

Compendium

Exchange rate pass through and transmission to consumer prices following the 2015 to 2016 depreciation of sterling

Comparison of the exchange rate movements with price movements looking at the path of exchange movements and CPI inflation.

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1 . Main points

- The 2016 exchange rate changes had more impact on high import intensity products than low import intensity products. Half of the subsequent increase in Consumer Prices Index (CPI) inflation was driven by the elements of the basket with more than 25% import intensity.
- The impact of exchange rate changes on high import intensity products was particularly pronounced in the initial months following the 2016 change.
- Following the 2016 exchange rate changes, the growth rate for the Consumer Prices Index for durable goods was more responsive than that for non-durable goods. This is in line with what prior empirical literature has shown regarding how the observed relationship between exchange rate and prices depends on sector and product characteristics.

2 . Introduction

The degree to which exchange rate changes are transmitted to import prices and consumer prices is commonly referred to as the exchange rate pass-through. Understanding the role of exchange rates in shaping economic outcomes is important from a monetary policy perspective. In particular, assessing the degree of pass-through of exchange rate movements is essential for monitoring and forecasting inflation.

Exchange rate changes are transmitted to import prices and then to final consumer prices via a number of channels, both direct and indirect. Inflation may be influenced directly – by higher prices of goods imported for direct consumption, as well as indirectly – through changes in the costs of imported goods which are subsequently used as inputs into domestic production. Following an exchange rate depreciation, imported final consumer goods become more expensive, pushing up overall consumer inflation. The cost of direct imports¹ makes up about 13% of overall final household consumption expenditure, with indirect imports at 8%, hence direct imports are the channel with the larger impact.

The indirect effect, which works via production costs and takes longer to trickle through the economy, is a two-stage process. In the first stage, the sterling depreciation translates into higher production costs due to more expensive imported inputs and these feed through the domestic intermediate and final goods production. In the second stage an inflationary impact is passed on to domestic consumer prices. We therefore examine both the direct effect, which works via impact of depreciation on higher prices for direct consumption, and the indirect effect, which operates via pass-through at different stages along the distribution chain (import prices, producer prices and subsequently consumer prices)².

However, changes in import prices are likely to translate into changes in the producer and consumer prices of an economy only if producers raise their prices in line with the increase in import prices. Firms may pass on the increase in costs resulting from the sterling depreciation to sustain mark-ups and profits, or they may keep prices constant and accept lower profits, thus dampening the pass-through to final consumer prices, or somewhere in-between.

It should be emphasised that additional factors determine the extent and speed of exchange rate pass-through. Some of these relate to the macroeconomic factors such as the degree of openness to trade, the structure of imports, the expected persistence of the exchange rate change, and the degree of slack in the economy. Other factors relate to the microeconomic structure and behaviour of firms, for example their pricing power, the degree of market concentration, and firms' hedging against exchange rate movements³. In addition, the share of imported final goods and services in the price index, and the importance of imported inputs (for example commodities) in domestic production all influence the magnitude and timing of pass-through (Hahn and O'Brien, 2018).

All mentioned factors can lead to variation in the magnitude and timing of transmission across components of the Consumer Prices Index (CPI), but these may also depend on the underlying drivers of the exchange rate movements (Forbes and others, 2018). We should emphasise that the change in the exchange rate can affect consumer prices with considerable delays. For these reasons this article has not attempted to compare the recent episode of exchange rate depreciation with previous episodes.

This article examines the experience of the sterling depreciation from the end of 2015 to the second half of 2016 to analyse the subsequent movement of prices, looking at:

- the transmission of exchange rate changes to consumer prices for high import intensity and low import intensity goods; goods versus services and durables versus non-durables
- the relationship between exchange rate changes and import prices, producer prices and consumer prices

Notes: Introduction

1. This excludes margins, taxes and subsidies to reflect their impact on prices.
2. Another type of indirect effect may be observed if the depreciation pushes up demand for cheaper domestically produced goods which can lead to higher prices. This effect may be relevant especially for food, but it is outside the scope of this article.
3. Firms may reduce their exposure to exchange rate risk by investing in financial instruments or holding reserves of foreign currency.

3 . The path of exchange rate movements and Consumer Prices Index (CPI) inflation

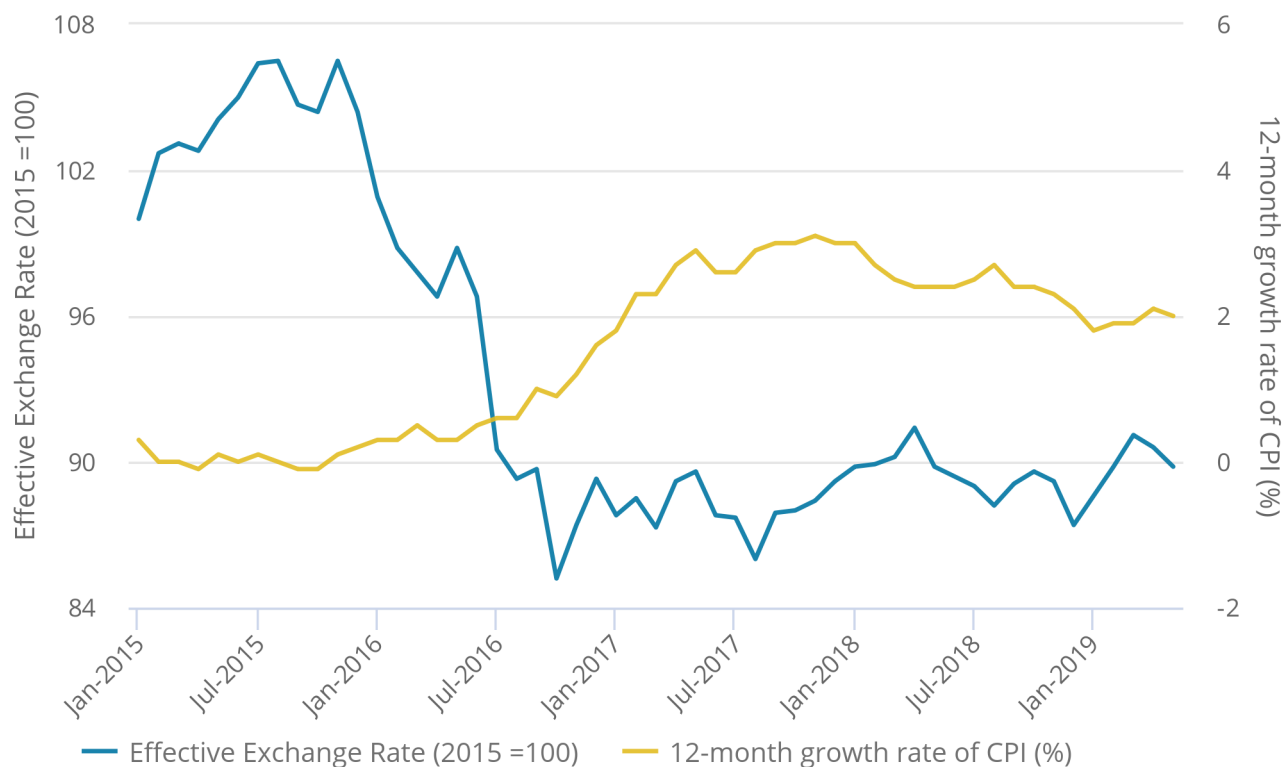
Figure 1 shows the sterling effective exchange rate from 2015 onwards. From December 2015 there was a fall in the sterling effective exchange rate which mostly reflects the market participants pricing the probability of different outcomes in relation to the referendum on the UK's membership of the EU ¹. After the outcome of the referendum on the UK's membership of the EU in June 2016, sterling fell sharply by 7% in one month. This reflected both higher uncertainty surrounding the future relationship with the EU and related change in policy, but also a decline in the expected future openness of the UK to trade, investment and immigration with the EU (Breinlich and others, 2017). In other words, the observed depreciation of sterling reflected market participants' revised expectations of the UK economy. By October 2016 sterling's effective exchange rate was 20% below where it had been at the previous peak.

Figure 1: Inflation rose following the depreciation of sterling

Index for the monthly average effective exchange rate for 12-month growth rate of CPI, UK, January 2015 to May 2019

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Index for the monthly average effective exchange rate for 12-month growth rate of CPI, UK, January 2015 to May 2019



Source: Bank of England - Bank of England Database, Office for National Statistics - Consumer Prices Index

The lower exchange rate raises the cost of importing both consumption goods and intermediate inputs, leading to the observed rise in the of the UK Consumer Prices Index (CPI) 12-month inflation rate. Figure 1 shows that during 2015 CPI inflation stayed close to zero, but then reached a peak of 3.1% in November 2017.

Stylised fact 1: The depreciation of sterling from 2015 to 2016 was followed by a rise in consumer price inflation from 2016 to 2017

However, we should note that higher inflation may also be driven by global events such as rise of the price of oil and inflationary pressures due to growth in the EU and the US (Breinlich and others, 2017). Hence, to more closely capture the effect of the referendum on the UK's membership of the EU on inflation, we investigate whether products that are likely to be more exposed to changes in the value of sterling, such as high import intensity products, experienced higher increase in prices compared to low import intensity products.

Notes: The path of exchange rate movements and Consumer Prices Index (CPI) inflation

1. We should note that betting markets implied around 85% probability that the UK would choose to remain in the UK (The Economist, 2016).

4 . Import intensity and inflation

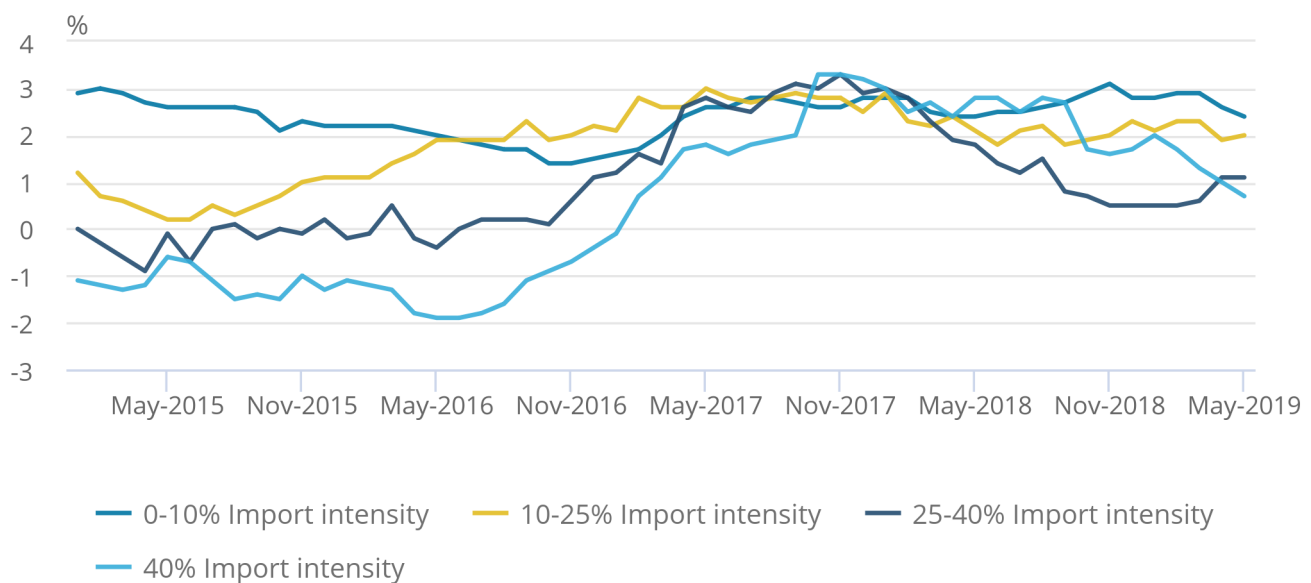
Import intensity, also known as import penetration, refers to the percentage of final household consumption which is due to imports. Once the estimation for the import intensity has been made, we are able to group the products into import intensity buckets. We exclude energy products and divide the remainder into four buckets of import intensity 0 to 10%, 10% to 25%, 25% to 40% and 40% plus. The lowest intensity bucket includes services such as hairdressing services, and the highest import intensity bucket includes goods such as new cars. It is worth noting that the categories are defined to reflect impact on consumer price so goods that face heavy domestic taxation, such as wine, have an import intensity figure much lower than would be implied by looking at only at the volume of imports. Figure 2 shows the 12-month growth rate of the Consumer Price Index (CPI) for each of the import intensity buckets¹. We expect that products with a higher import expenditure share (high import intensity products) will experience larger price rises when the costs of imported goods increase.

Figure 2: Lower import intensity groups have a more stable inflation rates

12-month growth rates for import intensity buckets with CPI weights, UK, January 2015 to May 2019

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12-month growth rates for import intensity buckets with CPI weights, UK, January 2015 to May 2019



Source: Office for National Statistics - Consumer Prices Index

In line with our expectations, Figure 2 points to the strong contrast between the rise in inflation following the depreciation for the high import intensity group compared with the low import intensity group. The higher import intensity groups switched from negative to positive inflation. In contrast the lowest two import intensity groups had more stable levels of inflation. The caveat is that the impact of exchange rate movements on inflation are likely to be spread out over time so we cannot draw simple conclusions about the length of lags, but the observed pattern is notable.

Stylised fact 2: High import intensity goods generally experienced a higher increase in inflation compared with low import intensity goods. Along with energy, they were the main drivers of the rise in the overall consumer price inflation rate following the depreciation

We also check the reliability of our initial results in relation to high and low import intensity products by comparing the price movements of goods and services separately. At the broadest level for services, which tend to be domestically produced, hence less import intensive and relatively more labour intensive, we might observe less impact on their price than manufactured goods.

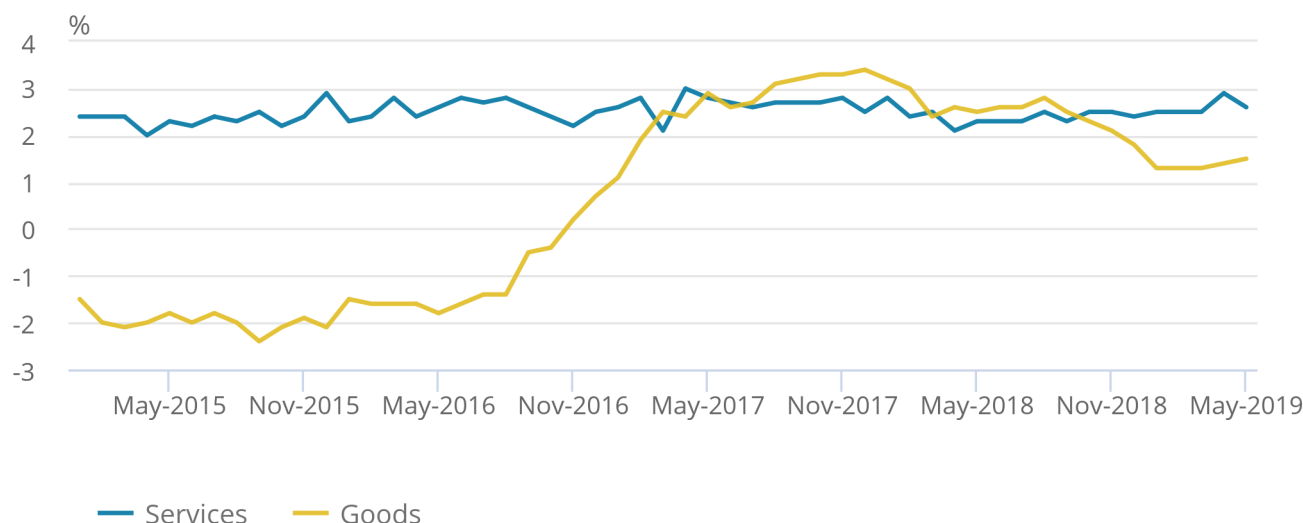
Figure 3 shows the marked difference between the path of inflation for goods and services following the depreciation of sterling. The inflation rate for services was remarkably stable, staying between 2% and 3% for the whole period from 2015 to the present. Goods price inflation, in contrast, changed from negative 2% before the depreciation to over 3% after it. The chart is not adjusted for labour cost growth, nor does it exclude the impact of energy prices; both are potentially significant additional drivers.

Figure 3: Different sectors face the exchange rate shock differently

12-month growth rate of the Consumer Prices Index for goods and services, UK, January 2015 to May 2019

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12-month growth rate of the Consumer Prices Index for goods and services, UK, January 2015 to May 2019



Source: Office for National Statistics - Consumer Prices Index

1. Consumer prices that are highly dependent on imports relate mainly to particular manufacturing products such as footwear and cars and some food products. Low import intensity tends to apply to services such as repair services or to products where distribution or taxation drives a high proportion of the final price to consumers, such as alcoholic beverages which are also heavily taxed.
2. The one percentage point contribution to change in inflation is the largest such swing for the highest import intensity group since at least January 2006.

5 . The size and the speed of transmission mechanism over the pricing chain (via import prices, producer prices (PPI) and consumer prices (CPI))

Exchange rate movements also affect domestic prices through the production process where changes in the cost of imported inputs to production feed through to changes in the price of firms' outputs. We would expect changes in the exchange rate to be reflected more quickly and more sizeably in movements in import price inflation than in producer and consumer price inflation, in part reflecting that the latter are more indirect in nature.

Indirect effects, which take longer to trickle through the economy, work via production costs which connect import prices with producer prices and then consumer prices, and depends on the pricing behaviour of domestic firms. The firms may pass on the increase in costs, depending on their market power, resulting from the sterling depreciation to maintain mark-ups and profits. Alternatively, they might keep prices constant and accept lower profits, thus dampening the pass-through to final consumer prices, or somewhere in-between.

At the import price stage, the exchange rate pass-through is related to the degree of competition across industries. The degree to which firms can adjust mark-up in response to an exchange rate change depends on their pricing power, which is a function of how easily their products can be substituted with other similar ones and the degree of market concentration. In short, the greater the capacity for substitution between domestic and imported products and the higher the number of firms servicing the UK market, the lower would be the pass-through to import prices in sterling.

The upper panel of Figure 4 shows that the depreciation of sterling was followed first by a sizeable increase in inflation for imports of inputs to manufacturing and then a somewhat larger increase in inflation for manufacturing inputs overall. The lower panel shows inflation for output producer prices and consumer prices, with a rescaled vertical axis to make the changes more visible. The increase in inflation for output producer prices (factory gate prices) was much lower than the inflation rates shown in the upper panel and the increase for consumer prices was even more muted. These findings are exactly in line with what we would expect from the indirect effects described earlier.

Figure 4: The impact of depreciation on output producer price inflation and consumer price inflation was lower and with more of a lag than on import price inflation and input producer price inflation

[Data download](#)

Import price inflation rose from negative 7.2% in August 2015 to 13.6% in January 2017, a rise of 20.8 percentage points. Input price inflation rose from a low of negative 14.6% in August 2015 to a high of 19.9% in January 2017. It is likely that the rise in energy prices in this period contributed to the increase in input producer prices, compounding the effect of the depreciation.

Stylised fact 3: The exchange rate depreciation was followed by large increases in the inflation rate for imported commodities and for inputs to the manufacturing process, and then more muted increases in output producer prices and consumer prices

Focusing on the last stage of the pricing chain, namely consumer prices, we expect that the pass-through will be higher for durable goods and lower for non-durable goods. The impact of an exchange rate change on non-energy industrial goods inflation is to a large extent transmitted via the prices of durable goods. The empirical literature has shown that the observed relationship between exchange rate and prices depends on sector and product characteristics.

Of the components making up the CPI excluding energy and food, non energy industrial goods (NEIG) prices are the most sensitive to movements in the exchange rate. This is particularly the case for durable goods because durables are traded more extensively and have higher import intensity compared with non-durables. In fact, a large proportion of international trade is in durable goods comprising more than 60% of imports and exports for Organisation for Economic Co-operation and Development (OECD) countries, whereas the share increases to 70% after excluding raw materials and energy products (Engel and Wang, 2007). Figure 8 shows that this pattern observed in previous episodes was repeated in the 2015 to 2016 depreciation. The increase in inflation for durable goods was greater than for non-durables.

As the size and speed of the exchange rate pass-through seems to differ across product categories this indicates that cost structures and pricing decisions at the firm level are important factors determining the exchange rate effects at the aggregate price level. These differences at the goods category level can be related to different industry characteristics.

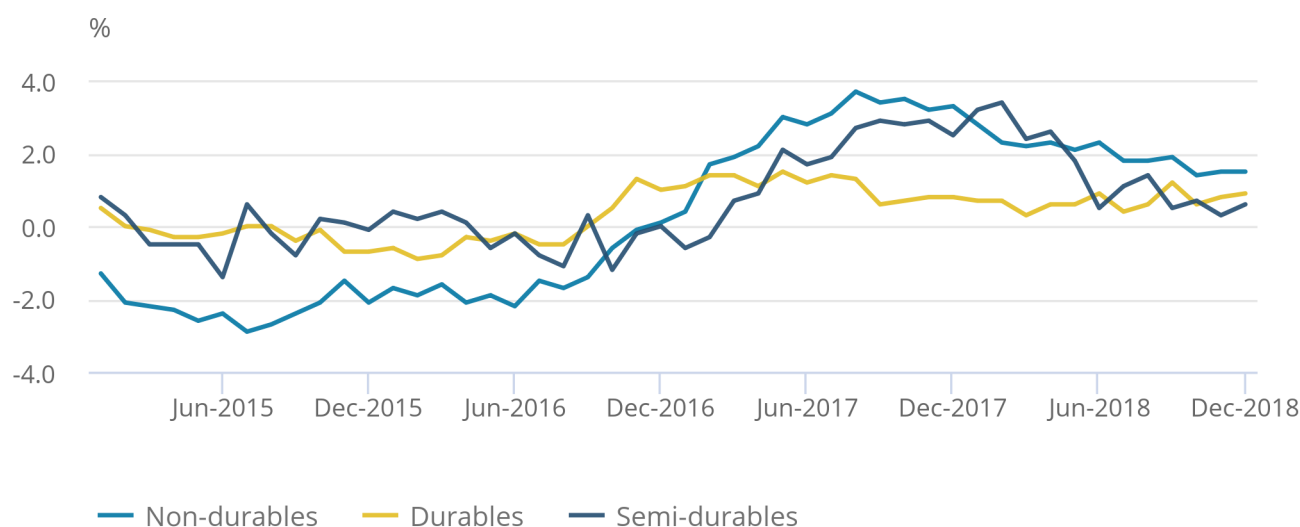
Stylised fact 4: There was a marked contrast between the change in inflation for goods and the more stable inflation rate for services following the depreciation and there was also a noticeably greater impact on inflation for durables compared with non-durables

Figure 5: The increase in inflation for durable goods was greater than for non-durables

12-month growth rate of CPI for durable, non-durable and semi-durable goods, UK, January 2015 to December 2018

Figure 5: The increase in inflation for durable goods was greater than for non-durables

12-month growth rate of CPI for durable, non-durable and semi-durable goods, UK, January 2015 to December 2018



Source: Office for National Statistics - Consumer Prices Index

6 . Conclusion

Exchange rate pass-through refers to the degree to which movements in the exchange rate are transmitted to import prices and subsequently domestic prices. This reflects the higher prices of goods imported for direct consumption as well as through changes in the costs of imported goods which are subsequently used as inputs into domestic production.

In this analysis we use the depreciation of sterling in 2016 as a case study which enables us to investigate the exchange rate transmission through import and producer prices to consumer prices. The picture that emerges is of a rise of the rate of inflation after the depreciation and one that was markedly higher for goods with higher import intensity. The depreciation was transmitted both through higher prices for goods imported for consumption and through higher import prices of goods used as inputs in productions. Given the number of factors that influence it, however, further research is required to understand the speed and magnitude of pass-through.

We should note that monitoring the impact of past exchange rate depreciation on the inflation should be an ongoing task. Pass-through models suggest that the impacts are spread over several quarters, and the exchange rate pass-through may be difficult to detect if it is offset by other factors including the pricing power of firms.

7 . References

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8 . Authors

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