Office for National Statistics

Article

Measuring price changes of the UK national accounts : February 2023

The implied gross domestic product (GDP) deflator is the broadest measure of inflation in the domestic economy, reflecting changes in the price of all goods and services that comprise GDP, and captures movements in the terms-of-trade.

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Release date:
16 February 2023

Next release:
To be announced

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1 . Main points

- The implied gross domestic product (GDP) deflator is the broadest measure of inflation in the domestic economy, reflecting changes in the price of all goods and services that comprise GDP; this captures the movements in the terms-of-trade that are particularly relevant at times when there are large movements in oil and commodity prices and/or in exchange rates.

- The implied price of GDP has increased by 6.4% in the year to Quarter 3 (July to Sept) 2022, while UK consumer price inflation (CPI) has been 10.0% over the same period, as the UK is a net importer of energy goods so these higher UK import prices bring down the change in the implied price of UK GDP.

2 . Measuring price changes

Consumer price inflation in the UK reached highs not seen for around 40 years in late 2022, for more information see our Consumer price inflation, UK: December 2022 bulletin. Higher tradable goods prices reflect the global recovery from the coronavirus (COVID-19) pandemic, including the effects of imbalances in product and labour markets. Food and energy prices have also increased markedly in 2022, particularly gas prices, in response to the conflict in Ukraine. These inflationary trends have been a global phenomenon over the last year, for more information see our Global inflation: 1970 to 2022 article.

It has been the higher import prices of energy and non-energy goods that have pushed consumer prices higher over the last year. The implied price of gross domestic product (GDP) is considered a more appropriate proxy for broader domestic inflationary pressures in an economy, particularly for open economies like the UK. Changes in import prices have implications for how we consider the implied GDP deflator, particularly at times of large energy price movements or movements in the exchange rate.

3 . The implied price of UK gross domestic product

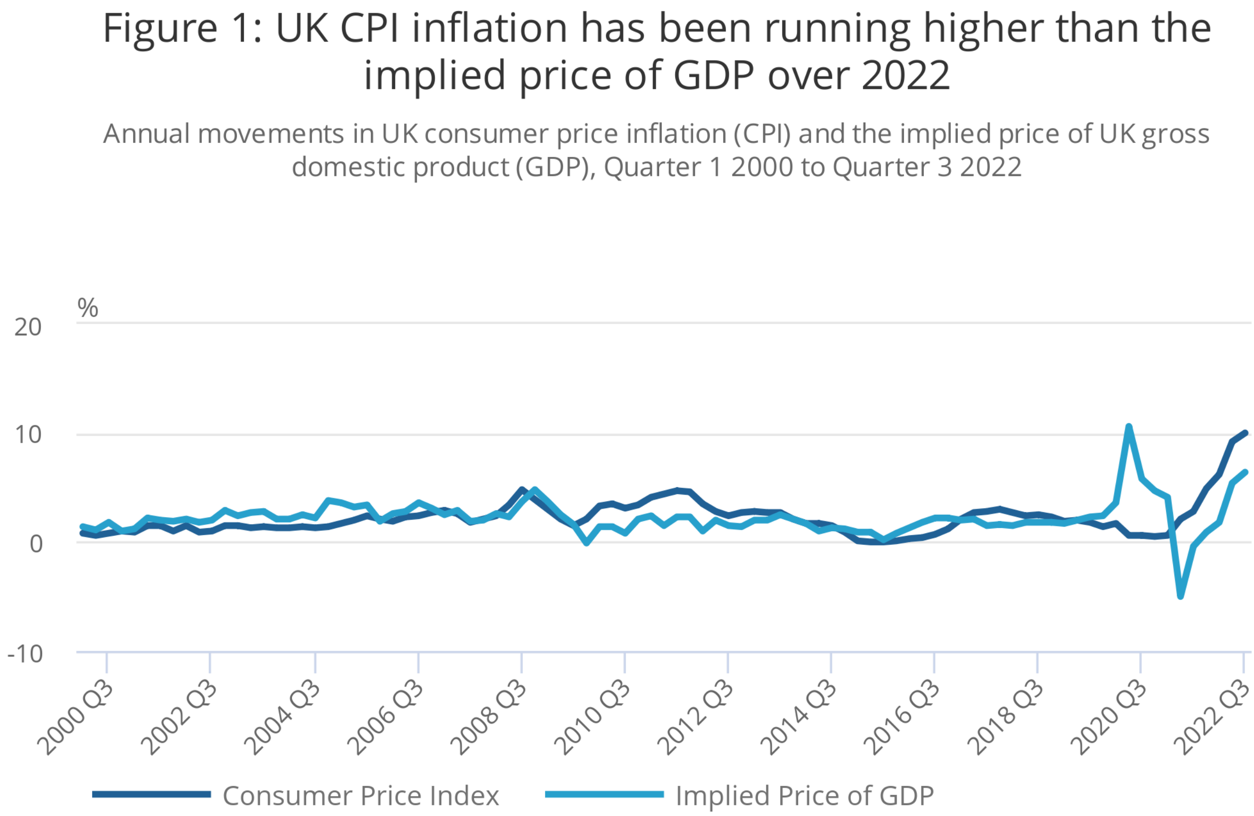
Volume (or real) estimates of gross domestic product (GDP) are primarily produced by deflating current price (or nominal) estimates using price indices that reflect the components of GDP. This reflects those price indices we have for domestic production for output volumes or those price indices for consumption, investment, exports, and imports for expenditure volumes. As such, the implied GDP deflator is a weighted average of the price changes of the components of GDP, where the impact of the price change of each component depends on how much each component contributes to GDP. It is considered an implied price, as there is no one observable price for a unit of GDP – it reflects the price movements of many goods and services for the individual components of GDP.

The implied GDP deflator is the broadest measure of inflation in the domestic economy. It reflects changes in the price of all goods and services that comprise GDP. In contrast, consumer price inflation (CPI) captures the rate of the price change of goods and services that are purchased to be consumed by households, where these reflect only what households are buying in the UK to consume. Consumer price inflation including owner occupiers' housing costs (CPIH) is a broader measure of consumer price inflation in that it includes owner occupiers' housing costs. These are the costs to households that own the property they live in, by including a measure of what it would cost owner occupiers to rent their own home.

Figure 1 shows that UK CPI inflation has been 10.0% in the year to Quarter 3 (July to Sept) 2022. However, the implied price of GDP has only increased by around 6.4% over this same period. Higher import prices of energy and non-energy goods have pushed consumer prices higher over the last year. Changes in import prices are not considered as part of domestic inflation.

Figure 1: UK CPI inflation has been running higher than the implied price of GDP over 2022

Annual movements in UK consumer price inflation (CPI) and the implied price of UK gross domestic product (GDP), Quarter 1 2000 to Quarter 3 2022



Source: Office for National Statistics

Notes:

1. Estimates of the implied price of gross domestic product (GDP) based on the Quarterly National Accounts published on December 22.

4 . The impact of coronavirus (COVID-19) on the implied price of government consumption expenditure

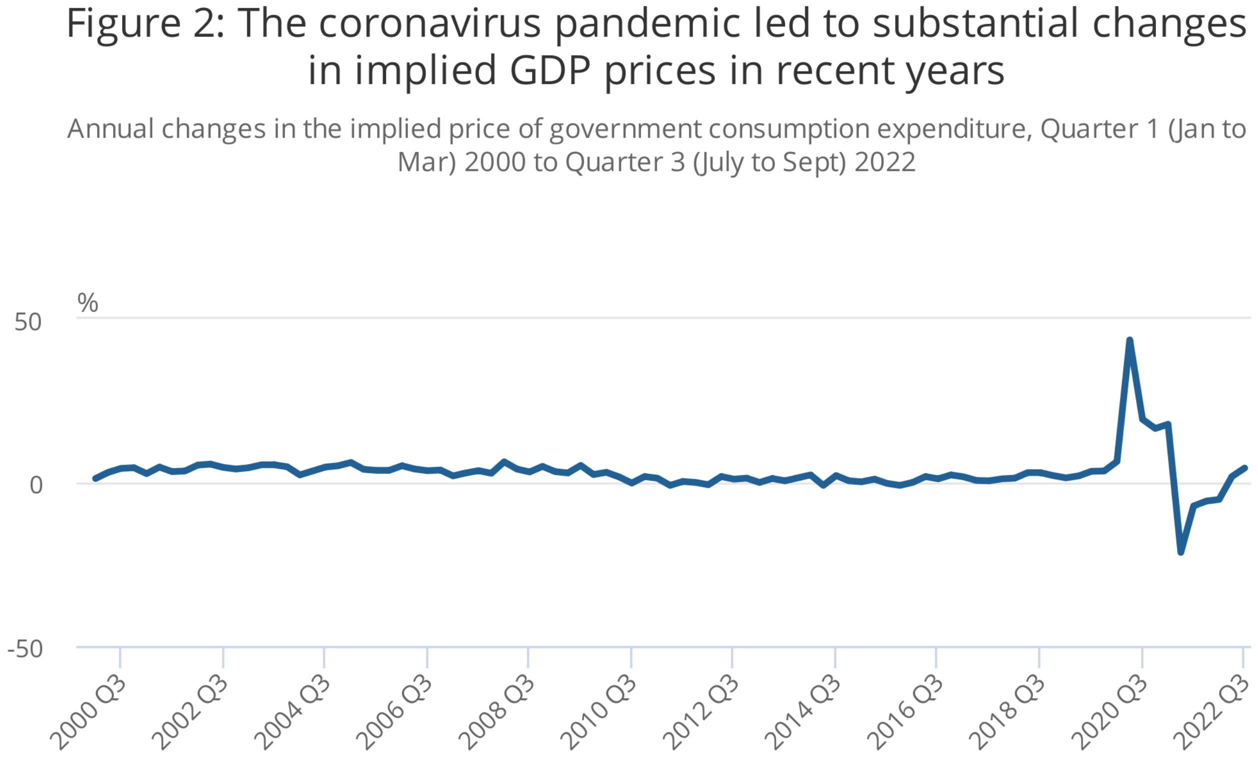
The implied price of gross domestic product (GDP) includes the price change of the expenditure that is incurred by government in producing non-market output, even though there are no market prices for these transactions. However, estimating the value and volume of expenditure in producing these services is challenging, as there is typically no market price for which this output is sold. This was further complicated by the impacts of the coronavirus (COVID-19) pandemic on the provision of health care and education. For more information, see our International comparisons of GDP during the coronavirus (COVID-19) pandemic article.

The coronavirus pandemic led to a large fall in the volume of health care and education output through 2020 and 2021. This reflected significant compositional shifts in the provision of health care services, given the resource constraints, and an extended period of remote learning for schools. However, there was not a commensurate decline in current price spending on these public services. This difference between activity and spending was reflected in large movements in the implied price of government consumption expenditure, which then fed through to the implied price of GDP (Figure 2). However, these pandemic effects did not reflect changes in the price of providing health care and education. It was more a reflection of how non-market output was delivered at this time.

As such, the implied GDP deflator through 2020 and 2021 was not considered a useful proxy of broader domestic inflationary pressures. However, as there has subsequently been a normalisation in how the volume of this non-market output is now provided, it does not explain why the implied GDP deflator was lower than consumer price inflation through 2022.

Figure 2: The coronavirus pandemic led to substantial changes in implied GDP prices in recent years

Annual changes in the implied price of government consumption expenditure, Quarter 1 (Jan to Mar) 2000 to Quarter 3 (July to Sept) 2022



Source: Office for National Statistics

Notes:

1. Estimates of the implied price of gross domestic product (GDP) based on the Quarterly National Accounts published on December 22.

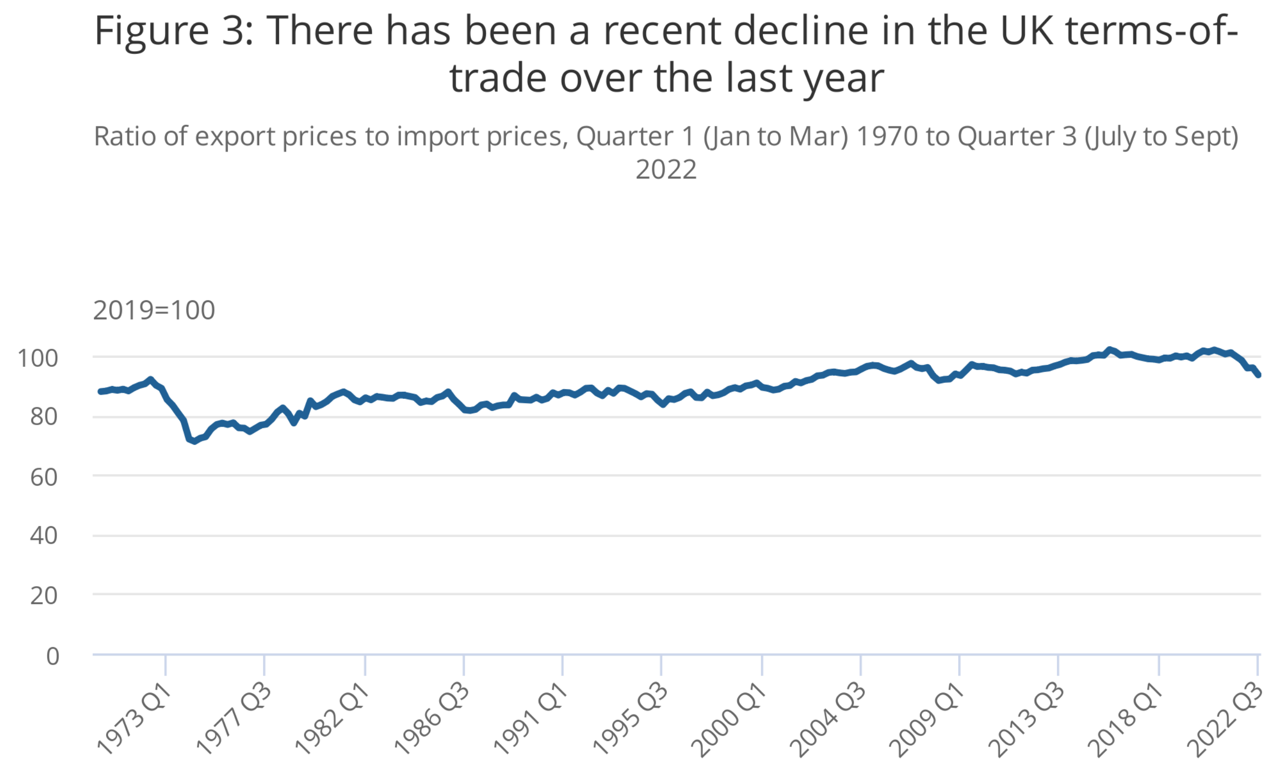
5 . The impact of energy price movements on the terms-of-trade in the UK

The implied gross domestic product (GDP) deflator also reflects the relative price of internationally traded goods and services, which is particularly relevant for open economies. Movements in the terms-of-trade – the ratio of export prices to import prices – are of particular interest at times when there are large movements in oil and commodity prices and/or in exchange rates.

The UK is a net importer of energy and non-energy goods, which explains why import prices have increased relatively more than export prices recently in response to the energy price shock of the last year. Figure 3 shows that the UK is currently experiencing its largest negative terms-of-trade effect since the mid-1970s. This not only has a welfare implication on the purchasing power of UK GDP, but it also has an impact on the implied price of UK GDP.

Figure 3: There has been a recent decline in the UK terms-of-trade over the last year

Ratio of export prices to import prices, Quarter 1 (Jan to Mar) 1970 to Quarter 3 (July to Sept) 2022



Source: Office for National Statistics

Notes:

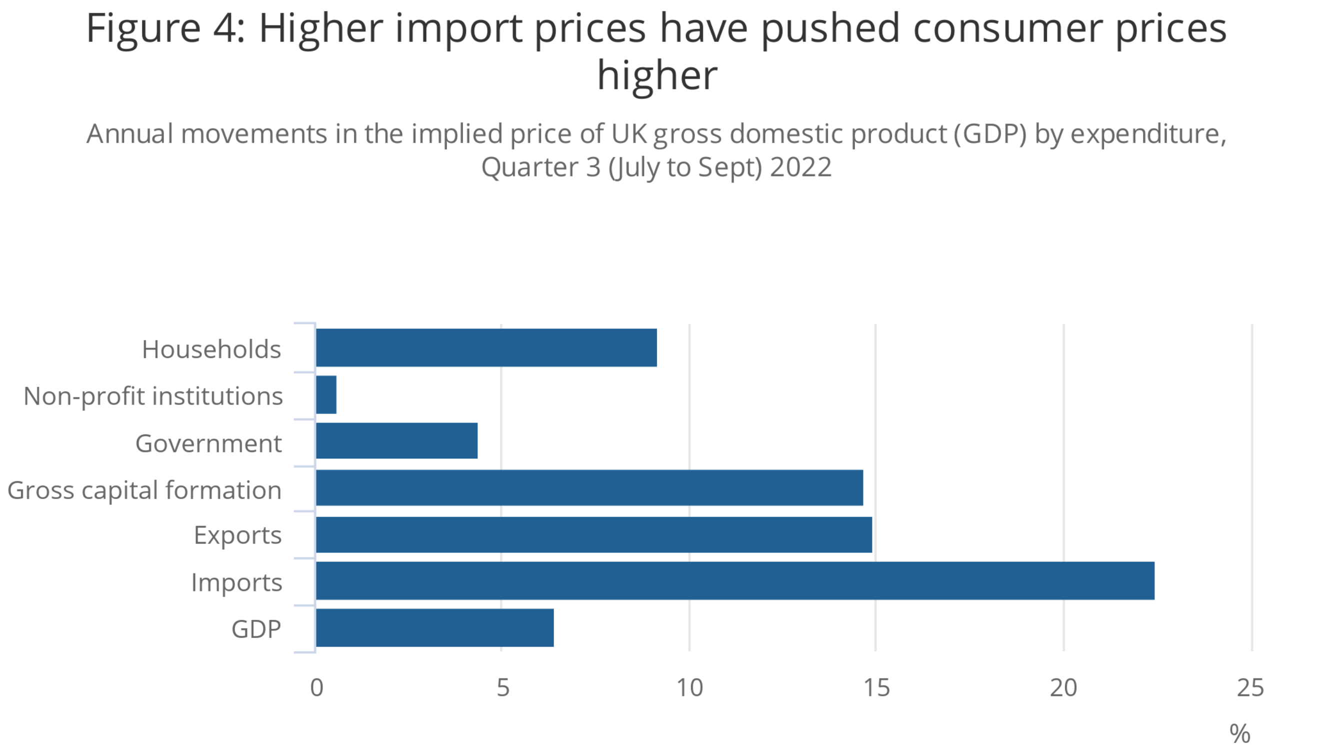
1. Estimates of the implied price of gross domestic product (GDP) based on the Quarterly National Accounts published on December 22.

The implied GDP deflator captures the price of goods and services that are produced domestically. Higher prices for consumption, investment and government expenditure will increase the implied price of GDP. Higher prices for exports will also lead to a higher implied price of GDP, given UK exports are produced in the UK. In contrast, higher import prices will reduce the implied price of GDP, as these are not produced in the UK.

Over the last year, there have been very large and volatile energy price movements, following the Russian invasion of Ukraine. As the UK is a net importer of energy and non-energy goods, these higher energy prices explain why import prices have increased faster than export prices. Figure 4 shows how the change in prices over the year to Quarter 3 (July to Sept) 2022 by type of expenditure in the UK. The implied price of household consumption expenditure reflects the movements in consumer price inflation (CPI). There has been an increase in energy and non-energy goods prices over the last year, reflecting the imbalances in product and labour markets as part of the recovery from the coronavirus (COVID-19) pandemic and the conflict in Ukraine. Given that it has been higher import prices that have pushed consumer prices higher over the last year, UK CPI inflation has been higher than the change in the implied price of UK GDP over this period. All else the same, this will always be the case if there is a fall in the UK terms-of-trade.

Figure 4: Higher import prices have pushed consumer prices higher

Annual movements in the implied price of UK gross domestic product (GDP) by expenditure, Quarter 3 (July to Sept) 2022



Source: Office for National Statistics

Notes:

1. UK CPI inflation increased by 10.0% in the year to Quarter 3 2022.

2. Estimates of the implied price of gross domestic product (GDP) based on the Quarterly National Accounts published on December 22.

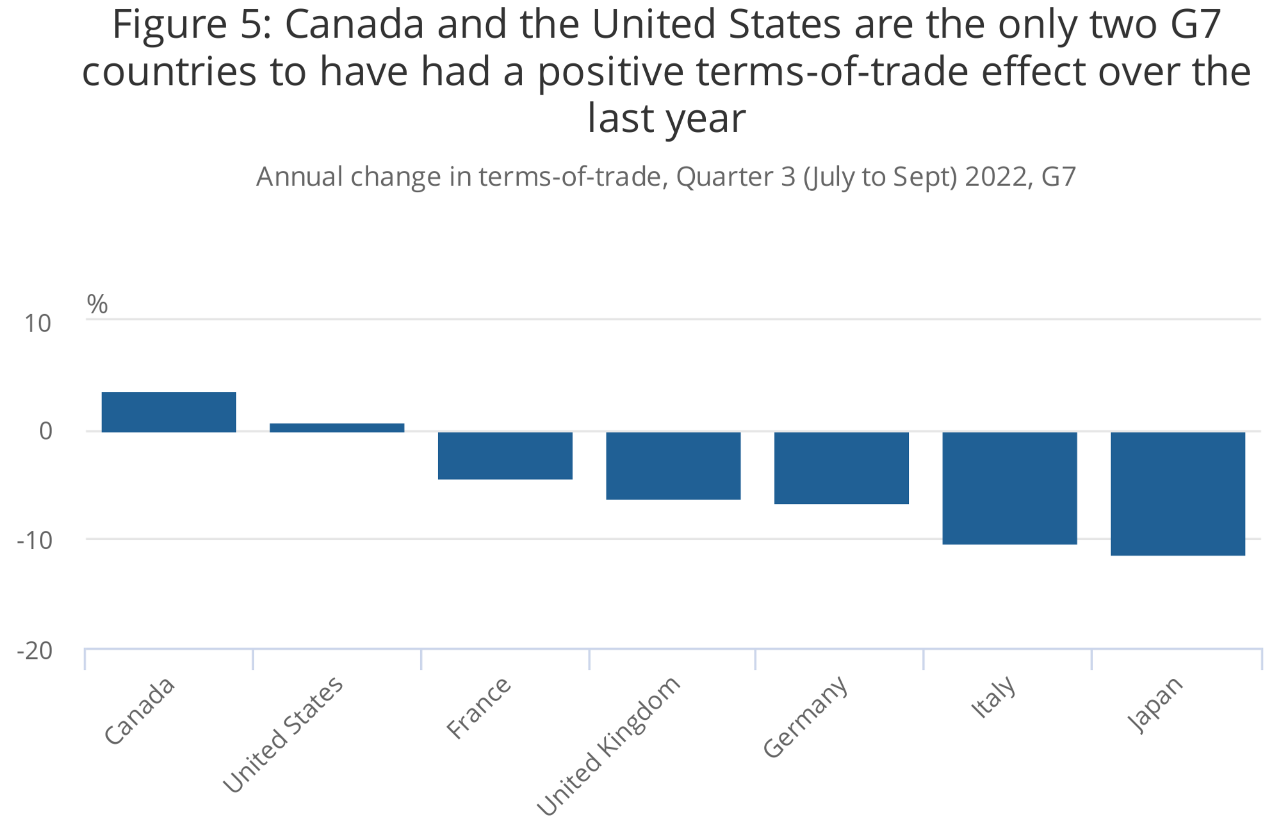
6 . The impact of energy price movements on the terms-of-trade in the G7 economies

Given the increase in food, energy and tradable goods prices over the last year, all open economies have experienced a change in their terms-of-trade. This terms-of-trade effect depends on whether a country is a net exporter or importer of those commodities that have experienced large price changes.

Figure 5 shows the change in the terms-of-trade for the G7 economies over the year to Quarter 3 (July to Sept) 2022. Canada and the United States are the only two G7 countries to have had a positive terms-of-trade effect over the last year, reflecting how these countries are net energy exporters. In contrast, France, Germany, Italy, and Japan experienced a negative terms-of-trade effect, like the UK.

Figure 5: Canada and the United States are the only two G7 countries to have had a positive terms-of-trade effect over the last year

Annual change in terms-of-trade, Quarter 3 (July to Sept) 2022, G7



Source: Organisation for Economic Co-operation and Development

Notes:

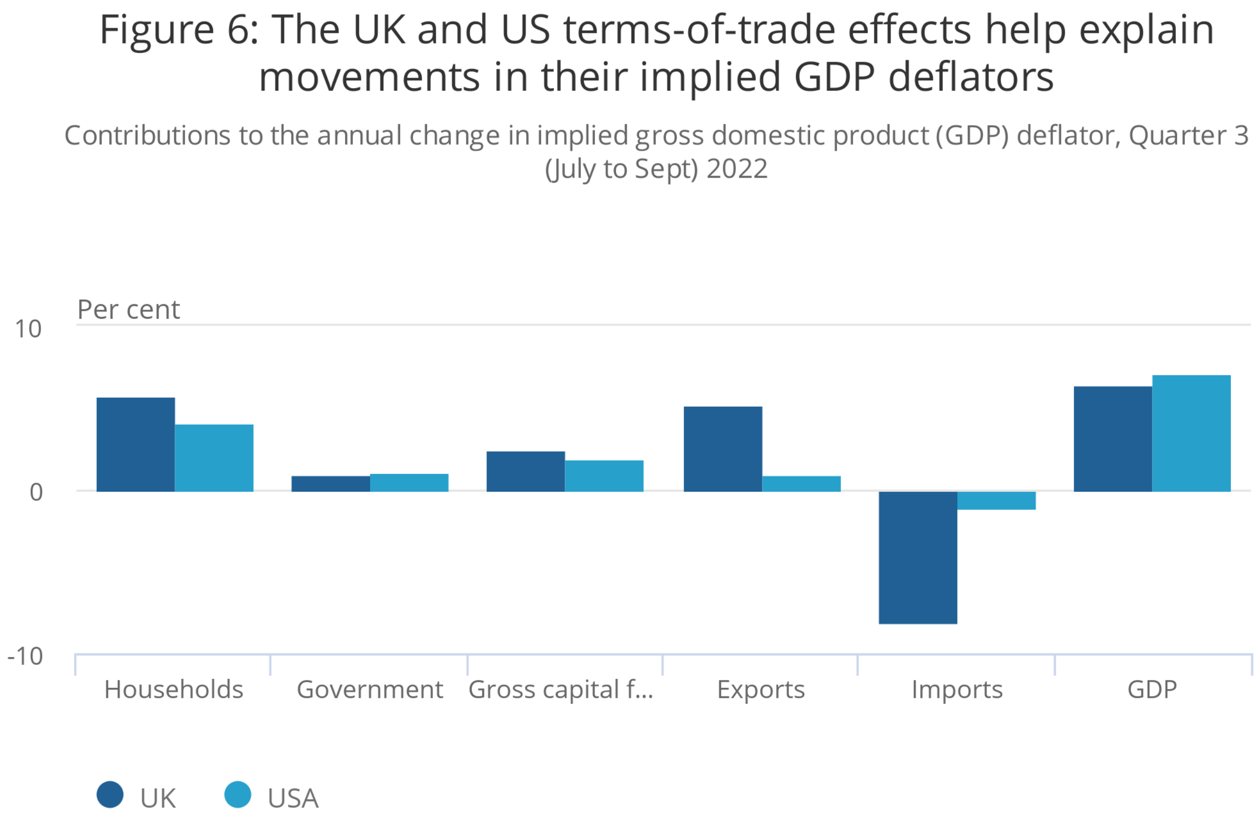
1. All international figures are correct as of 9 January 2023.

In the year to Quarter 3 2022, there was a 7.1% increase in the implied price of US GDP, compared with the 5.8% increase for the implied price of UK GDP. This reflects the changes to the terms-of-trade for these two countries. Figure 6 shows the expenditure contributions to the price change of implied UK and US GDP in the year to Quarter 3 2022, which reflects the price change of these types of expenditure but also the composition of expenditure in these countries.

The contribution of the price increase in household consumption expenditure has been higher in the UK, including the effects of a tight labour market and being more exposed to the effects of cuts in Russian gas supply. However, the UK has experienced a lower increase in its implied price of GDP over the last year. This is because of these terms-of-trade effects. Unlike the US, the UK is a net energy importer and so UK import price inflation has been much higher (Figure 6). The positive terms-of-trade effect in the US pushes up its implied GDP deflator, while the negative terms-of-trade effects in the UK pushed down its implied GDP deflator.

Figure 6: The UK and US terms-of-trade effects help explain movements in their implied GDP deflators

Contributions to the annual change in implied gross domestic product (GDP) deflator, Quarter 3 (July to Sept) 2022



Source: Organisation for Economic Co-operation and Development

Notes:

1. All international figures are correct as of January 9th 2023.

2. Excludes non-profit institutions serving households and the statistical discrepancy.

The implied GDP deflator is a weighted average of the price changes of the various components of GDP, which provides a broad measure of domestic inflationary pressures. This includes the extent that there has been a change in the terms-of-trade, which are particularly relevant at times of large movements in oil and commodity prices and/or in exchange rates.

If a commodity increases in price rapidly and a country is a net importer of that commodity, their GDP deflator will reduce, all else the same. Likewise, if a country is a net exporter of that commodity, it will increase their GDP deflator, all else the same. It has been the increase in import prices that have pushed consumer prices higher in the UK. Any historical or international comparisons of these implied price movements of GDP need to consider these terms-of-trade effects, specifically whether a country is a net exporter or importer of these global commodities. This explains why the change in the UK's implied GDP deflator has been lower than consumer price inflation over the past year, but also why it was lower than the change in the implied price of GDP in the United States.

7 . Glossary

Gross domestic product (GDP)

A measure of the economic activity produced by a country. There are three approaches used to measure GDP – the output approach, the expenditure approach, and the income approach.

Terms of trade

The ratio of export prices to import prices.

The implied GDP deflator

A broad measure of general inflation, taking into account changes in prices for all the goods and services produced in in the domestic economy. Used to adjust for price changes in the National Accounts.

8 . Data sources and quality

More information on the UK national accounts methodology is available in our Introduction to the UK national accounts.

More information on how the gross domestic production (GDP) national accounts data are gathered and measured is available in our GDP quarterly national accounts, UK: July to September 2022 bulletin.

For more information on how the consumer price inflation data are gathered and measured, see our Consumer price inflation, UK: December 2022 bulletin.

9 . Related links

GDP quarterly national accounts, UK: July to September 2022
Bulletin | Released 22 December 2022
Revised quarterly estimate of gross domestic product (GDP) for the UK.

Consumer price inflation, UK: December 2022
Bulletin | Released 18 January 2023
Price indices, percentage changes, and weights for the different measures of consumer price inflation.

Global inflation: 1970 to 2022
Article | Released 22 November 2022
Examining trends in consumer price and producer price inflation in the global economy over the last 50 years, including the main drivers and the extent of co-movements.

10 . Cite this article

Office for National Statistics (ONS), released 8 February 2023, ONS website, article, Measuring price changes of the UK national accounts