Office for National Statistics

Article

Conceptual and methodological differences between private housing construction output and gross fixed capital formation private sector dwellings

Explains why construction output related to private housing is not equal to investment expenditure on dwellings by analysing their components and how the statistics are calculated.

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1 . Introduction

Private housing construction output and gross fixed capital formation (GFCF) private sector dwellings are closely related concepts, however there are a number of important differences. Although private housing construction output is the primary data source for estimating GFCF private sector dwellings, there are conceptual and methodological differences between the two series. Thus, there can be disparities between the data series, such as has been observed in the first three quarters of 2018. This article will describe, and assess the impact of, the differences in the concepts and different methods of seasonal adjustment and deflation which all contribute to the disparity seen between the two series.

It should be noted that optimal methods are used in estimating the series in question. Due to their characteristics and requirements, these two series are treated differently at points during their production, which can account for some of the differences mentioned in this article.

It should also be noted that while construction output covers Great Britain, GFCF covers the UK (Great Britain and Northern Ireland). This is not currently a factor in the difference between private housing construction output and GFCF private sector dwellings as construction output in Great Britain is used to represent the whole UK. From Blue Book 2019, GFCF private sector dwellings in Northern Ireland will be accounted for, however this is not expected to have a material impact on estimates of GFCF private sector dwellings for the UK.

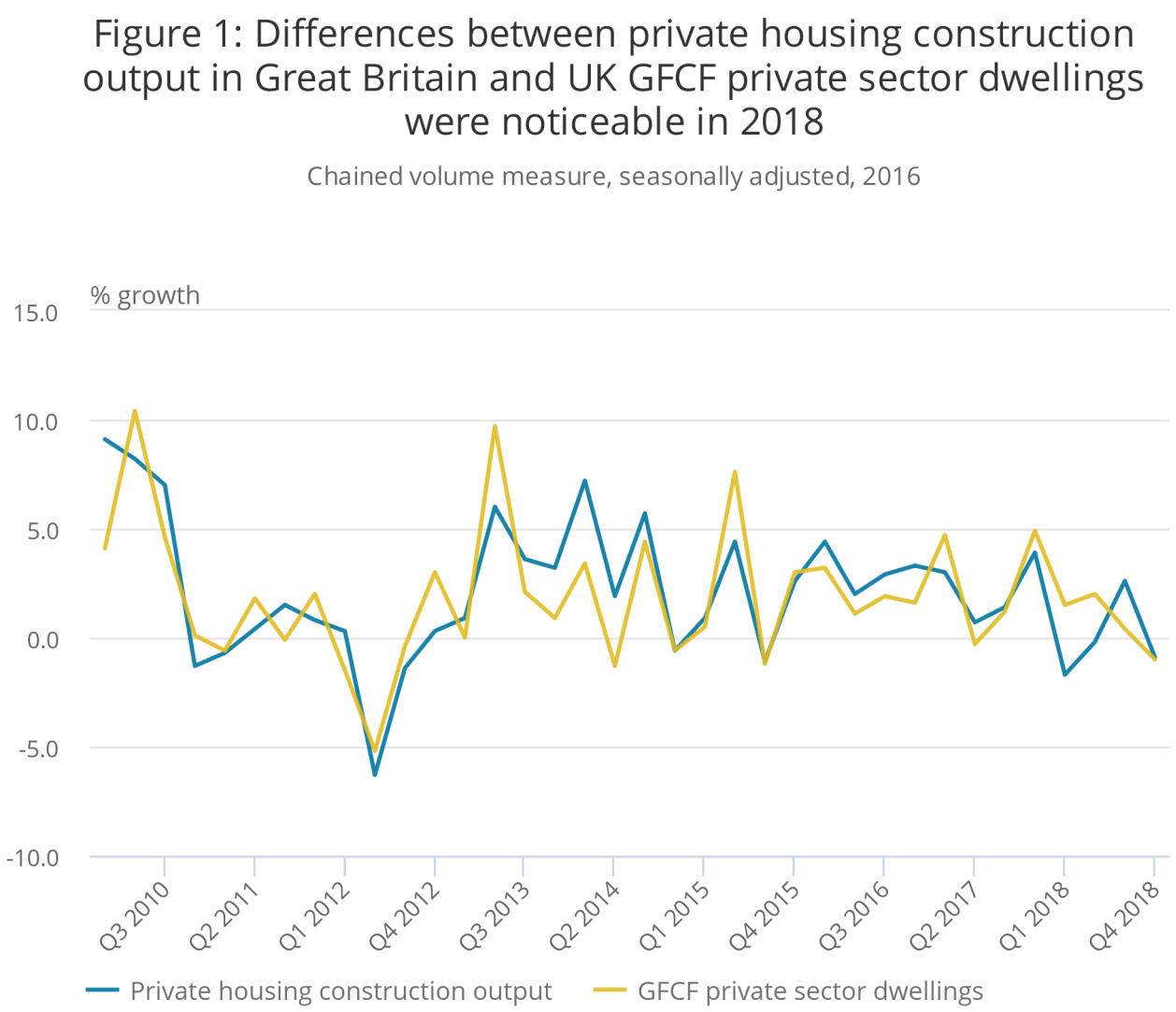
Please note that all data used in this article are consistent with the GDP quarterly national accounts, UK: October to December 2018, Business investment in the UK: October to December 2018 revised results and Construction output in Great Britain: March 2019.

2 . Background

This article seeks to explain some of the conceptual and methodological reasons for the differences between private housing construction output and investment in private sector dwellings. This updates a previous article, Conceptual differences between an aggregate of construction output measures and the GFCF dwellings measure , published in June 2013. It will focus on an aggregate of the construction output series private housing new work and private housing repair and maintenance alongside Gross Fixed Capital Formation (GFCF) private sector dwellings. These are closely related concepts, so it might be expected that these would follow a similar underlying trend. However, this is not always the case. Figure 1 shows that there were particularly noticeable differences between the series in 2018.

Figure 1: Differences between private housing construction output in Great Britain and UK GFCF private sector dwellings were noticeable in 2018

Chained volume measure, seasonally adjusted, 2016



Source: Office for National Statistics

Private housing construction output includes the value of construction work undertaken for private sector clients on high rise residential buildings, flats, maisonettes, new houses and other types of residential housing. On the monthly business survey for construction and allied trades, this is split into new construction work, which also includes demolition and site preparation work and repair and maintenance which includes improvements, extensions and major alterations. These data are published as private housing new work and private housing repair and maintenance in the output in the construction industry publication tables. More information about how these estimates are compiled can be found in the construction output QMI.

Gross Fixed Capital Formation (GFCF) is defined as acquisitions less disposals of fixed assets that are used repeatedly or continuously in production for more than one year. Dwellings are buildings or designated parts of buildings that are used entirely or primarily as residences, including any associated structures, such as garages, and all permanent fixtures customarily installed in residences. Some examples of dwellings could be houses, mobile homes and caravans, but not prisons, boarding schools or hospitals.

There are two main reasons why construction output related to private housing and investment in private sector dwellings may diverge from one another:

- conceptual: around 75% of investment in private sector dwellings is directly comparable to construction private housing output; the remaining 25% is explored in Section 3.
- methodological: differences in the way these two series are calculated include the way in which the series are seasonally adjusted and deflated

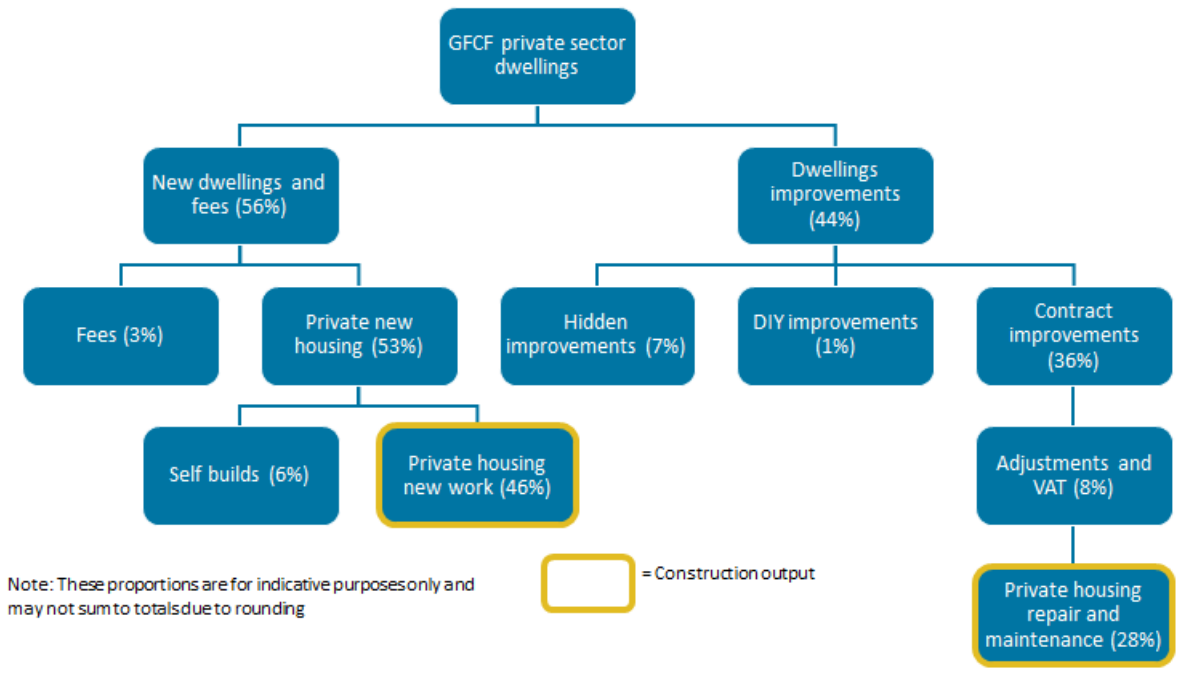
3 . Conceptual differences between aggregated private housing construction output and GFCF private sector dwellings

There are three approaches to measuring Gross Domestic Product (GDP) (PDF, 317KB).

1. Expenditure (how much is spent in the economy in a given period)
2. Output or production (how much is produced in the economy in a given period)
3. Income (how much is earnt in the economy in a given period).

For example, if a household wanted to invest in a dwelling, by building a new one or carrying out major improvements (that is beyond ordinary maintenance and repairs (European system of accounts 2010)(PDF, 6.40 MB)), they will most likely pay contractors to carry out the work, so it may be expected that gross fixed capital formation (GFCF) private sector dwellings and private housing construction output be equal. However, it is important to note that there are other expenditures associated with investment in dwellings that are not classified as construction output, but as output in other industries.

Figure 2: Components of gross fixed capital formation private sector dwellings, 2018



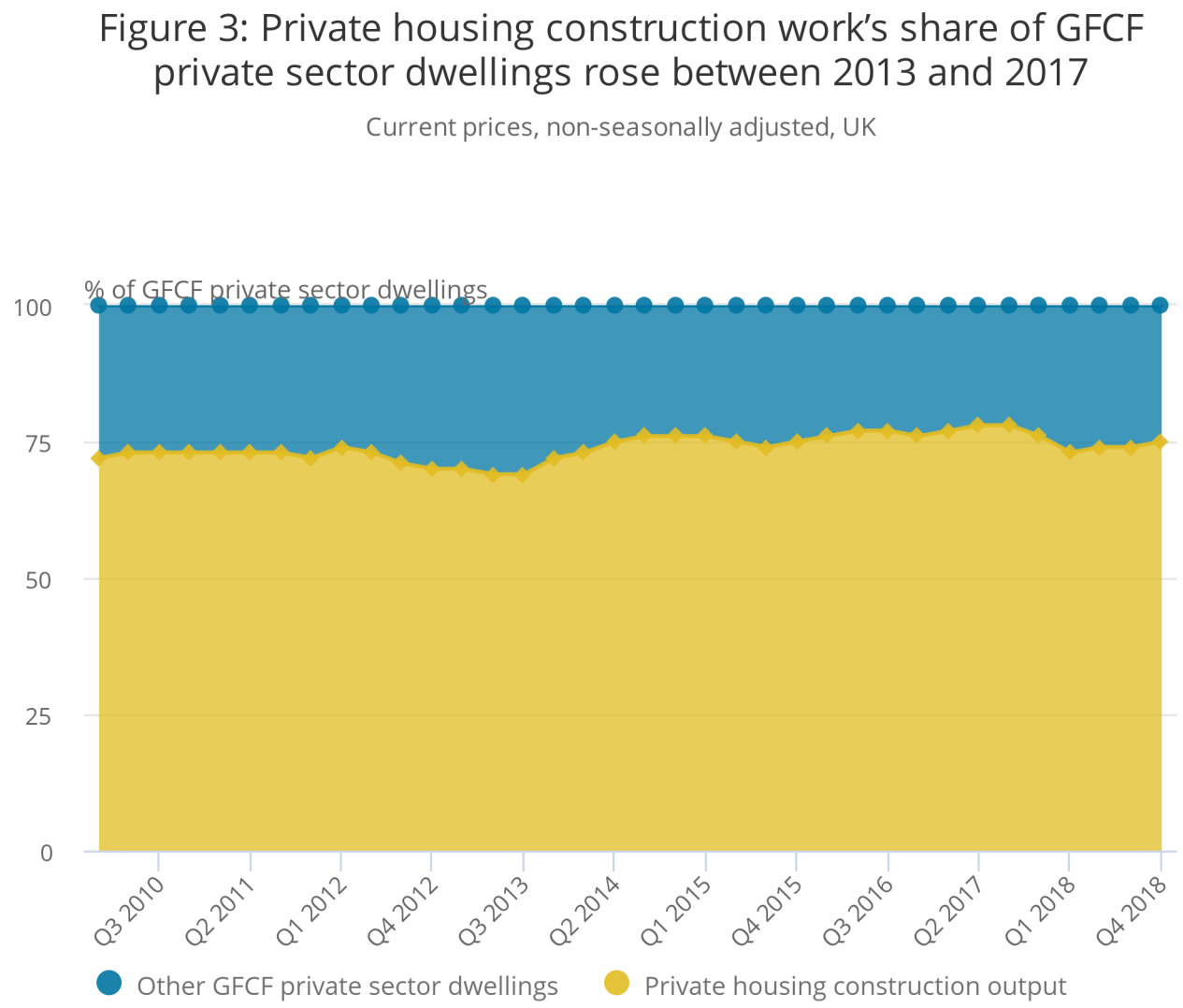
Source: Office for National Statistics

Figure 2 shows that around 75% of GFCF private sector dwellings comes from construction output data with the remaining portion taking place outside of the construction industry. Figure 3 shows a breakdown of GFCF private sector dwellings by private housing construction output and the remainder of GFCF private sector dwellings.

Between Quarter 2 (Mar to Apr) 2013 and Quarter 1 (Jan to Mar) 2017, private housing construction output's share of GFCF private sector dwellings broadly increased. This shows that during this period, private housing construction output grew faster than the other components of GFCF private sector dwellings. This could be partially attributed to a lack of available data sources, for example for the self-builds component, which led to values being carried forward year on year. However, work is currently ongoing to include new data on self-builds for inclusion in GFCF private sector dwellings estimates from Blue Book 2020.

Figure 3: Private housing construction work's share of GFCF private sector dwellings rose between 2013 and 2017

Current prices, non-seasonally adjusted, UK



Source: Office for National Statistics

The largest component of the “other” GFCF private sector dwellings is hidden improvements, which make up around 7% of GFCF dwellings. This captures work undertaken by the self-employed who are not a part of the sample surveyed to produce the estimates of construction output in Great Britain. This is due to them not being registered for Pay As You Earn (PAYE) and being below the Value Added Tax (VAT) threshold. We are working to improve estimates of hidden improvements to dwellings.

Do it yourself (DIY) improvements (or own account improvements by households) and housing fees represent investment in dwellings that fall outside the construction industry. DIY improvements are carried out by households – not construction companies – and therefore are not included in construction output. However, there is still expenditure involved so a proportion of household DIY goods expenditure data is used to estimate this.

Housing fees are the costs associated with building a new house, aside from the cost of construction. These include legal fees, architect’s fees and costs of planning applications and other government fees. However, as no source is available for these data, they are taken to be 5% of investment in new housing. We are seeking to improve methods to calculate these fees, with a view to including improved estimates in Blue Book 2020.

The contract improvement component refers to improvements carried out on existing dwellings by contractors. While the value of construction work on private housing repair and maintenance is the source for these data, two adjustments are made to account for over and under coverage:

1. Uplift of private housing repair and maintenance to account for the exclusion of business services such as architects and surveyors in construction output data. These professions are outside the scope of the UK SIC 2007 coverage for the monthly business survey for construction and allied trades.

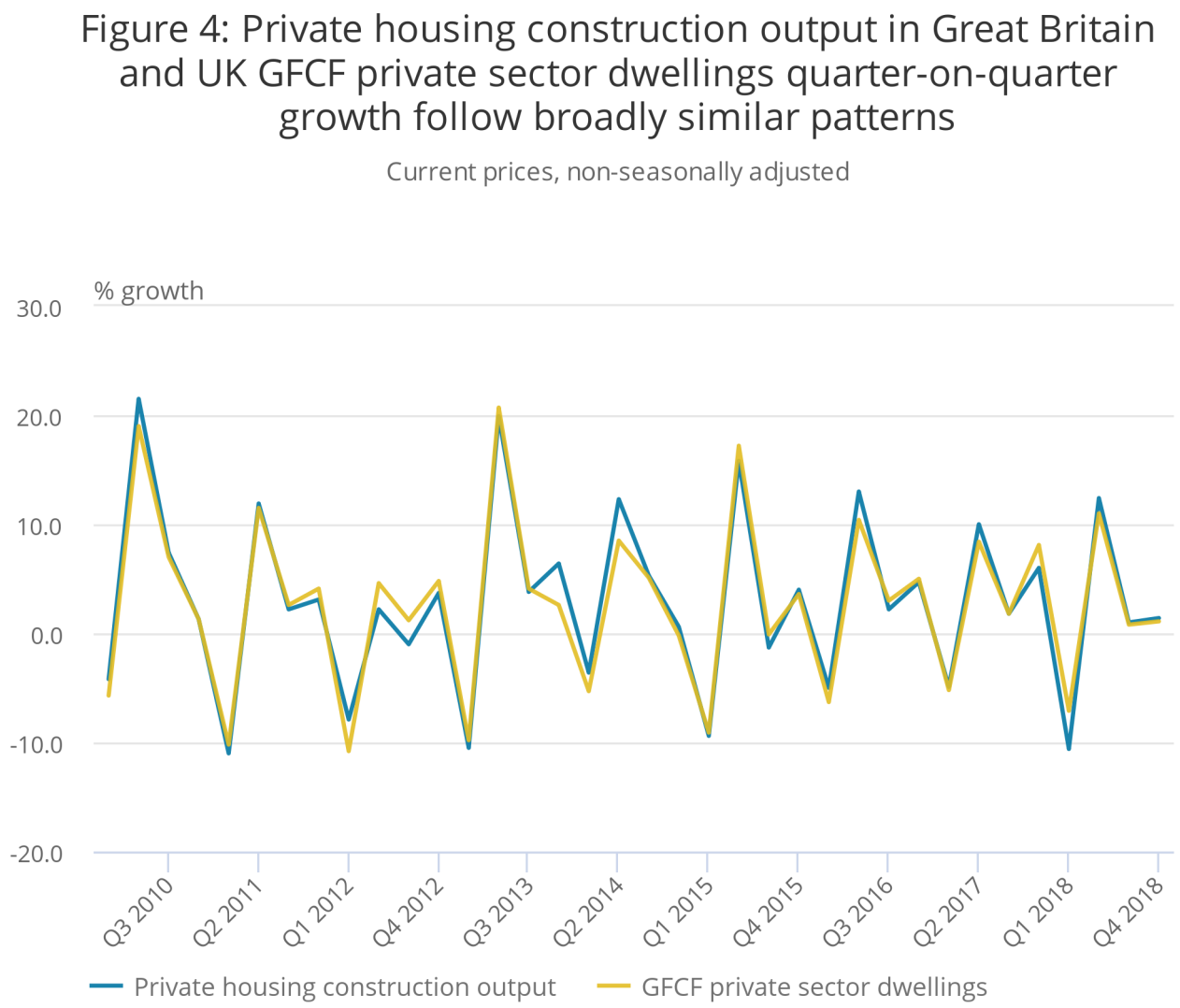
2. Removal of dwellings repair and maintenance classified as household consumption expenditure; only major improvements are classified as gross fixed capital formation.

In addition, as it is a measure of output, Value Added Tax (VAT) is not included in the repair and maintenance series in construction output but is included in GFCF dwellings. While this would not affect growth rates (aside from periods where the rate of VAT changed), it does account for some of the difference in levels.

The conceptual differences explained here account for the differences in the levels of GFCF private sector dwellings and construction private housing output, as well as any differences in the growth rates of the current price, non-seasonally adjusted data, shown in Figure 4. However, the differences seen at the chained volume measure, seasonally adjusted level are more substantial, so differences in deflation and seasonal adjustment processes have also been analysed in the next section.

Figure 4: Private housing construction output in Great Britain and UK GFCF private sector dwellings quarter-on-quarter growth follow broadly similar patterns

Current prices, non-seasonally adjusted



Source: Office for National Statistics

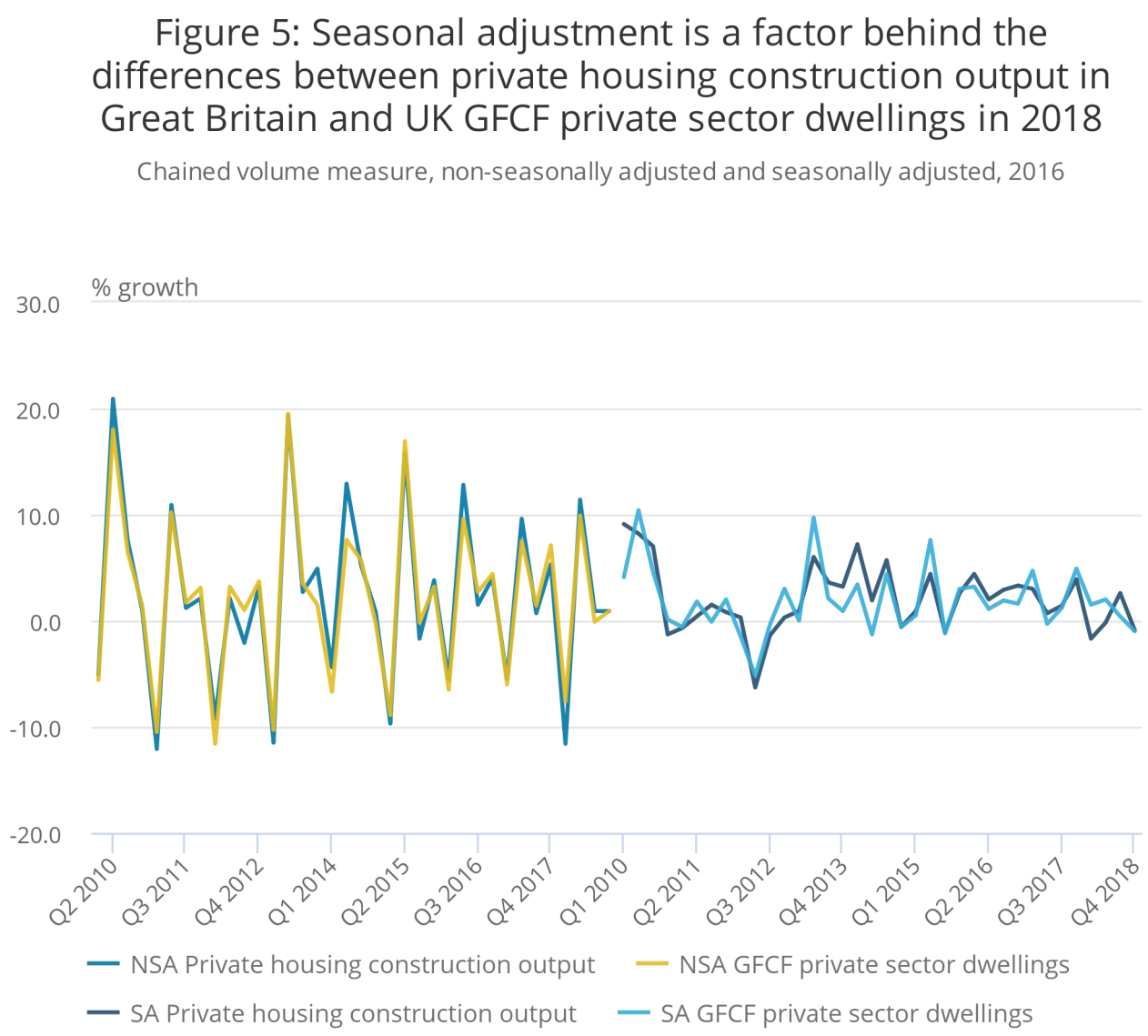
4 . Methodological differences between aggregated private housing construction output and GFCF private sector dwellings

Seasonal adjustment

When comparing the effects of seasonal adjustment on the two chained volume measure series it becomes apparent that this is a factor in the differences during 2018. Figure 5 shows the non-seasonally adjusted series broadly following the same pattern, although there are periods – including the first two quarters of 2018 – where growth in one series is positive and negative in the other.

Figure 5: Seasonal adjustment is a factor behind the differences between private housing construction output in Great Britain and UK GFCF private sector dwellings in 2018

Chained volume measure, non-seasonally adjusted and seasonally adjusted, 2016



Source: Office for National Statistics

Notes:

1. NSA = Non-seasonally adjusted.
2. SA = Seasonally adjusted.

Throughout 2018, differences were seen between private housing construction output and GFCF private sector dwellings which were larger than usual. In Quarter 1 (Jan to Mar) 2018, on a chained volume measure, seasonally adjusted basis, private housing construction output fell by 1.7% compared to Quarter 4 (Oct to Dec) 2017, while gross fixed capital formation (GFCF) private sector dwellings grew by 1.5% over the same period. This may have been due to the construction private housing output aggregate experiencing a larger than normal fall in Quarter 1 2018, while the fall in GFCF private sector dwellings was broadly in line with previous years.

Office for National Statistics has received some anecdotal information from a small number of survey respondents regarding the effect of adverse weather on their businesses in February and March 2018; the adverse weather conditions across Great Britain could have potentially contributed to the decline in construction output, although it is difficult to quantify the exact impact on the industry. Private housing construction output contracted further in Quarter 1 2018 than the other components of GFCF private sector dwellings. This is shown in Figure 3 as a fall in private housing construction output's share of GFCF private sector dwellings . This may have contributed to the differences in growth once the series were seasonally adjusted.

The differences due to seasonal adjustment could be down to a number of factors. The first is that construction output is a short-term indicator and is a monthly series while GFCF is a key input into quarterly GDP and is a quarterly series. This means that the comparable seasonally adjusted quarterly series have been constructed differently. For construction output, seasonal adjustment is applied to the monthly series, then the months are summed to form a quarterly seasonally adjusted series. On the other hand, the non-seasonally construction output data that is used to create GFCF estimates is summed to quarters before any processing is done and seasonal adjustment is applied later.

The length of series which seasonal adjustment is conducted on could also be a factor in the difference between the two series. While GFCF data is available to seasonally adjust from 1997, seasonal adjustment of construction output is carried out on a shorter time series beginning in 2010. However as with other methodological differences, the reason behind this is to ensure that optimal methods are used for each component.

Another significant factor in the recent divergence between GFCF dwellings and private housing construction output will be due to the level of aggregation at which seasonal adjustment is carried out. This can also be known as direct and indirect seasonal adjustment. Although different methods of seasonal adjustment will cause differences in seasonally adjusted series, it is important to note that both approaches are equally acceptable.

The quarterly aggregate of the two published construction output series – private housing new work and private housing repair and maintenance – is formed by seasonally adjusting the two components separately on a monthly basis then summing the months to form quarters, then finally adding the components together. This is a direct approach to seasonal adjustment.

To calculate GFCF private sector dwellings estimates, the construction output data inputted are two quarterly, non-seasonally adjusted series; private housing new work and private housing repair and maintenance. These are consistent with those series published as part of the Construction output in Great Britain release.

In the GFCF system, much of the data processing takes place before seasonal adjustment is applied, and as such the construction output data is combined with the other components of GFCF dwellings, and seasonally adjusted by institutional sector. This means that seasonally adjusted GFCF private sector dwellings is an aggregate of three series that have been seasonally adjusted separately; private non-financial corporations, households and non-profit institutions serving households. This means that the data that construction output and GFCF private sector dwellings have in common are seasonally adjusted indirectly in the GFCF system. However, it is worth noting that the majority – around 80% – of investment in private sector dwellings takes place within the households sector.

Deflation

Deflation is the act of removing the effects of inflation from a current price series. Construction output and the Gross Fixed Capital Formation (GFCF) dwellings components which are sourced from construction output are deflated using the Construction Output Price Indices (OPIs). Information about recent improvements to these indices can be found in Section 5 of the article Construction development: Impact of improvements to construction statistics: September 2017 and Construction output price indices QMI.

Although the same deflators are used, there are some differences in the treatment. Construction output is deflated by type of work, so private new housing and private housing repair and maintenance are deflated by their respective price indices. Deflation of the GFCF series is done at a lower level, separating dwellings into new work and repair and maintenance and then splitting these by Classification of Products by Activity (CPA).

New work and repair and maintenance are split into two products, building work (CPA 41) and specialised construction work (CPA 43). However, it is important to note that at this point, the additional components of GFCF private sector dwellings explained in Section 3 are included within these products. Analysis has shown that deflating by type of work and by type of work and CPA product produces the same results, however it could be a factor in explaining the differences between GFCF private sector dwellings and private housing construction output.

Recent analysis of the methods used to produce estimates of GFCF dwellings shows that the proportions used to split the two types of private housing work; new and improvements (repair and maintenance), into CPA products are fixed rather than being calculated from the construction output data.

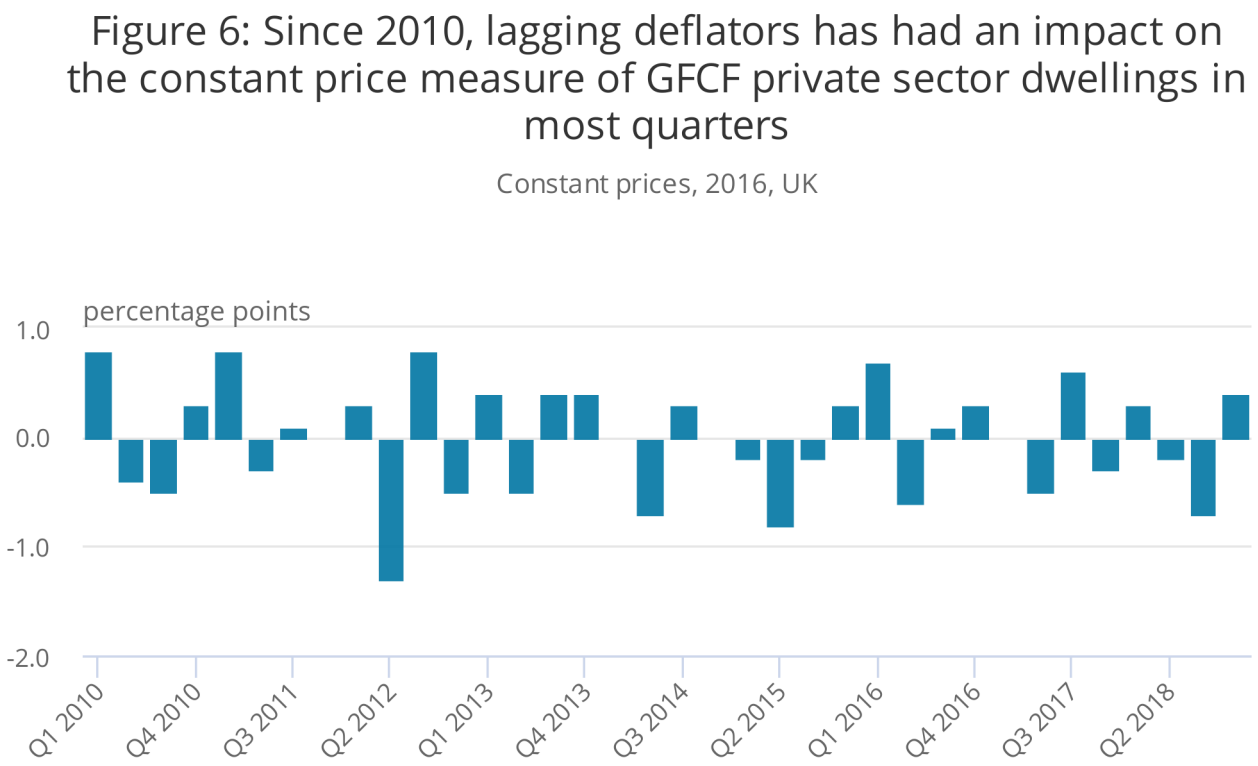
This means that changes in the composition of GFCF private sector dwellings that cause it to differ from the composition set out by the fixed proportions would result in some data being deflated by a suboptimal mix of deflators. Further work is being carried out to identify whether this is the case and if so, to assess the impact. In the meantime, publication of GFCF asset 'Private sector dwellings' broken down to its components 'dwellings new' and 'dwellings improvements' has been suspended, however we aim reinstate this publication by September 2019.

Another difference between the two methods is that deflators are lagged by one quarter when deflating GFCF. This is to account for the delay between payment and transfer of ownership of some assets that take a long time to construct.

In order to visualise the effect of using lagged deflators, volume or constant price measures of GFCF private sector dwellings were created using lagged and unlagged deflators to compare to constant price measures of private housing construction work. This is shown in Figure 6 where the differences between the two approaches are plotted. The mean absolute effect on growth of the use of lagged deflators was 0.8 percentage points. Figure 6 shows that between Quarter 1 2010 and Quarter 3 (July to Sept) 2018, the effects of lagged deflators were largely limited to plus or minus 1.0 percentage point. Analysis of the effects of lagging the deflators shows that the mean and median effects are 0. This shows that although there are only four quarters where lagging has no effect, there are roughly equal numbers of positive and negative effects and they are of broadly similar magnitudes, so there is no bias in the effect. The impact of lagged deflators partly reflects volatility in the price indices used as deflators, as a relatively steady deflator would mean that lagging would have a minimal effect.

Figure 6: Since 2010, lagging deflators has had an impact on the constant price measure of GFCF private sector dwellings in most quarters

Constant prices, 2016, UK



Source: Office for National Statistics

5 . Conclusion

This article has explained some of the conceptual and methodological differences between Gross Fixed Capital Formation (GFCF) private sector dwellings and private housing construction output as well as the impact of these differences. While the conceptual differences between GFCF private sector dwellings and private housing construction output account for the difference in levels of the two series, deflation and seasonal adjustment introduce further differences which are particularly noticeable throughout 2018.

Steps to reconcile these concepts as far as possible have been taken, with the recent changes to the gross domestic product (GDP) publication model allowing for the inclusion of the latest monthly construction output data in the quarterly GFCF estimates. In addition, compilers of GFCF and construction output statistics meet regularly to stay informed of movements in the data, so any inconsistencies can be investigated. The relationship between these indicators will continue to be monitored, while investigations into the impact of using fixed proportions to break down GFCF private sector dwellings into products are ongoing. As previously mentioned however, differences will remain due to the nature of the concepts and the differences in methodology used to ensure all data are processed in the optimal way.