments which you would welcome on revisions analysis. Please email your comments to [gdp@ons.gsi.gov.uk](mailto:gdp@ons.gsi.gov.uk) for the attention of Andrew Walton.