Office for National Statistics

Article

Producing an alternative approach to GDP using experimental double deflation estimates

Research on the production of an alternative estimate of gross domestic product under a new framework, including experimental estimates of double-deflated industry-level gross value added.

Contact:
Rhys Lewis, Rachel Meyrick and Sumit Dey-Chowdhury
blue.book.coordination@ons.gov.uk
+44 (0)1633 455284

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1 . Main points

- This article provides early research findings into the production of alternative estimates of gross domestic product (GDP) in a new framework; these reflect a step change in how we produce volume estimates of GDP.
- We produce our preliminary analysis of these experimental estimates of double-deflated industry-level gross value added (GVA), which have been produced for the period 1997 to 2018 in the UK.
- Further work is required to understand the impact of producing volume GVA estimates in this new framework, including the effects of double deflation.

2 . Overview of double deflation estimates

This article provides early research findings into the production of alternative estimates of gross domestic product (GDP) in a new framework. These reflect a step change in how we produce volume estimates of GDP, which include experimental estimates of double-deflated industry-level gross value added (GVA) – an important focus of recent recommendations into how we produce the national accounts in the UK. These have been produced for the period 1997 to 2018 in the UK, which we consider as the next step towards the full implementation of double deflation in the UK. This also incorporates some initial findings as part of our wider development programme to improve the quality of our deflators in the national accounts.

This is a big step forward in our transformation process. We will be carrying out further research to improve the coherency of our current price and volume estimates of GDP. As such, these estimates are subject to change following further data confrontation, reconciliation and user feedback, and should not be interpreted as the final revisions that are expected to be published in Blue Book 2021. Instead, this is part of the continuous improvements that this new framework has helped us identify as part of our future work programme.

Double deflation is widely recognised as the best approach to producing volume estimates of GVA – that is, output minus intermediate consumption. Under double deflation, for every industry, the current price estimate of its output is deflated by a price index for output and the current price estimate of its inputs is deflated by an input price index.[1] Previous analysis explains that the absence of double-deflated volume estimates of GDP can often lead to bias in industry-level estimates of volume GVA.

This has been identified as a shortcoming in the production of the UK National Accounts[2], which is why it has been the focus of important recommendations from the National Statistics Quality Review (2014) and the Independent Review of UK Economic Statistics (2016). These recommendations helped identify opportunities to develop the UK National Accounts, bringing them closer in line with international best practice.

In October 2018, we outlined ambitious plans for the transformation of the UK National Accounts to produce GDP under a new framework. In July 2020, we published an update on our progress so far, including how we aimed to produce experimental estimates of volume GVA at an industry level under a new approach and framework.

In this article, we produce our preliminary analysis of these experimental estimates of double-deflated industry-level GVA, which have been produced for the period 1997 to 2018 in the UK. This is the first time that these have been published at this level, which we consider an important step towards the implementation of double deflation in the UK and an important milestone in the transformation of the UK National Accounts.

It is important to realise that these impacts reflect broader improvements to how the balancing of current price and volume estimates of GDP in the supply and use tables (SUTs) framework has been undertaken for these experimental estimates. That is, these estimates do not simply reflect the removal of single deflation bias. For the purposes of this research, this has been carried out in a way that is based on the official current price estimates published in Blue Book 2020. However, this will not be the case for future work, as we recognise that further progress is required to further improve the coherency of our current price and volume estimates of GDP. Our work so far produces the basis for continuous improvement over the coming years, which will likely lead to some future revisions to GDP estimates.

These estimates also incorporate some of the initial findings of our wider development programme to improve the quality of our deflators in the national accounts, which include early results from our research into telecommunication services output and clothing deflators. These explain the impacts to headline estimates of volume GDP, changing the annual average growth rate from 2.0% to 2.1% between 1997 and 2018.

We focus on how the official single-deflated and experimental double-deflated estimates compare for industry-level estimates of volume GVA, covering the periods that relate to the pre-crisis years (1998 to 2007), the period of the financial crisis (2008 to 2009) and the post-crisis years (2010 to 2018). We offer some initial insight where the effects of double deflation may be more pronounced, but we also highlight further work is planned to offer more insights. We hope these research findings help facilitate user consultation to provide informed feedback on the estimates here.

This process will be further refined for next year's Blue Book, as we produced balanced current price and volume estimates of GDP in conjunction. As such, these estimates are subject to change following further data confrontation, reconciliation and user feedback, and as such these estimates should not be interpreted as an indication of revisions that are expected to be published in Blue Book 2021. This explains why additional improvements to the headline and industry-level estimates of GVA should be expected in Blue Book 2021 and how this is part of the continuous improvements that this new framework has helped us identify as part of our future work programme. This is why we emphasise the experimental nature of these estimates.

Notes for: Overview of double deflation estimates

1. If double deflation is carried out in a supply and use tables (SUTs) framework, then this is carried out a lower-level product level for every industry, as is the case for these experimental estimates.

2. The International Monetary Fund (2017) provides further information on how volume GDP estimates are produced in the G20 countries. It finds that at the time of writing, around half of these countries have applied double deflation, while the other half leads on single deflation or single extrapolation.

3 . A new framework for UK GDP

Double deflation

The international best practice is to produce current price and volume estimates of gross domestic product (GDP) within the supply and use tables (SUTs) framework, including the process of double deflation. This reconciles the supply and demand of goods and services at the industry- and product-level so it allows deflation to be carried out at a detailed level in a single and coherent framework. The application of this new framework for volume estimates of gross value added (GVA) will produce better estimates of productivity at the industry level. Recent analysis has explained the recent change in how we propose to produce estimates of double-deflated GVA and the underpinning principles.

The latest progress update shows that the transactions by product within the SUTs framework have been deflated separately; we have looked to use the best available deflator for each transaction by product. One implication is that SUTs then require balancing in volume terms, as total supply and total demand will not be automatically balanced. Previous analysis has shown some of the balancing challenges we have experienced in producing reconciled estimates, particularly in earlier years and for specific industries. We advise some caution in analysing these experimental estimates as we continue to work through the underlying data to validate the balancing adjustments applied as part of the confrontation and reconciliation of different data sources as part of the Blue Book 2021 process.

In these experimental figures, the headline estimate of GDP will be largely unaffected by how we are implementing double deflation. This is by construct because we have chosen to continue to lead the volume estimates of GDP on the expenditure approach for the balanced years – that is, the years for which the SUTs have been compiled, which now covers up to and including 2018. This is because it allows the volume estimates to rely on the more extensive use of higher-quality Consumer Prices Index (CPI) deflators.

The concept of double deflation relates only to the production (sometimes referred to as output) measure of GDP. Given that the expenditure approach leads the volume estimate of UK GDP, it can be argued that the headline volume estimate of GDP is already produced by double deflation. This is because changing the prices by which intermediate demand is deflated need not have a bearing on the expenditure deflator. However, we recognise that this argument is conditional on optimal expenditure deflators. Our view is that our CPI deflators are one of the higher quality deflator sets available in the UK, but we have also identified a wider development plan to improve the quality of the full suite of deflators. As such, we would expect volume estimates of GDP to be revised in practice. Furthermore, producing volume estimates in a SUTs framework will also lead to us revisiting our current prices estimates in the same framework.

For the purposes of these experimental estimates, we have also incorporated our early findings as part of a wider programme that looks to improve the deflators in the UK. These have not yet been incorporated into the official estimates in the UK National Accounts, which will be carried out in Blue Book 2021.

Telecommunication services

Recent research explains the theoretical and practical challenges of recording the price change of telecommunication services output, specifically capturing the effects of technological change of this product over time. Changes in quality over time should be recorded as a volume change and not a price change. Our research has looked to capture the known challenges in this space – the under-representation of internet services within the current deflator and an improvement in the handling of access charges for telecommunications services. As such, this has a stronger price decline, which captures the technological and associated quality changes that have taken place over time.

Clothing

In 2010, we implemented changes to how we collected clothing prices in the CPI. The effects of methodological changes to the CPI are typically not applied to the historical estimates, and there are no revisions to the CPI. However, this has essentially led to a structural break in the household final consumption expenditure deflator for clothing – one that is pre-2010 and the other post-2010. From a deflator perspective, we feel it is preferable to use a consistent deflator over time, so we have implemented an adjustment to the deflator that aligns the historical estimates of clothing prices to the methodological changes that have been made to the consumer price family of indices from 2010 onwards.

This explains why there are changes to the headline volume estimates of GDP, as these have not yet been implemented in the official estimates. This will also impact on these experimental industry-level estimates, reflecting how this will lead to revised volume estimates of output and intermediate consumption for certain industries. We recognise that further work is still required ahead of the planned implementation into the UK National Accounts in Blue Book 2021.

Producing balanced estimates of GDP

Another feature to consider in these experimental estimates is that we have incorporated broader changes to how the balancing of current price and volume estimates of GDP in the SUTs framework has been undertaken for these experimental estimates. In recent years, there has been progress in how we produce GDP estimates in the UK, including a view to improve the coherency and consistency of the UK National Accounts.

Current industry volume estimates of GVA are primarily compiled from the Index of Production and Index of Services, which are based primarily on the returns to the Monthly Business Survey (MBS).[1] This is a proxy for the production measure of GDP, which is calculated by taking turnover and removing the impact of price changes and reflects our best understanding of short-term movements in the economy.

During the "closed" years – that is, the periods subject to SUTs balancing – the volume estimates of output are aligned with the expenditure measure of GDP, reflecting the higher-quality consumer price deflators used. The adjustments to bring the lower-level industry GVA into line are made proportionally over the services industries.

There will be more coherent estimates of industry-level GVA as we have now expanded the SUTs framework to current prices and previous year's prices.[2] Those industry-level current price estimates from within the SUTs framework are much richer than those that currently feed our industry short-term volume estimates. This not only reflects that this is based on a wider range of annual surveys and administrative information, but it is also recording the correct concept of GVA rather than turnover as a proxy indicator. This also means that at industry level, the current price and volume relationship is now preserved, which historically has not been the case.

Previous analysis explains how we have historically produced volume estimates of GDP in fully balanced years. This is undertaken through producing an annual balanced level of current price GDP through the SUTs framework, where these estimates are reconciled in a detailed 112 product by 112 industry matrix. We deflate the expenditure approach to set the annual level of volume GDP. As such, the two measures of volume GDP are not confronted – we align to expenditure at the top level, and each component is then aligned independently at the detailed level. In contrast, these experimental volume estimates of GDP have been produced in the SUTs framework as well, such that the confrontation of volume estimates of production and expenditure are taking place at a lower industry- and product-level. This will help ensure a holistic approach to data quality takes place to inform the estimates and therefore facilitate a more consistent application of balancing adjustments and more plausible implied production deflators.

This also helps explain why we do not consider these estimates to be necessarily fully reflective of those that will be published in next year's Blue Book. It reflects the work we have carried out as so far and the work we still need to do. Further work is required to confront the two volume measures of GDP – production and expenditure – in advance of Blue Book 2021. As part of this, we will review the current price GDP balance, which in this experimental release is consistent with Blue Book 2020. As we utilise our new framework for producing GDP, we will continually review the data sources used and incorporate improvements to utilise new sources and our ongoing research into deflator improvements.

This is why we recommend that these experimental estimates are treated as interim research rather than as indicative of Blue Book 2021 revisions. We will explain the effects of this ongoing work in future communications as further work is undertaken on how best to confront the data within the SUTs framework, which might lead to changes to how we carry out the balancing of current price and volume estimates of GDP.

Notes: A new framework for UK GDP

1. The initial quarterly estimates of output also reflect information on agriculture, construction and retail sales.

2. In the UK National Accounts, volume estimates are produced through chain-linking. This is the process of joining together two indices that overlap in one period by rescaling one to make its value equal to that of the other in the same period. The volume is calculated at the prices of the previous year.

4 . Experimental estimates of double-deflated GVA

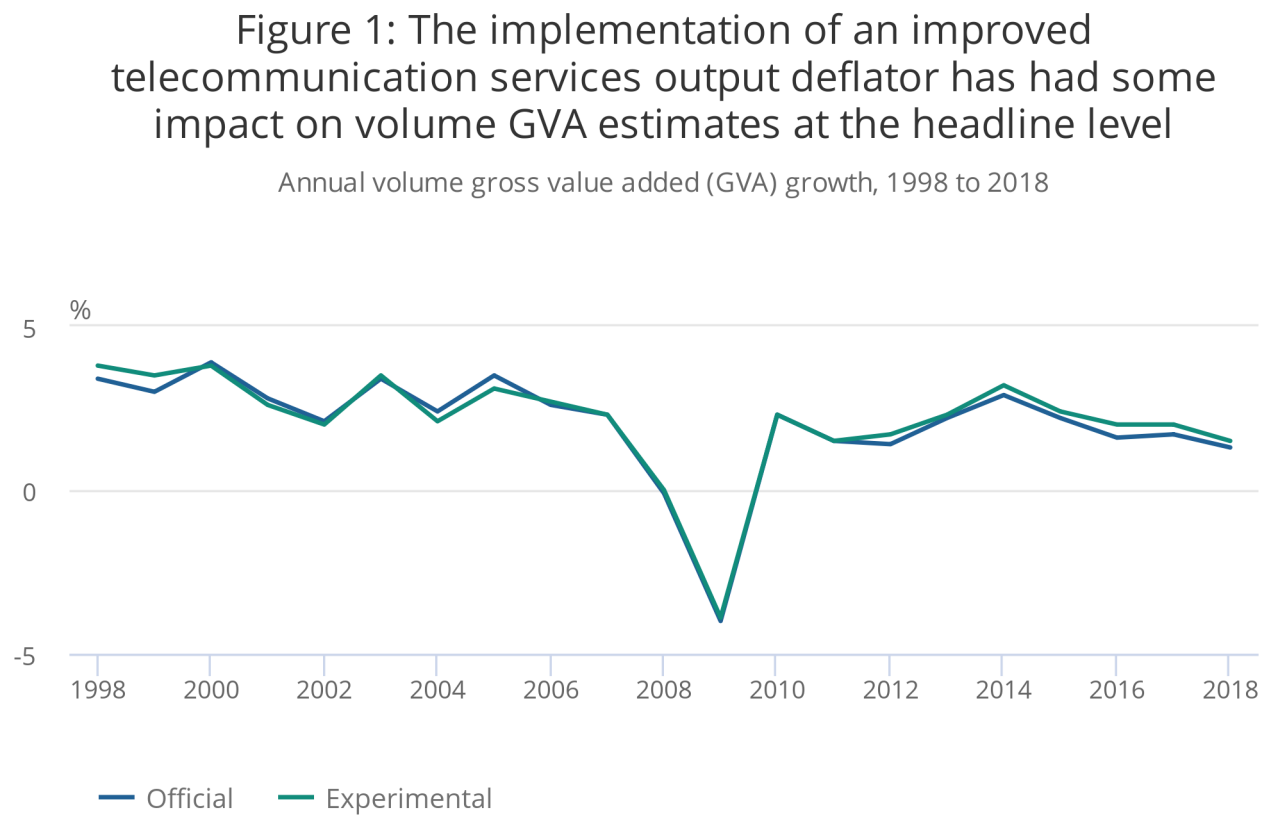
Figure 1 compares the official and experimental estimates of volume gross value added (GVA) at the headline level. At this level, by construct, the impacts of this new framework at this level only capture the effects of the incorporation of alternative deflators for telecommunications services and clothing.

GVA growth is higher across all periods, most pronounced in the underlying post-crisis (2010 to 2018) trend of annual GVA growth. This is up from the official 2.0% estimate to an experimental one of 2.1%, reflecting the increasing volume of output of the telecommunication industry. This captures how we have become better at recording the impact of quality change in this product, which is then implicitly reflected in its price falling faster than the deflator used by the official estimates. This leads to a higher volume of output, all else the same.

Prior to 2010, this effect is partially offset by improvements to align the historical estimates for the clothing deflator, which tends to lower GVA growth over the period prior to 2010. This change primarily impacts the manufacturing industry, specifically that of the manufacture of textiles, wearing apparel and leather products.[1]

Figure 1: The implementation of an improved telecommunication services output deflator has had some impact on volume GVA estimates at the headline level

Annual volume gross value added (GVA) growth, 1998 to 2018



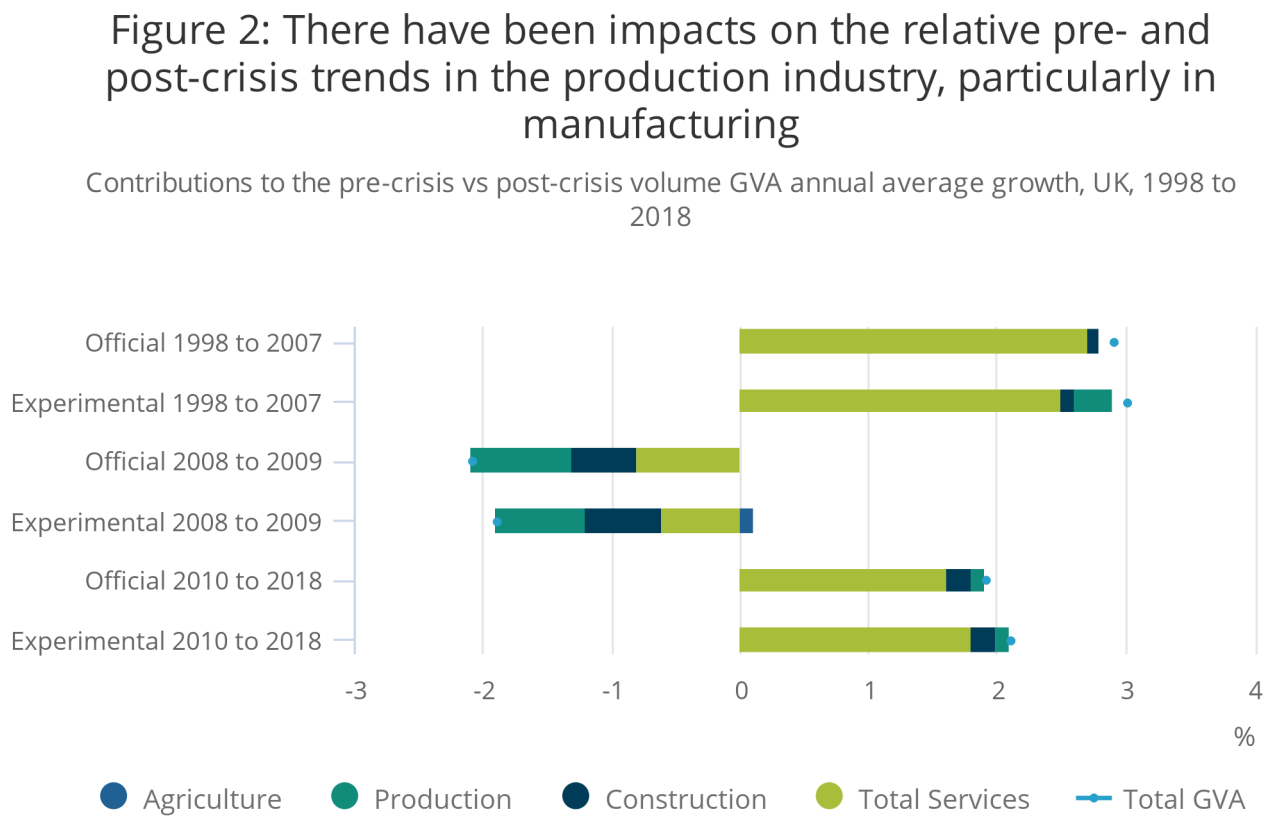
Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

Changes in these experimental estimates are much more pronounced at the industry level, which in part reflects the effects of double deflation. However, these also reflect the wider effects of the balancing process in which these current price and volume estimates have been produced. It also reflects the industry-level effects of the new estimates of telecommunication services and clothing, where these feed into their volume estimates of output and intermediate consumption. Given the ongoing data confrontation efforts, we recommend a focus on underlying trends rather than specific years.

Figure 2 shows the headline impacts to the industry-level volume GVA, comparing the change to the industry composition of volume GVA over time. This takes into consideration the relative size of each industry, so it provides a clearer picture of the impact on the size and composition of the industry picture. We compare the profiles in the pre-crisis years (1998 to 2007), the period of the financial crisis (2008 to 2009) and the post-crisis years (2010 to 2018). This provides further insights into the extent of these impacts, which not only vary by industry but also over time.

Figure 2: There have been impacts on the relative pre- and post-crisis trends in the production industry, particularly in manufacturing

Contributions to the pre-crisis vs post-crisis volume GVA annual average growth, UK, 1998 to 2018



Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

Notes:

1. Figures may not sum because of rounding.
2. Volume gross value added (GVA) growth and its contributions are based on the arithmetic averages for these periods.
3. Total services are the sum of the individual service industry's volume GVA growth contributions.

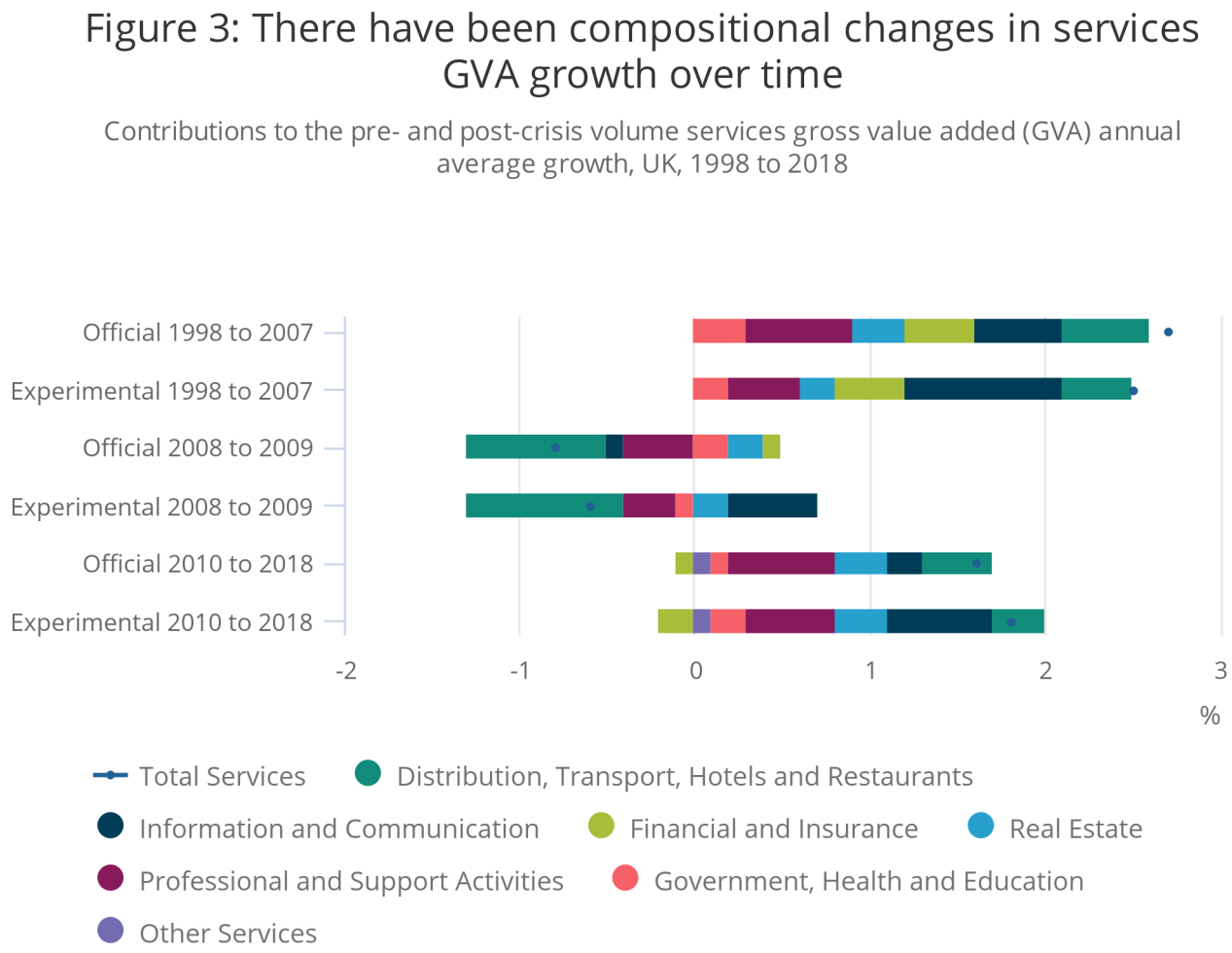
In the pre-crisis period, the contribution of the production industry was relatively higher. The official estimates show production output increased by 0.3% per year on average over this period, while the experimental estimates show that it increased by 1.8% per year on average. This has primarily been driven by the manufacturing industry, which is because of our new approach where volume is now reconciled by confronting estimates at a detailed product by industry level. As such, this provides a contrasting pre- and post-crisis comparison of the production industry in the experimental estimates.

The contributions of the agriculture and construction industries are largely unchanged over this period. That said, this mainly reflects the relatively low weight of these industries as there have been some downward impacts to construction GVA growth leading up to the crisis and also in the 2008 to 2009 period. These experimental estimates imply there was a larger contraction in the construction industry in the years of the financial crisis, declining by 9.6% per year on average. This compares with the official estimates of a decline of 7.9% for these years.

Figure 3 shows a breakdown of the industry contribution to volume estimates of services GVA over time. This provides more insight into the compositional effects that have taken place. The most pronounced effects are in the information and communication industry, which primarily reflects how we are now better capturing the effects of quality change over time for telecommunication services. This has particularly led to a higher contribution in 2008 to 2009 and in the post-crisis period. It is also useful to consider the effect this has on the volume GVA estimates of other industries, given how this is consumed as an input into the production process of other industries.

Figure 3: There have been compositional changes in services GVA growth over time

Contributions to the pre- and post-crisis volume services gross value added (GVA) annual average growth, UK, 1998 to 2018



Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

Notes:

1. Figures may not sum because of rounding.

2. Volume gross value added (GVA) growth and its contributions are based on the arithmetic averages for these periods.

3. Total services are the sum of the individual service industry's volume GVA growth contributions.

The underlying contributions in finance and insurance are lower, which in part reflects the impact on telecommunication services as an intermediate input. That said, we would advise caution in the analysis of these experimental figures. We have identified that further research is required in improving the reconciliation of these industry-level figures, and this is reflected in the future transformation of the UK National Accounts, including the planned implementation of the Financial Services Survey.

There have also been downward impacts to the contributions for distribution, transport, hotels and restaurants for all periods, although this has minimal impact on the change in the pre- and post-crisis periods. There have also been changes to professional and support services over time, as these experimental estimates show a lower contribution in the pre- and post-crisis period.

Table 1 shows the average GVA growth for the three periods that relate to the pre-crisis years (1998 to 2007), the period of the financial crisis (2008 to 2009) and the post-crisis years (2010 to 2018). It also provides information on the size and direction of the impacts compared with the official estimates, highlighting how these not only vary by industry but also over time. There is more volatility for volume GVA growth for most of these industries over the period 1998 to 2018. This will be most pronounced when there is inherent volatility in the movements of output and input prices, particularly where the product mix of output and intermediate consumption for an industry might be contrasting and/or those industries that might be more exposed to oil and commodity price shocks in its output or input prices.

Table 1: The impacts of these experimental estimates are reflected by industry and over time
Average annual volume gross value added (GVA) growth and size of impacts, 1998 to 2018

	1998 to 2007	2008 to 2009	2010 to 2018
Agriculture	4.6	11.6	1.1
	(+3.6)	(+11.0)	(-0.5)
Production	1.8	-4.3	1
	(+1.6)	(+0.8)	(+0.4)
Construction	1.7	-9.6	3.2
	(-0.5)	(-1.7)	(+0.1)
Distribution, Transport, Hotels and Restaurants	2	-4.9	1.9
	(-0.6)	(-0.3)	(-0.4)
Information and Communication	15.4	7.4	9.2
	(+6.7)	(+8.4)	(+5.4)
Finance and Insurance	6	-0.2	-2.6
	(-1.3)	(-1.3)	(-1.6)
Real Estate	1.4	1.3	2.7
	(-0.9)	(-0.3)	(+0.7)
Professional and Support Services	4.2	-2.7	3.9
	(-2.0)	(+1.1)	(-1.5)
Government, Health and Education	1.3	-0.9	1
	(-0.6)	(-2.1)	(+0.3)
Other Services	-0.3	-1.3	1.9
	(-1.9)	(-0.6)	(+0.2)

Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

Notes

1. The main figures reflect the experimental estimates of average annual gross value added (GVA) growth for each industry over the selected time periods.

2. The figures in parentheses show how much larger or smaller the experimental estimates are relative to the official ones.

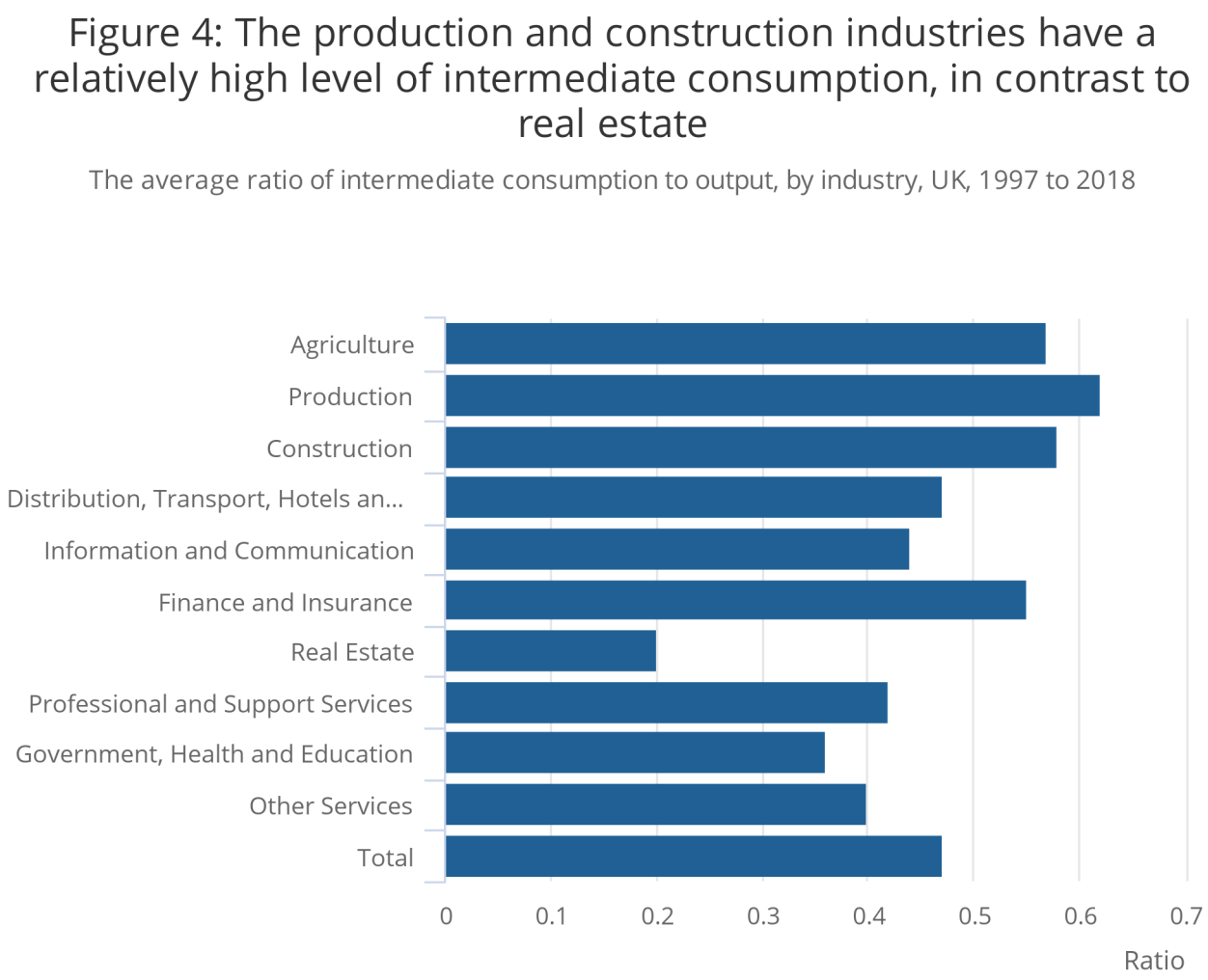
Previous analysis shows that the relative size of industry-level bias is more pronounced (1) the larger the share of intermediate consumption of GVA for that industry and/or (2) the larger the difference between output and input prices. We provide some further information on these industry-level features to help provide some context around the effects of double deflation, though further work will be undertaken as part of the refining of these estimates over the coming years.

Figure 4 shows the relative size of intermediate consumption for each industry over the period 1997 to 2018. It shows that the production, construction and agriculture industries are most likely to be impacted by double deflation, all else the same. It is also helpful to consider how the structure of the production process for industry has changed over time. For instance, these three industries have all experienced an increase in the relative size of intermediate consumption. In contrast, this is not the case for most services industries – the only exception is real estate. This points to how industry-level structural changes in the respective production processes need to be looked at to understand how double deflation impacts industry-level volume GVA.

Another feature to consider is the volatility over time in the relationship between output and input for an industry. Agriculture and real estate are the industries that have experienced the most movements over the period 1997 to 2018, which might provide some further insight into how these industries have responded to shocks.

Figure 4: The production and construction industries have a relatively high level of intermediate consumption, in contrast to real estate

The average ratio of intermediate consumption to output, by industry, UK, 1997 to 2018



Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

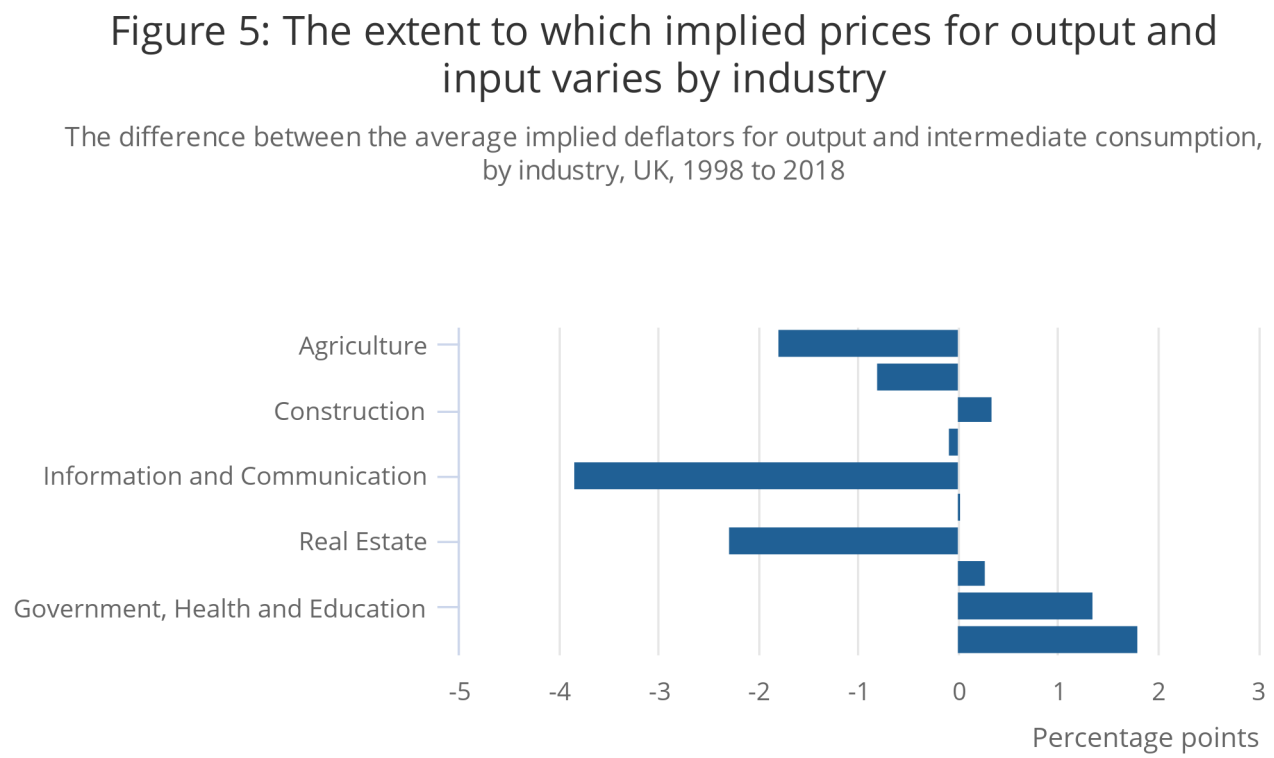
Notes:

1. Arithmetic averages of these periods.

Figure 5 captures the relative change in output and input prices over time for each industry. It shows the industry-level difference in the average annual output and input price inflation, picking up the effects of prices shocks on an industry but also implicitly the compositional change in the production process. Double deflation has been carried out in the SUTs framework, so it is picking up the effects of change in the product composition of output and input for an industry.

Figure 5: The extent to which implied prices for output and input varies by industry

The difference between the average implied deflators for output and intermediate consumption, by industry, UK, 1998 to 2018



Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

Notes:

1. Arithmetic averages of the difference over the period.

It shows how the price of the output of information and communication has fallen much faster than its input prices, in part reflecting the effects of technological change and how we are capturing the quality change much more effectively here. The price of its output fell by 3.3% per year on average over this entire period. In contrast, there was a slight increase in the price of its input of 0.5% per year on average. All else the same, this would imply that the effects of double deflation would lead to an upward change to volume GVA growth for this industry.

The real estate and agriculture industries share a similar narrative in that output prices increased at a slower rate than their input prices (or that output prices decreased at a faster rate than its input prices). In contrast, the effects of double deflation on volume GVA growth lead to a downward impact for other services and government, health and education.

These effects might be more pronounced for certain years, when there is a specific shock that leads to a particularly pronounced impact in the relative prices of output and input prices for an industry. This might reflect a demand and/or supply shock impacting on that industry or it might capture how exchange rate movements and those in oil and commodity prices impact on the production process for an industry.

Notes: Experimental estimates of double-deflated GVA

1. The impact to the manufacture of textiles, wearing apparel and leather products industry not only reflects that of changes to the clothing deflator. There are relatively large imbalances in this industry, which have been reflected in how balancing adjustments have been applied to this industry.

5 . An industry focus

Further work is required to understand the impact of producing volume gross value added (GVA) estimates in this new framework, including the effects of double deflation. As part of this research, we will be carrying out further industry-level reviews to enhance our knowledge of underlying trends and we welcome feedback as part of this exercise via email to blue.book.coordination@ons.gov.uk.

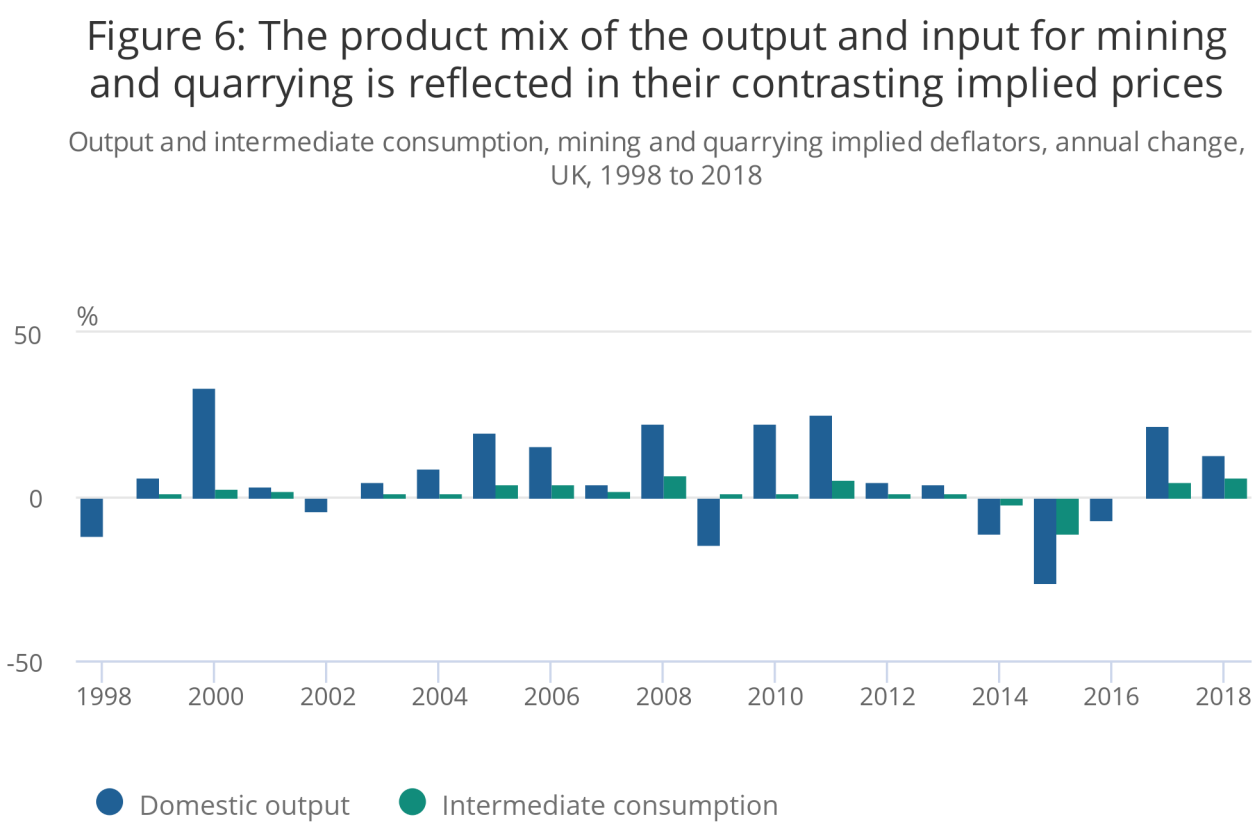
As part of these initial experimental estimates, we have provided some insights from our work so far to help highlight these changes but also to answer why these will likely be further revised as part of our ongoing research to improve the reconciliation of these estimates. A table summarising this can be viewed in the accompanying dataset. This will also involve how we have applied balancing adjustments in these estimates, which will be reconsidered as we balance supply and use tables (SUTs) in current prices and previous year's prices for future Blue Books.

Mining and quarrying

Figure 6 shows the relative price change of the output and intermediate consumption for the mining and quarrying industry. This is an industry in which the move from official single-deflated GVA estimates to experimental double-deflated GVA has had an impact that reflects the contrasting product mix of the output and input for that industry, which is then reflected in the respective implied prices over this period of time.

Figure 6: The product mix of the output and input for mining and quarrying is reflected in their contrasting implied prices

Output and intermediate consumption, mining and quarrying implied deflators, annual change, UK, 1998 to 2018



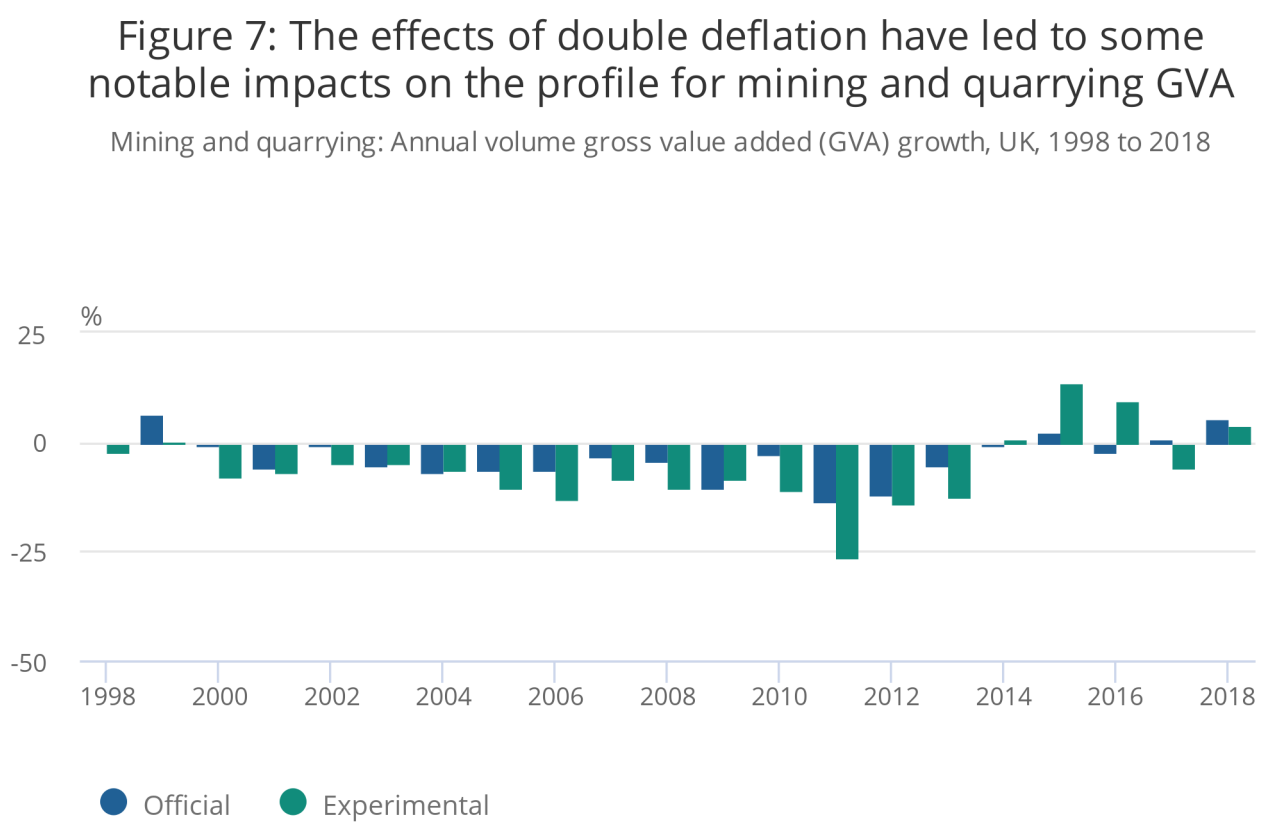
Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

For example, crude petroleum and natural gas account for over 80% of this industry output, so the change in its output price index is strongly correlated with the price of oil and gas. In contrast, its inputs largely comprise of mining support activities and machinery, where there is much less of a correlation with the price of oil and gas. As such, the changes in output and input prices have not been correlated with one another. This lack of correlation is then reflected in double-deflated estimates of GVA.

Figure 7 compares the volume GVA growth profiles over the last 20 years, which shows how the more volatile movements in output prices is then reflected in more volatile volume estimates of GVA. Rather than focus on the impact on the underlying pre-crisis (1998 to 2007) and post-crisis (2010 to 2018) trends on this industry, we look at specific years in which the effect of double deflation is most pronounced. For example, Figure 7 shows a large upward change to volume GVA growth for mining and quarrying in the mid-2010s. This reflects the large decline in oil prices that was recorded in the latter half of 2014, reflecting a range of supply and demand factors. This large fall in the price was then reflected in a higher volume estimates of output of this industry, while having much less of a pronounced effect on the price and so volume of its intermediate inputs.

Figure 7: The effects of double deflation have led to some notable impacts on the profile for mining and quarrying GVA

Mining and quarrying: Annual volume gross value added (GVA) growth, UK, 1998 to 2018



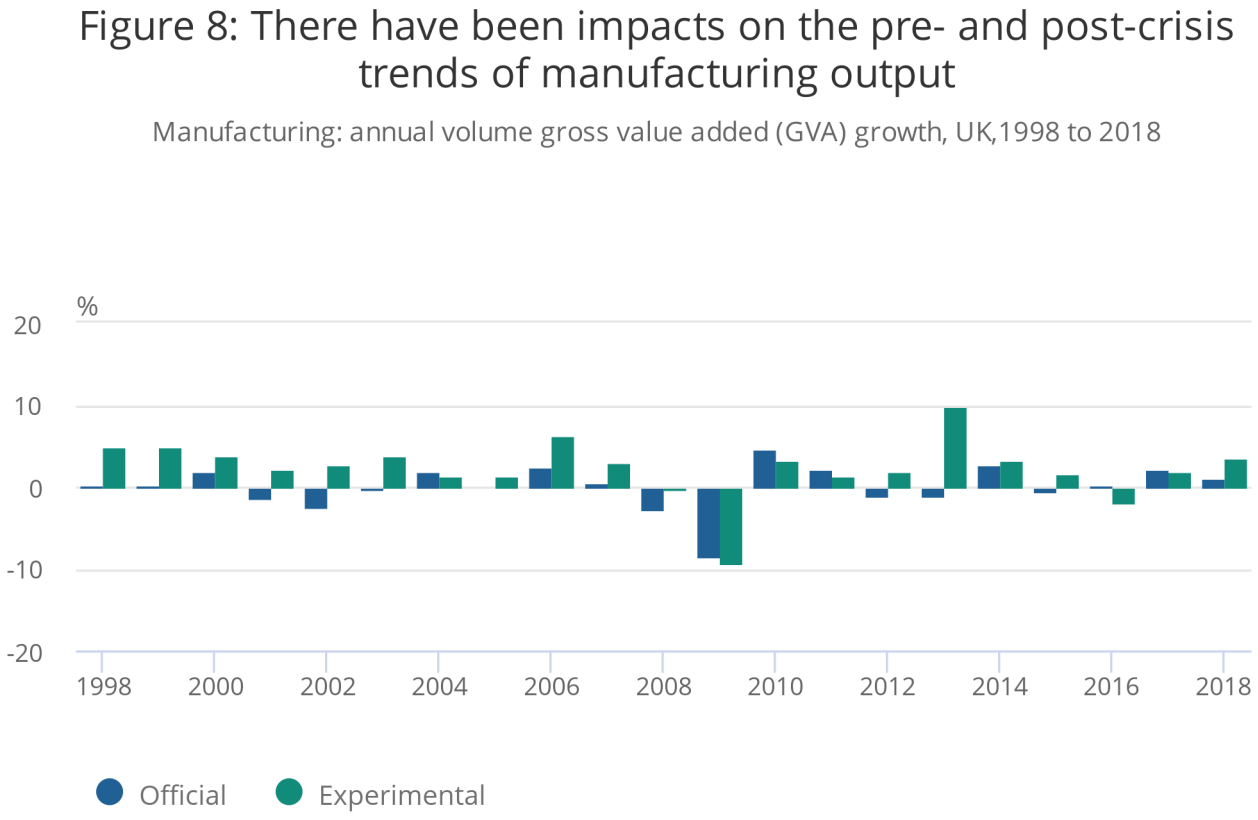
Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

Manufacturing

Figure 8 compares the volume GVA growth profiles over the last 20 years of the manufacturing industry. As previously noted, in the pre-crisis years of 1998 to 2008, there has been a large upward impact of 3.1 percentage points on the annual average growth rate for this industry. In contrast, the change is only 1.6 percentage points in the annual average growth rate in the period 2010 to 2018. As such, this has impacted on the comparisons of the underlying trends in the pre- and post-crisis years. This is because of our new approach where volume is now reconciled by confronting estimates at a detailed product by industry level.[1]

Figure 8: There have been impacts on the pre- and post-crisis trends of manufacturing output

Manufacturing: annual volume gross value added (GVA) growth, UK,1998 to 2018



Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

One example of how this has been carried out in practice is the manufacture of computer, electronics and optical products. The capturing of quality change for a product is important in estimating its “pure” price change over time. There are numerous ways in which this can be carried out, including hedonic price adjustment where the impact of observed changes in the characteristics of a product on its price is estimated. The use of such a hedonic price adjustment in the Consumer Prices Index (CPI) for computers and other technology products in the expenditure approach to gross domestic product (GDP) has led us to balance the production approach more towards expenditure for this industry. This reflects our view that the expenditure deflators are of superior quality as the production approach deflators are not hedonically adjusted. This helps explain why we see stronger GVA volume growth in these earlier years in this industry, reflecting the falls in the price of these technological products once changes in their characteristics have been accounted for.

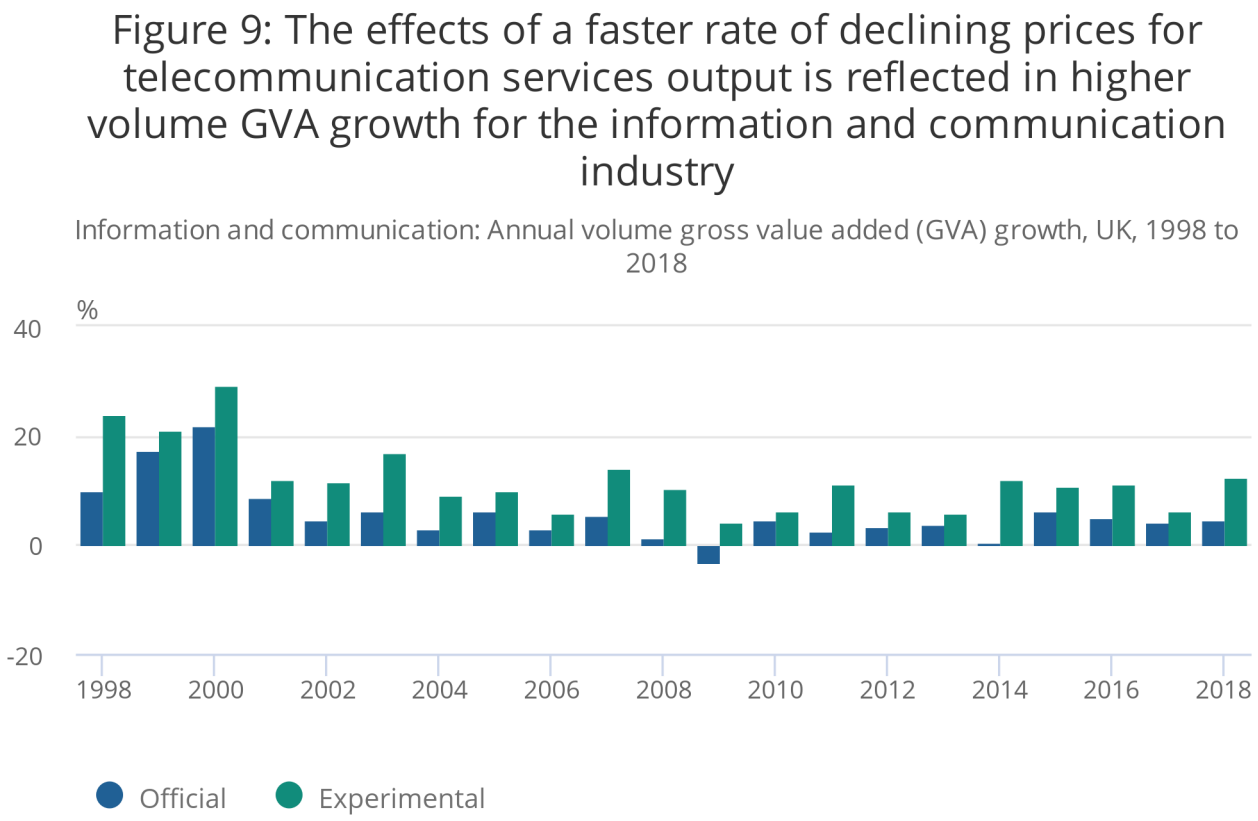
We have identified this as an industry where further confrontation of the measure in current prices is needed for Blue Book 2021, particularly in the pre-crisis years. As such, these initial figures should not necessarily be considered as an indication of where we expect to end up once these are implemented in the UK National Accounts. It is an example of highlighting where we will focus future research to improve our understanding of how to produce our most appropriate estimates for this industry.

Information and communication

We have undertaken research to improve how we estimate the change in prices of telecommunication services output, specifically the under-representation of internet services and an improvement in the handling of access charges for telecommunications services. Figure 9 shows its impact on the volume GVA for the information and communication industry, where the effects of a faster rate of declining prices for this output are reflected in higher volume GVA growth. These experimental estimates show that average annual GVA growth for this industry was 12.0% over the period 1998 to 2018, compared with 5.8% in the official estimates.

Figure 9: The effects of a faster rate of declining prices for telecommunication services output is reflected in higher volume GVA growth for the information and communication industry

Information and communication: Annual volume gross value added (GVA) growth, UK, 1998 to 2018

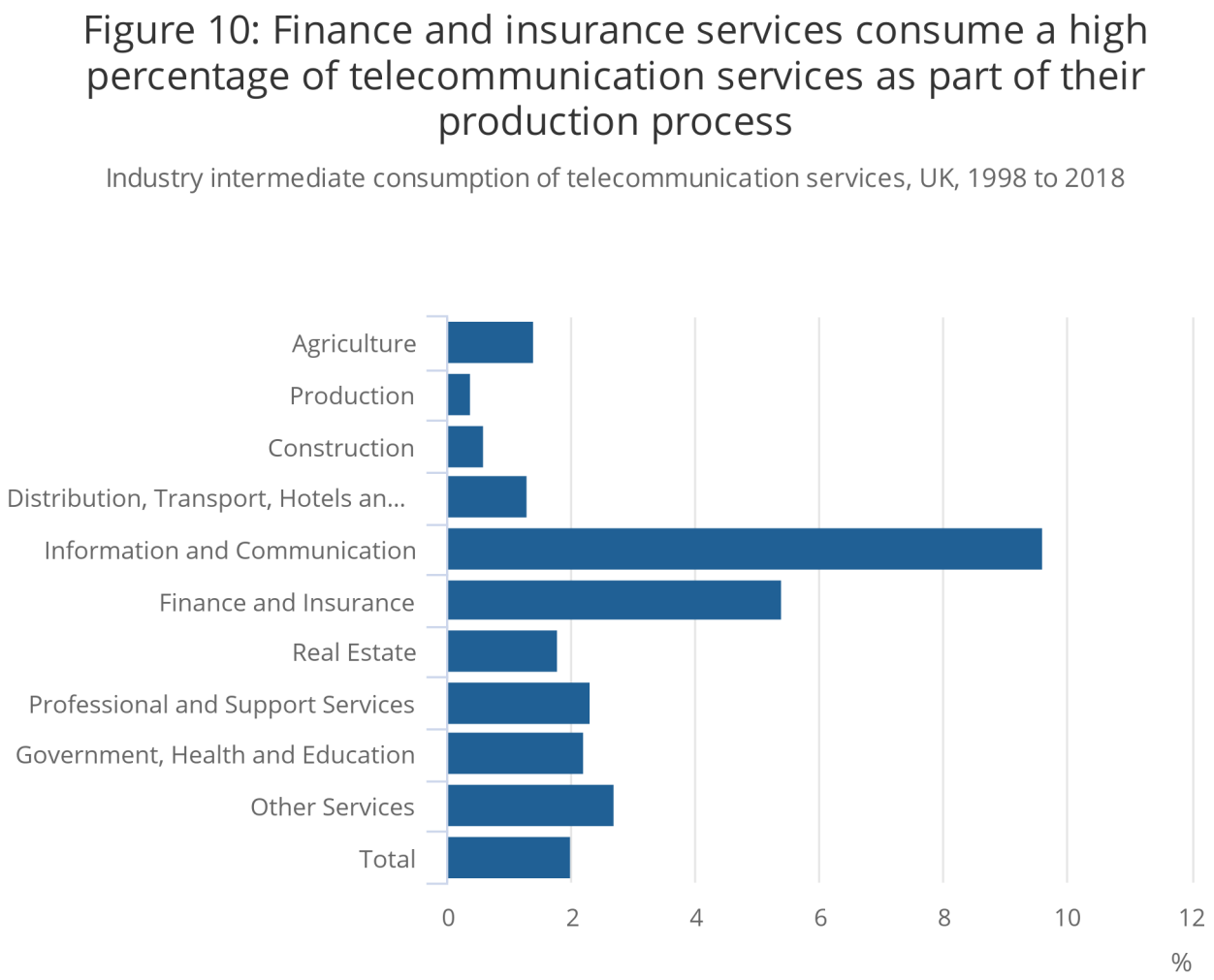


Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

However, the impact of the telecommunication services deflator improvement is wider than this industry. This is because these revised volume estimates are also reflected in how these services are consumed by other industries as part of their production process. Figure 10 presents the percentage of telecommunication services that are consumed by each industry. Aside from others within the information and communication industry, those most impacted include finance and insurance services and gambling and betting services (within other services). All else the same, this would have lowered the volume GVA growth for these industries.

Figure 10: Finance and insurance services consume a high percentage of telecommunication services as part of their production process

Industry intermediate consumption of telecommunication services, UK, 1998 to 2018



Source: Office for National Statistics – Using experimental double deflation estimates to produce GDP

Notes:

1. Arithmetic averages over the period.

Notes for: An industry focus

1. The upward impact in 2013 results from our other improvements to producing volume estimates of GVA. This reflects the use of current price estimates through the SUTs framework, leading to a revised estimate of volume of output alongside falls in the growth of intermediate consumption during this period. This is an area that will need further work in improving the coherence of current price and volume estimates.

6 . Experimental double deflation estimates data

UK National Accounts: experimental double-deflated GVA industry estimates
Dataset | Released 2 November 2020
Double-deflated industry-level gross value added (GVA) estimates, index and growth rates.

7 . Glossary

Double deflation

Double deflation is a method for calculating value added by industry chained volume measures, which takes separate account of the differing price and volume movements of input and outputs in an industry's production process.

Gross domestic product (GDP)

Gross domestic product (GDP) is the total value of output in the economic territory. It is the balancing item on the production account for the whole economy. Domestic product can be measured gross or net. It is presented in the accounts at market (or purchasers') prices.

8 . Data sources and quality

One of the statistical limitations that has previously been highlighted in the production of the UK National Accounts has been the absence of double-deflated volume measures of industry gross value added (GVA). Recognised as international best practice, it has been one of our long-standing aims to produce double-deflated estimates of GVA. In recent years, we have undertaken significant work in progressing this part of the transformation of the UK National Accounts. This in turn has helped identify numerous theoretical and practical challenges in the compilation of UK gross domestic product (GDP) estimates.

For the first time in the UK, we have produced our first experimental volume estimates in a supply and use tables (SUTs) framework, including double-deflated estimates of GVA. These have been published for the period 1997 to 2018 in the UK and are an important milestone in this journey, which also includes recent work we have undertaken as part of improving our wider package of product deflators. That said, we recognise that this is only a step forward in our transformation process.

9 . Future developments

The balancing of the supply and use tables (SUTs) in current prices and previous year's prices will be carried out in conjunction in the future, rather than as is the case in these experimental estimates. As we finalise the Blue Book 2021 estimates, further research will produce more coherent estimates through data confrontation, particularly in earlier years and for specific industries. This will involve revisiting our current price estimates as well as our volume estimates to produce a more coherent gross domestic product (GDP) picture. This is why this work is best viewed as the next step towards producing SUTs in previous year's prices, in advance of implementation in Blue Book 2021, rather than as indicative Blue Book estimates.

As part of the future transformation, we will use our new framework to identify priority areas for development to improve continuously our double-deflated volume estimates of gross value added (GVA) and the production of GDP in the UK.

As such, we recommend that this is seen as an initial research piece and that these experimental estimates are treated with some caution. These estimates are a reflection of the work we still need to carry out, as it is of our work so far. As we improve our estimates of double-deflated GVA, we will provide more illustrative examples of this impact on industry-level volume estimates of GVA. We welcome user feedback on the initial industry-level findings that are shown here and would value any further insights that stakeholders may have to help us refine these experimental estimates. Please email us at blue.book.coordination@ons.gov.uk.

10 . Related links

UK National Accounts, The Blue Book: 2020
Compendium | Released 2 November 2020
National accounts statistics including national and sector accounts, industrial analyses and environmental accounts.