

Resolution Foundation

UK Trade Policy Observatory

REPORT

Changing Lanes

The impact of different post-Brexit trading policies on the cost of living

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October 2017

Acknowledgements

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Executive Summary

The issue of trade has returned to the frontline of British policy making and politics for the first time in 40 years. Most of that debate has focused on questions about the UK economy as a whole and the relationship between trade and growth. But the quantity and prices of goods and services we trade also have significant effects on the living standards of British households as consumers. Such effects are quite apart from the prospects of the firms they work for or the macroeconomy. This paper seeks to redress that balance by doing two things. First we examine the direct living standards effects of shifts in the prices of consumer goods since the referendum. Second we set out some scenarios of how changes in the UK's trade relationship with the EU post-Brexit might affect the prices consumers pay. In particular we look at what impact two "no deal" Brexit scenarios could have on prices and living standards. The first is reverting to MFN tariffs, the second eliminating all tariffs.

Since the vote to leave the European Union the value of sterling has declined by 11 per cent. This devaluation was not felt in consumer prices until early 2017 when it was the predominant factor in driving a rise in the price of essentials such as food and clothing. Food and drink inflation was running at 2.3 per cent and clothing inflation at 4.6 per cent in the year to August 2017, prices were falling for both a year ago. This fast rise in the cost of essentials has meant that over the course of 2017 inflation has increased at a faster rate for poorer households.

But this sterling-driven increase in inflation was not the only factor affecting the price of traded goods and living standards. In early 2017, as a result of rising oil prices and transport costs, households in the top 10 per cent of the income distribution were experiencing inflation of 2.7 per cent, compared to 2.1 per cent for households in the bottom 10 per cent.

So simply looking at two periods of very recent increases in inflation, driven by shifts in the exchange rate and the price of highly traded commodities, demonstrates the need for more of a focus on the living standards implications

of anything that affects the price and quantity of the goods we trade.

While the value of sterling and the oil price have driven price rises since last summer, changes in the UK's trade relationship with the EU will have an important impact on consumer prices once the country leaves the EU. In 2016 trade with the EU accounted for 55 per cent of UK imports of goods. However, this masked significant variation across different products. In some cases, although domestic products constitute the majority of UK consumption, the EU is the UK's main supplier of imports: imports account for 28 per cent of the UK's consumption of dairy products and 98 per cent of these come from the EU. In other cases the rest of the world is more important: only 29 per cent of the UK's clothing and footwear imports come from the EU. However in some cases the UK is both a heavy importer of a good that comes overwhelmingly from the EU: imports constitute 82 per cent of UK consumption of transport vehicles and 85 per cent of these come from the EU.

Any tariff changes after Brexit will have a significant impact on consumer prices. If it fails to sign a trade agreement with the EU, the UK will be obliged to levy the same, so-called most-favoured-nation (MFN), tariffs on imports from the EU as from other partners. Current policy is that the UK will adopt current EU MFN tariffs after Brexit, which implies that after the transition or implementation period, tariffs on clothing, footwear, beverages and tobacco will rise by 10 per cent or more, those on dairy products will rise by 45 per cent and those on meat products by 37 per cent.

Tariff changes will feed through into consumer prices. As a result of reverting to MFN tariffs with the EU we estimate the price of clothing will rise by 2.4 per cent, and the price of transport vehicles will rise by 5.5 per cent. Prices will rise even more for food products. The prices of dairy goods will rise by an average of 8.1 per cent and by 5.8 per cent for meat products.

Overall such price rises will have a significant impact on consumer spending. A family's weekly shop on the final consumption goods for which we estimate tariff changes would rise by 2.7 per cent, pushing up annual spending by around £260. However this is just an average effect. Some households would experience more significant price rises; 3.2 million households would see

price rises of £500 or more.

There is evidence that the impact on the cost of living will also differ depending on where a household is in the income distribution or where they are in the country. The negative impact on households near the bottom of the income distribution (in the bottom 20 per cent) will be a third greater than for those near the top (in the top 20 per cent). The impact on households on average in Northern Ireland will also be a third greater than for those in London.

Clearly reverting to MFN tariffs with the EU is by no means the only possible outcome from a “no-deal” Brexit. If we leave the EU without a free trade agreement some have argued that the UK should unilaterally reduce all tariffs to zero. Our analysis indicates that should the country do this the benefits to consumers would be low. Across those goods affected by the tariff cuts prices would fall by just 1 per cent. The evidence is that – unlike a rise in prices caused by reverting to MFN tariffs with the EU – zero tariffs would have a relatively even impact across the income distribution. Although households right at the bottom would benefit the most, those in the middle 20 per cent of the distribution would be no better off than those at the top.

Furthermore unilateral elimination of tariffs would not only give up the UK’s best leverage in future trade negotiations but would also have a significant impact on specific industries that would be exposed to greater competition immediately. Across sectors affected by tariff removal, the average tariff fall would be relatively small at 1.3 per cent. However in some of the consumer goods sectors we analyse – meat and fish processing, producers of other food products and clothing and footwear manufacturers – average tariffs would fall by between 4 and 8 per cent. These sectors employ around a quarter of a million people. Overall, 1.4 million people are employed across all the sectors that could be affected.

There is also a regional dimension to any elimination of tariffs. The evidence is that London and the South East would be least affected. Just 2 to 3 per cent of employees work in consumer goods sectors affected by tariff removal in parts of the capital. Compare this to many rural areas in the North and Midlands where as many as 13 per cent of employees could be affected. Our estimates suggest that around 200,000 people could be employed in affected sectors in parts of Leicestershire, Northamptonshire, Yorkshire and Lincolnshire.

There have been lots of broad analyses about the long-run impact that leaving the EU could have on the UK economy. We take a narrower approach. In particular we examine what we already know has happened to consumer prices and identify the specific impact of one very definite consequence of leaving the EU without a trade deal, the change in the UK's tariffs. In taking this approach we have chosen not to investigate some of the long-run effects – on things such as productivity, immigration, and broader trade flows – that exiting the EU will undoubtedly have. Doing so allows us to provide estimates that we can be confident are a baseline and a good indication of some of the initial impacts that could occur come April 2019 or 2021.

Section 1

Introduction

Since the vote to leave the EU discussions about the UK's trade policy have become a key political issue for the first time in 40 years. There has been much talk about what the UK's relationship with the EU will look like once we leave and the extent to which the country can forge new trading relationships. What's been missing has been much discussion about what this will mean for living standards.

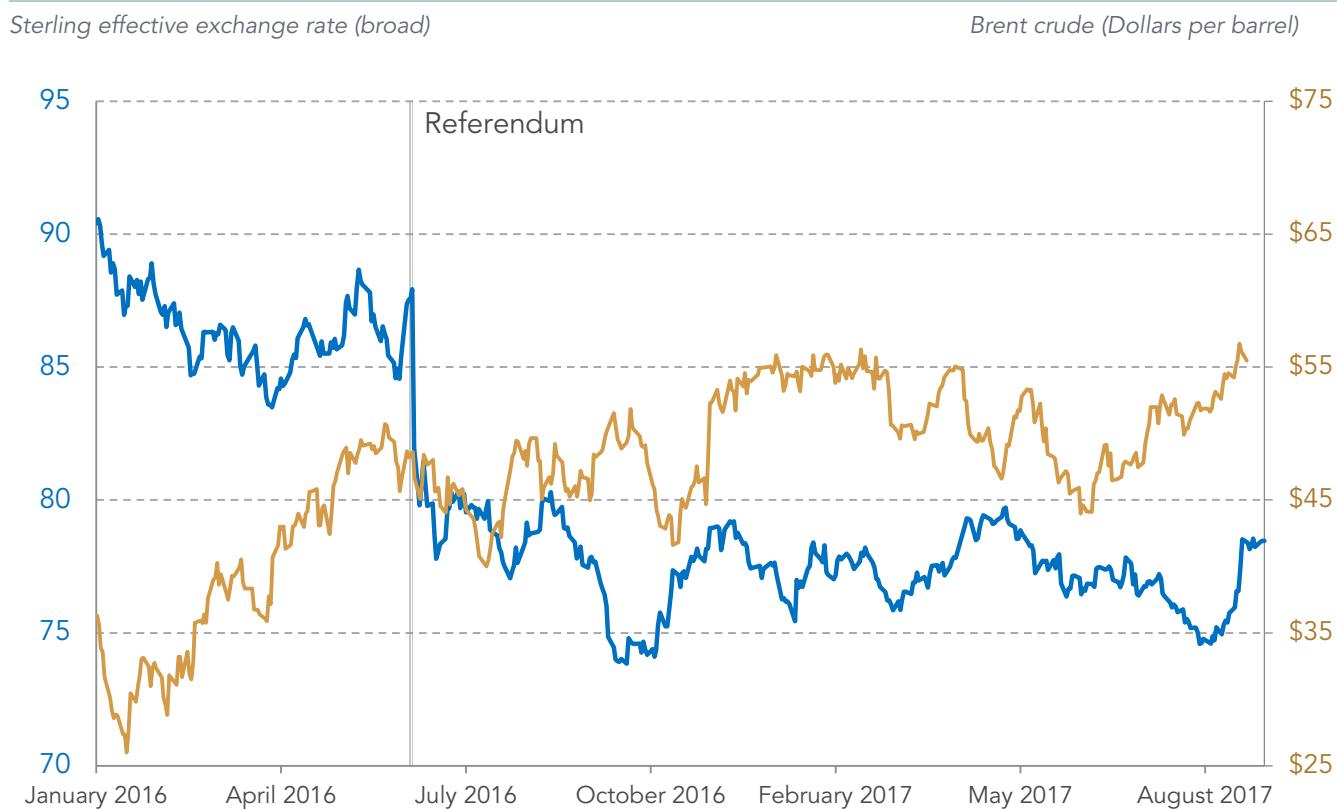
This paper fills this gap. It analyses in more detail than any other how changes in the UK's trade regime could affect prices and spending, and what impact this will have on the living standards of UK households. First we look at what the data tells us has happened to consumer prices since the referendum. We then model two scenarios in which the UK leaves the EU without the framework of a free trade deal agreed. Finally we take a look at what industries and places will be affected should the UK eliminate all its tariffs upon departing the EU.

Richer households were more affected by the rising oil price, while the devaluation of sterling has had a larger impact on poorer households

Before we estimate what impact a change in the UK's trade policy will have upon households once we leave the EU we first look at what's happened to prices since the referendum. It is well-known that following the vote the value of sterling dropped significantly. As of the end of September 2017 sterling was down 11 per cent – on a trade-weighted basis – from its value on 23rd June 2016. The recent devaluation has been a large one and the value of sterling impacts the price of goods, particularly those that largely come from imports, however the speed and extent to which a devaluation feeds through into domestic prices depends on a number of factors, not least what is driving the change in the exchange rate. Recent academic work suggests that an exogenous shock to a country's exchange rate bought about by a sudden revaluation of the value of that country's currency (resembling what happened following the Brexit vote) feeds through into domestic prices after around a year, and a 10 per cent decline increases consumer prices by around 1 per cent.^[1]

In the recent case the decline of sterling was certainly a major reason why inflation rose in late 2016 and the first half of 2017, however it was not the only cause. Preceding the decline in sterling was an increase in the oil price (see Figure 1). This had an impact on UK consumer prices (unrelated to the Brexit vote) before the impact of the devaluation was felt. The majority of the oil price rise occurred before the referendum and its impact on consumer prices was predominantly felt in late 2016 and the first quarter of 2017.

[1] Kristin Forbes, Ida Hjortsoe and Tsvetelina Nenova 'The shocks matter: improving our estimates of exchange rate pass-through', *External MPC Unit Discussion Paper 43*, November 2015.

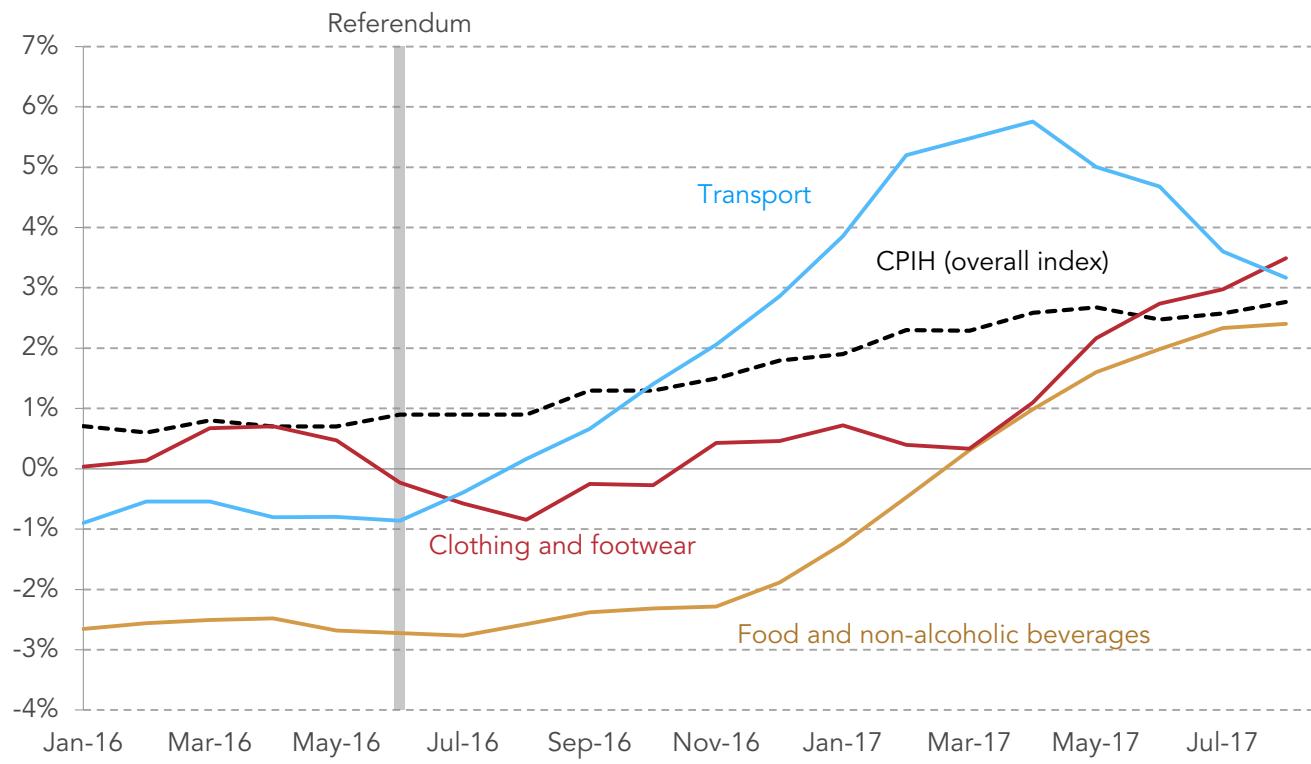
Figure 1: Oil price and exchange rate shocks

Source: Bank of England, Effective exchange rate and U.S Energy Information Administration, Spot price Brent Crude

The differing impact of the rise in the oil price and the devaluation of sterling is evident by looking at how the prices of different products have changed in the past year. Figure 2 shows that, predominantly as a consequence of a rise in the oil price, transport inflation increased in the months after the referendum. By contrast it took some months before sterling's devaluation began to be felt in rising food, drink and clothing prices, items for which imports make up a significant share. Furthermore since April 2017 transport inflation has fallen back, while the inflation of essentials has continued to rise.

Figure 2: Transport inflation preceded price rises for clothing, footwear, food and drink

Inflation rate (3 month rolling average)

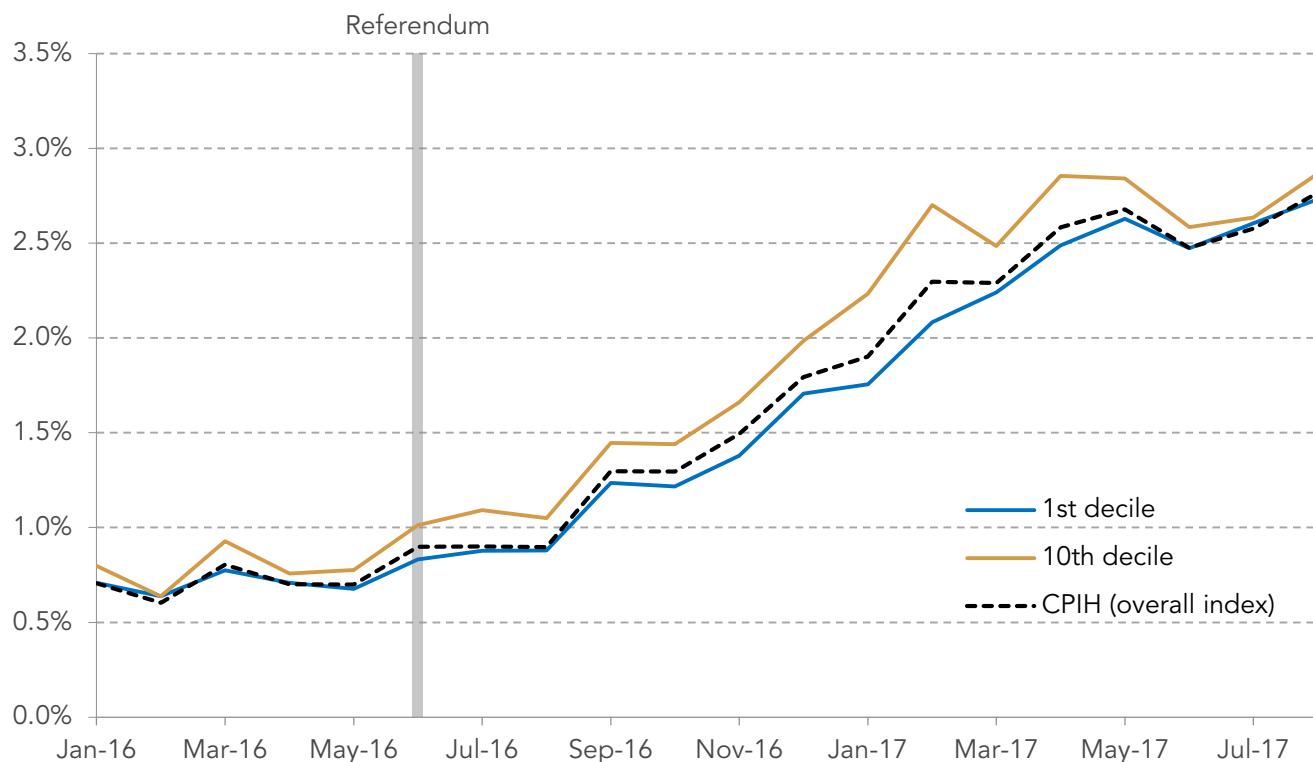


Source: ONS, Consumer Price Inflation

The rise in transport costs meant that richer households felt the impact of rising inflation first. Figure 3 shows that by February 2017, shortly before transport inflation peaked, households in the top 10 per cent of the income distribution were experiencing an inflation rate of 2.7 per cent, compared to 2.1 per cent for a household in the bottom 10 per cent of the distribution. Since then, however inflation for better off households has slowed, while it has continued to rise for households in the bottom of the income distribution. This is because essentials such as food, drink and clothing form a larger part of the budgets of less well-off households.

Figure 3: Richer households felt the effects of rising inflation first

Inflation rate



Source: RF analysis of ONS, Living Costs and Food Survey (LCFS) and ONS, Consumer Price Inflation

If the prices of such items continue to rise faster than the overall rate of inflation then lower-income households may soon feel the squeeze more, though at present households across the distribution are now experiencing inflation of around 2.7 to 2.9 per cent. The result therefore is that lower income households are feeling the pinch of the current *change* in inflation more than their better off counterparts, but the *level* of inflation is now at similar levels for all households. Despite this, due to differences in nominal income rises some households are still likely to be worse off than others (see Box 1).

i Box 1: Differences in nominal income growth are driving divergences in the growth of real income

Changes in the prices of goods and services are only one side of the living standards equation. People's real incomes are determined by the prices of the things they buy but also the nominal value of their income, when changes in the former outpace the latter people experience a squeeze in their real income. As is clear from Figure 3 inflation is currently running at just over 2.7 per cent. The extent to which people are feeling the pinch depends on their income. Working-age households who derive part of their income from benefits will find that inflation is currently having a big impact on their spending power because the majority of working-age benefits including JSA and housing benefit

have been frozen in nominal terms. Households that derive most of their income from earnings will be hit slightly less hard, average weekly earnings having risen by 2 per cent in the past year. Finally some people – particularly pensioners – have had the value of their part of their incomes protected because the state pension has been uprated in line with inflation. Of course within all three groups there will be some households that have experienced better (or worse) income growth than these figures suggest, but it is important to bear in mind that all the analysis in this report looks at prices and that a complete picture requires an understanding of how incomes are rising as well.

We have good data on what has happened to consumer prices since the referendum, and consequently, which households have been most affected. However current data on prices tell us very little about what may happen once we leave the European Union and the UK is able to make changes to the regime which governs our trade with the EU and the rest of the world. Such changes are likely to have a significant impact upon consumer prices. Furthermore, although we analyse them separately below, these changes cannot be divorced from changes in the exchange rate. A sudden change in tariffs will first be felt in a further revaluation in the value of sterling; as we have seen recently when the probability of the UK leaving the EU without a trade deal increases the value of the pound declines.

Below we will explain how – using data on production, trade, tariffs and household consumption – we can assess how changes to the UK's trade policies may impact domestic prices and how much households may need to spend to maintain their current levels of consumption. However, before we do that we will first examine how spending varies across UK households as this determines the extent to which households are affected.

Lower income households tend to spend more on essentials but less on transport

Each year the Office for National Statistics (ONS) carries out a survey of around 6,000 households to understand spending patterns and the cost of living. The Living Costs and Food Survey (LCFS) provides detailed information on weekly spending across over 400 goods and services coupled with a range of demographic and economic indicators. Once we have estimated how tariff changes feed through into price changes for particular goods we can use this information to see how household spending will be affected.^[2] In doing this we make the assumption that all households are affected by the same price changes, that is if the price of men's shoes rise by 3.2 per cent (our estimate in Section 5 below) we assume that all households that buy men's shoes are affected to the same extent. In reality some households will buy imported shoes, while others will buy shoes produced in the UK; however, without such detailed information on household spending we have to make this assumption.

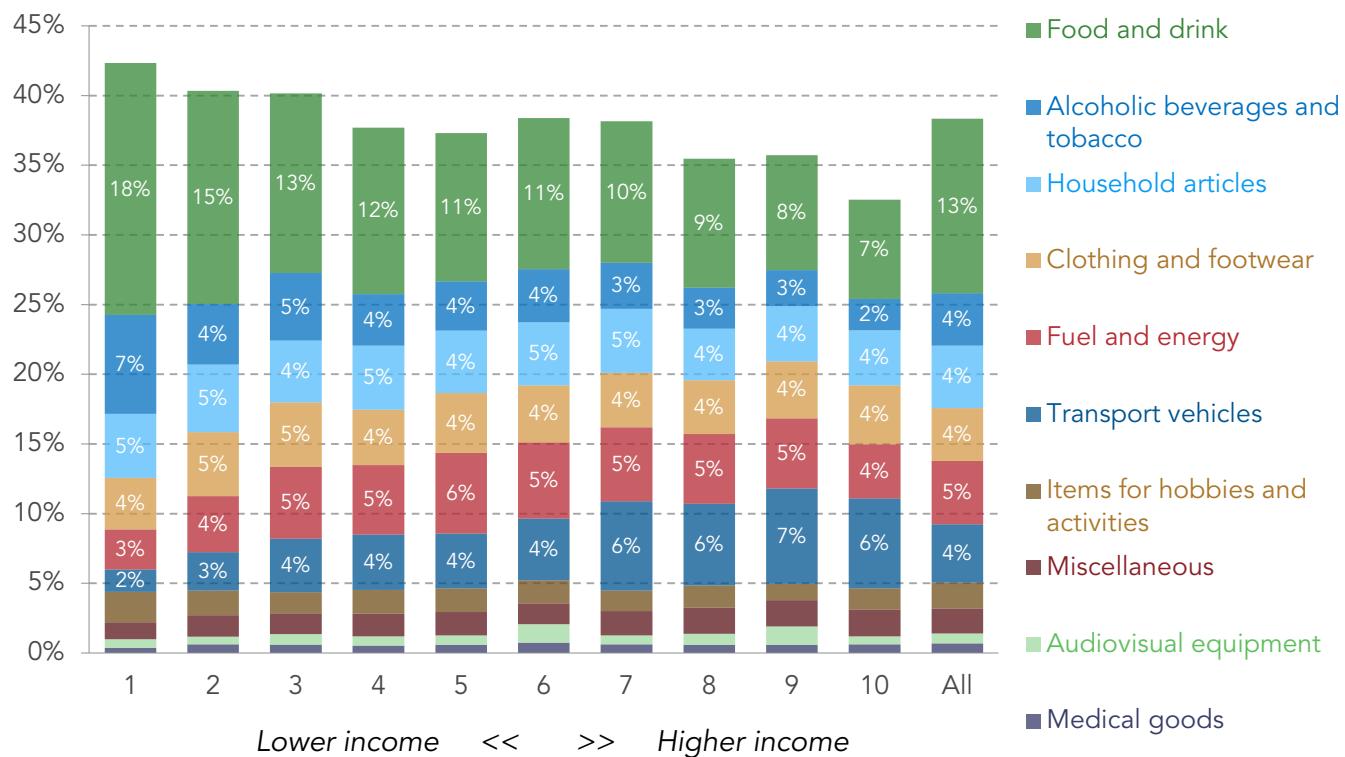
What households consume determines how they will be affected by price changes. The evidence suggests that spending patterns differ by households and across regions. Figure 4 looks at the goods for which we are able to estimate the impact of tariff changes and shows how consumption varies across the income distribution. For households in the first decile on the income distribution (the poorest 10 per cent of households on the left of the figure) 18 per cent of their weekly spending goes on food and drink, by contrast the 10 per cent of households at the top of the income distribution spend just 7 per cent on such essentials. Higher income households spend more on transport than lower income households and those in the middle – in particular the fifth decile – spend the most (proportionally) on fuel and energy.

It is also important to note that the items below constitute 38 per cent of weekly spending for the typical household. As we will come on to explain households spend the rest on services or the goods for which we are unable to derive tariff driven price changes for. Insofar as tariff changes have an impact on services or trade is impacted by non-tariff barriers (NTBs) our estimates will underestimate the impact of changes in the UK's trading relationships.

[2] We use the 2014 LCFS so as to be consistent with the production, consumption and international trade data. The 2015-16 LCFS was released in July 2017 and due to consumption patterns remaining pretty constant year-to-year our use of the 2014 data is unlikely to have a significant impact on our results.

Figure 4: Lower income households spend more on essentials than their richer counterparts

Spending on products affected by tariff changes as a share of total spending



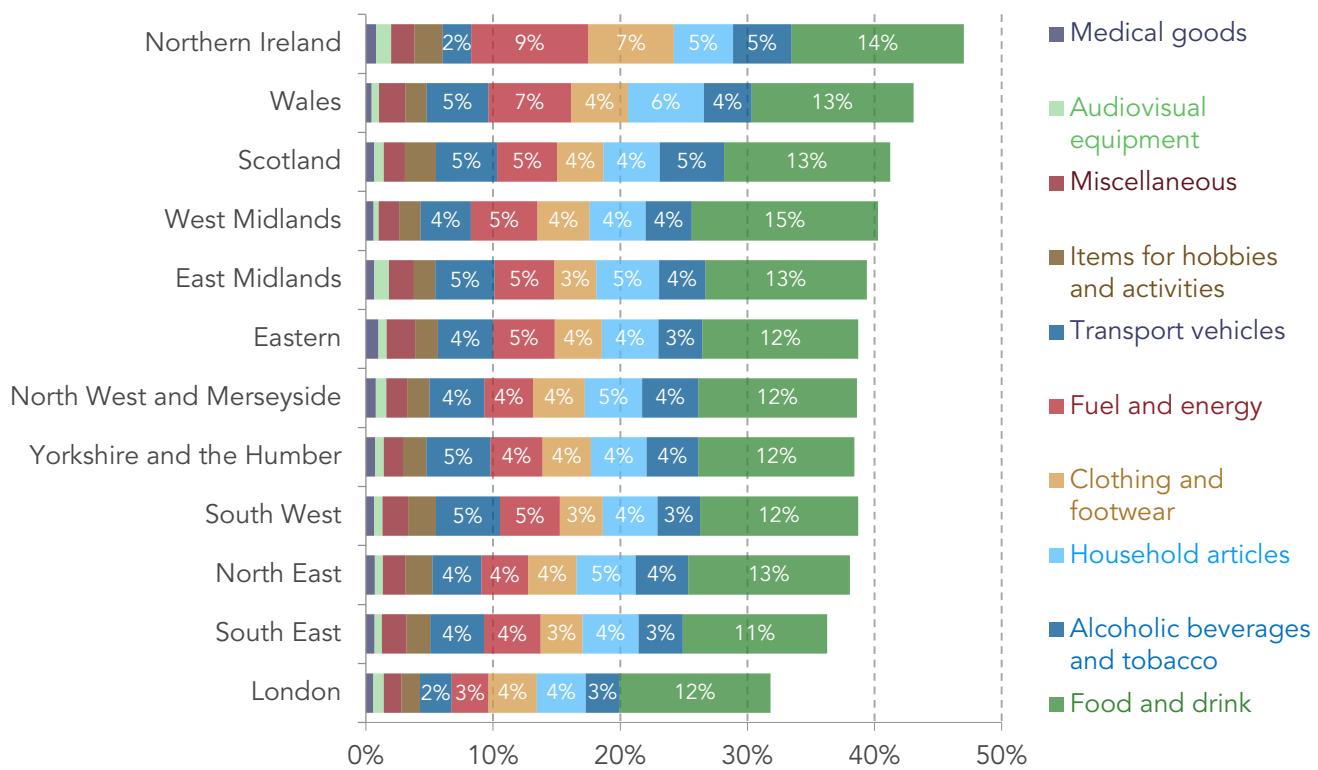
Notes: 'Household articles' refers to spending on items such as carpets, furniture, kitchenware, etc.

Source: RF analysis of ONS LCFS 2014

Below we carry out a similar exercise but looking at different regions of the UK. Figure 5 shows that – on the face of it – household spending on the items affected by tariff changes varies more across regions and nations of the UK than across the income distribution. Spending on these items varies from 32 to 47 per cent across the country compared to 32 to 42 per cent across the income distribution. However, this difference is driven by London, Northern Ireland and, to a lesser extent, Wales. If London, Wales and Northern Ireland are excluded then spending varies by just 3 percentage points.

Figure 5: Households in Northern Ireland and Wales spend significantly more on fuel and energy than in the rest of the UK

Spending on products affected by tariff changes as a share of total spending



Notes: 'Household articles' refers to spending on items such as carpets, furniture, kitchenware, etc.

Source: RF analysis of ONS LCFS 2014

What is also apparent is that differences in spending across nations and regions is driven by differences in spending on food and drink, but also by far higher spending on fuel and energy in Northern Ireland and Wales, and lower spending on fuel and energy, and transport vehicles (not necessarily transport services) in London. The fact that the items driving differences in spending across regions and nations is different to those driving differences across the income distribution is important. Some items, such as food, drink, clothing, and transport vehicles are more affected by tariffs than others, such as fuel and energy. To the extent that spending on these items differs across the country or across the income distribution, this will determine how different households are impacted by any changes in the UK's trade regime. Below we will quantify the possible impacts of tariff changes on household spending and living standards, but before that we examine how different types of post-Brexit trading regimes will impact consumer prices.

Section 2

Modelling the impact of a change in the UK's trade policy

Having looked at what has happened to consumer prices since the referendum, and how household spending patterns have determined who has been most affected, we now turn to the future. Estimating how changes in trade policy – in this case changes in tariff rates – feed through into domestic prices is a complex task. By using data on production, trade, tariffs and household consumption we are able to estimate how tariff changes feed through into domestic prices. Below we outline the approach we use to do this, in the next section we present our results.

Although the government wants a free trade deal with the UK, this is not yet assured

Whether we realise it or not, a lot of what we buy in the UK comes from imports. Ranging from exotic fruits, clothing and footwear, mobile phones through to foreign cars, international trade can bring us the benefits of lower prices and a wider variety of goods to consume.

A lot of what we import originates from the EU. In 2016 trade with the EU accounted for 55 per cent of UK imports of goods – or 59 per cent of UK imports of goods less oil and erratics.^[3] This volume of trade between the UK and the EU has important implications in the context of Brexit. As the UK leaves the EU – and is no longer a member of the European Single Market and the European Customs Union – the UK's trading relationship with the EU will change. Although the government is adamant that the costs to businesses will be minimised when it comes specifically to trade with the EU, arguably anything other than a continuation of the *status quo* will increase trade costs and consumer prices.

Tariffs are one potential component of the costs of trading. At present, all trade between the UK and the EU is carried out with zero tariffs and with very low non-tariff barriers courtesy of the Single Market. The UK Government wants to negotiate a new free trade agreement with the EU that will keep tariffs at zero, and has stated that its goal is the ‘freest and most frictionless trade possible in goods between the UK and the EU’.^[4] At present the government hopes such a deal will come into effect following a transition period after we leave the EU in April 2019.

However, this outcome is not assured. Trade talks with the EU have not yet begun, and the EU’s position remains that they will not begin until sufficient progress has been made on other issues such as EU citizen’s rights, the ‘divorce’ bill and the Irish border. The government has made it clear that it doesn’t want to exit the European Union, the Single Market and the Customs Union, without the framework of a free trade deal agreed, however there is planning underway for this eventuality.^[5] In the Customs Bill released on 9 October the government stated that the bill “will

[3] Oil and other “erratic” commodities can make a large contribution to trade in goods, but often mask the underlying trend in the export or import values due to their volatility. The “erratics” series includes ships, aircraft, precious stones, silver and non-monetary gold. For details, see: <https://www.ons.gov.uk/economy/nationalaccounts/balanceofpayments/bulletins/uktrade/nov2016>.

[4] HM Government, *Future customs arrangements: a future partnership paper*, August 2017

[5] BBC, “Brexit: UK to wait until ‘last moment’ to spend on ‘no deal’ plan”, 11 October 2017

give the government the ability to operate a standalone customs regime and ensure that VAT and excise legislation operates effectively, if the UK were to leave the EU without a negotiated settlement.” The government is clear that this is not the “preferred outcome” but is clear that it is “essential that the UK is prepared for all possible outcomes”. The government goes on to say that if such an outcome were to occur “the UK would apply the same customs duty to every country with which it does not have a trade deal or otherwise provide preferential access to the UK market, such as schemes for developing countries”.^[6] This is one of the “no-deal” scenarios we model below.

A wide range of potential responses to a no-deal scenario have been proposed by those advocating such an outcome,^[7] ranging from joining other free trade agreements to reducing all tariffs to zero.^[8] This would allow importers to bring EU goods into the UK with no tariffs and would also allow goods from the rest of the world to also be imported tariff-free. However, other countries do not need to reciprocate and so we explore a unilateral elimination of tariffs. In effect the imports from other countries would enter the UK tariff-free but UK goods would face tariffs entering both the EU and, as they do now, other countries.

The unilateral removal of tariffs has drawbacks in negotiating terms, if the UK reduces its tariffs to zero it will have little leverage to get other countries (many of whom still impose very high tariffs) to reduce their tariffs or non-tariff barriers to trade in the future. It will also have a dislocating effect on UK business (which we look at below). However, focusing just on the economic impact on consumers, this proposal has been widely scrutinised,^[9] and the benefits it produces have been shown to be based on unrealistic assumptions.^[10] Using more realistic assumptions we look at what impact this unilateral elimination of tariffs would have upon the prices of UK goods. We also explore some of the wider ramifications of this for firms and regions.

We explore what will happen if the UK reverts to MFN tariffs, or reduces all tariffs to zero

In this report, therefore, we explore the impact on UK consumer prices of two contrasting Brexit scenarios that do not depend on reaching an agreement with the EU. Both recognise that in the absence of a trade agreement, the UK will be obliged by WTO rules to levy the same tariffs on imports from the EU as it levies on goods from other countries.

1. The first looks at the impact of reverting to most-favoured-nation (MFN) tariffs with the EU, in which the UK raises its tariff on EU goods to the level that the UK is obliged to levy on goods from other countries.^[11]
2. The second scenario looks at the impact if the UK reduced its tariffs on other countries to the current level that it applies to EU goods – zero. This would be a unilateral trade

[6] HM Treasury, *Customs Bill: legislating for the UK's future customs, VAT and excise regimes*, October 2017

[7] C Cook, ‘Brexit: Liam Fox, transition and ‘Project After’’, BBC News, 9 October 2017

[8] P Minford & E Miller, *What shall we do if the EU will not play ball? UK WTO Trade Strategy in a Non-Cooperative Continent*, February 2017

[9] T Sampson, S Dhingra, G Ottaviano, J V Reenen, *The ‘Britain Alone’ scenario: how Economists for Brexit defy the laws of gravity*, 30 May 2016

[10] L A Winters, *Will eliminating UK tariffs boost UK GDP by 4 percent? Even ‘Economists for Free Trade’ don’t believe it!*, UK Trade Policy Observatory, 19 April 2017

[11] We also model this scenario in the forthcoming National Institute Economic Review paper, analysing its impact on different households, according to their economic status (employed full-time, employed part-time, unemployed), household composition (single, single parents, couple, couple with children) and age (working-age, pensioned). For more detail, see: S Clarke, I Serwicka & L A Winters, “Will Brexit raise the cost of Living”, *National Institute Economic Review* 242 (1): R1-R14, November 2017 (forthcoming).

liberalisation which would apply irrespective of whether or not other countries reciprocated and would eliminate tariffs on all UK imports.^[12]

The multi-market partial equilibrium model used for simulating the effects of Brexit features five suppliers to the UK market. Alongside the UK, these are the remainder of the EU (EU27), the rest of High-Income countries (RHIC – comprising of Canada, Iceland, Israel, Japan, Norway, South Korea, Switzerland and the United States), Emerging Markets (EM – China, India, Indonesia, Mexico and Turkey), and a residual Rest of the World (RoW). The composition of the groups RHIC and EM is limited by data availability, because the full multi-market model requires complete production, trade and tariff data by sector.

Other than the price effect, the model is also set to simulate changes in output, demand and sales, and could simultaneously estimate these changes across a number of different markets. The present exercise, however, focuses just on the effect of the potential Brexit scenarios on consumer prices in the UK.^[13]

The model assumes that goods are differentiated by place of production, so that, for example, cars from the UK, Germany, Japan and Mexico are all somewhat different and hence are imperfect substitutes for each other. Demand for a product (such as cars) is allocated across the varieties from different countries of origin according to consumers' preferences and the relative prices of the varieties; we assume that consumers are quite sensitive to changes in prices, and hence in tariffs. Because preferences vary across individuals, UK consumers taken together like a mix of different varieties of a product. This is the so-called 'love of variety' assumption that is often adopted in trade policy analyses. By substituting away from varieties that have become more expensive as a result of tariff increases, consumers are able to avoid some of the effect of those tariff increases on their cost of living. On the supply side, the model assumes that each variety of each product is supplied by a perfectly competitive industry that is subject to (mildly) rising marginal costs.

In modelling the effects of trade policy changes, a modeller faces a choice of whether to use a partial equilibrium model or a general equilibrium one.^[14] An appealing feature of the partial equilibrium model is its ability to analyse the effect of trade policy changes at a very fine level of sectoral disaggregation, something that the general equilibrium model is not suited to handle. This means that if we are to exploit the fine level of detail of household consumption in the LCFS dataset and the even finer detail of the tariff schedule, the consumption effects of Brexit are best analysed using the partial equilibrium modelling framework.

There is a trade-off, however. The partial equilibrium model does not account for inter-market linkages; as such, it simulates the first round effect of trade policy changes, but it does not capture the long term effects. We also assume that in response to tariff changes UK firms do not change their prices.

We model the effects of 'MFN Brexit' and 'Zero Tariff Brexit' on consumer prices for 65 groups covering manufactured goods and 18 groups covering fresh foodstuffs.^[15] The simulation results for these 83 groups feed into calculation of Brexit-induced price changes for 218 categories of final consumption goods as found in the Living Costs and Food Survey (LCFS).^[16]

[12] This unilateral liberalisation has been advocated by Minford and Miller (2017). Singapore, for example has adopted this policy.

[13] In running the simulations, we assume that the EU27 applies the MFN tariffs on UK imports after Brexit. The price effect of Brexit on the EU27, however, is not the focus of this report and is not discussed here.

[14] A Practical Guide to Trade Policy Analysis, available at: https://www.wto.org/english/res_e/publications_e/wto_unctad12_e.pdf.

[15] Manufacturing is covered by 137 ISIC4 groups, and reliable production data exists for 122 ISIC4 groups. Of these 65 groups map directly into the personal consumption basket and 57 groups encompass solely intermediate inputs and capital goods used by industry – e.g. nuclear reactors or railway locomotives. This paper ignores the latter group.

[16] The process of disaggregating prices effects from ISIC4 groups to COI+ categories used in the LCFS is discussed in S Clarke, I Serwica & L A Winters, "Will Brexit raise the cost of Living", *National Institute Economic Review* 242 (1), November 2017 (forthcoming).

Under both scenarios, the base tariffs used in the modelling are the effectively applied (AHS) rates, which are defined as the lowest available tariff for any particular trade. If a preferential tariff exists (e.g. under the Generalized System of Preferences^[17] including the Everything But Arms scheme for the least-developed countries), it is used as the AHS tariff. Otherwise, the MFN tariff is used.

[17] For detail, see: Generalized System of Preferences, Handbook on the Scheme of the European Union. Available at: http://unctad.org/en/PublicationsLibrary/itcdtsbmisc25rev4_en.pdf.

Section 3

The impact on prices

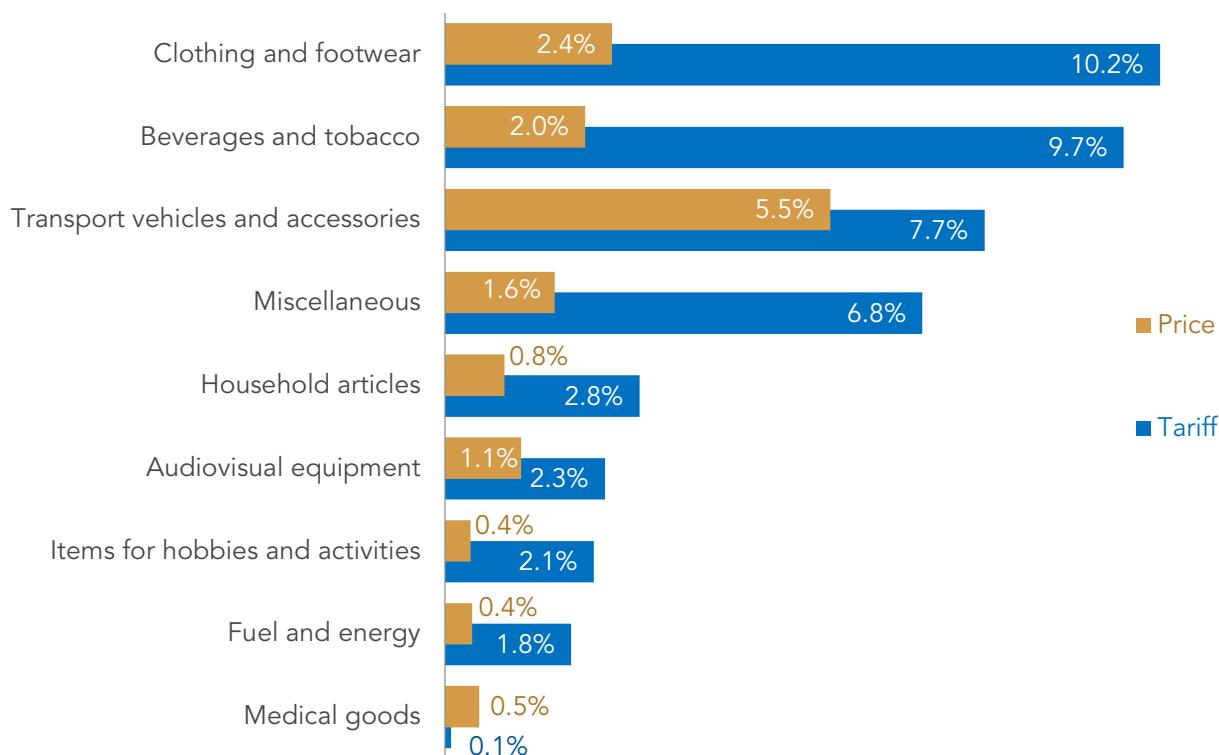
In this section we will outline how tariffs and prices will change should the UK leave the EU without the framework of a free trade deal agreed. We first explore what the impact will be should the UK revert to MFN tariffs with the EU, we then turn to the effect of eliminating all tariffs. In this analysis we look at how changes in tariffs feed through into the prices of consumer goods.

A ‘no-deal’ Brexit will have a significant impact on consumer spending

Starting with the impact of reverting to MFN tariffs with the EU Figure 6 shows how tariffs and prices will be affected for a range of goods. In some cases, particularly transport vehicles, prices will rise significantly. However in other cases – clothing and footwear and beverages and tobacco – although the tariff change will be greater, the price impact will be smaller.

Figure 6: Reverting to MFN tariffs with the EU will significantly raise the price of some goods

Change due to reverting to MFN tariffs with the EU - goods



Notes: See Annex and online for full modelling details

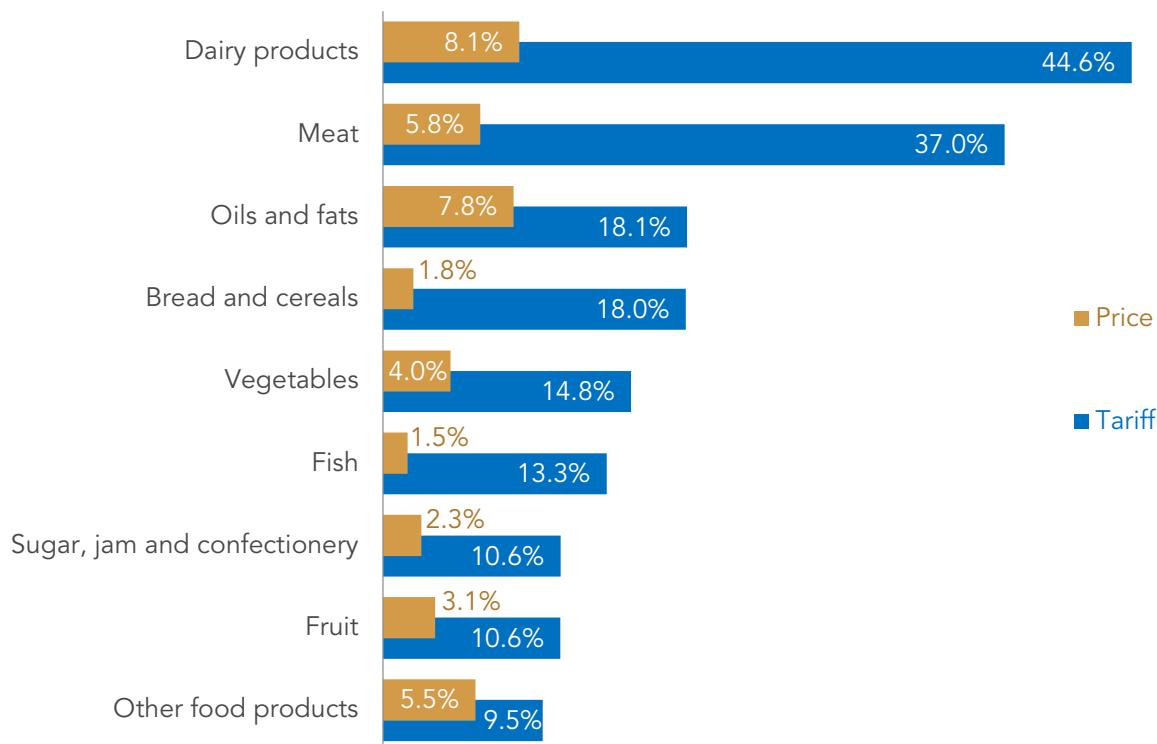
Source: Calculations by I Serwicka & L A Winters

A number of factors determine how tariffs feed through into price changes. In the case of reverting to MFN tariffs with the EU it is the share of UK consumption supplied by imports from the EU that matters. Where a large part of UK consumption is supplied by imports and a large proportion of these are from the EU – as in the case of transport vehicles – the price impact is large. Yet in other cases, such as clothing, where imports account for a large share (around 98 per cent) of UK consumption but only around a third of this comes from the EU the price effect is more muted. The opposite is the case for beverages and tobacco, only 40 per cent of domestic consumption is made up of imports, but three-quarters of this comes from the EU.

Such factors also explain the extent to which tariff rises feed through into price changes in the case of food. Food products are likely to see a more dramatic increase in tariffs compared to manufacturing and other non-food items if the UK reverts to MFN tariffs with the EU. In some cases (see Figure 7), such as meat and dairy products, tariffs will rise by over 30 per cent. However the impact on the prices will not be as large. The largest price effect is for dairy products (8.1 per cent), which is the result of such products having the largest average tariff increase and a large share (98 per cent) of UK imports coming from the EU. Across all food and goods reverting to MFN tariffs with the EU is expected to raise prices by 2.7 per cent on average.

Figure 7: Tariff rises will be larger for food stuffs but price changes will be smaller

Change due to reverting to MFN tariffs with the EU - food



Notes: See Annex and online for full modelling details

Source: Calculations by I Serwicka & L A Winters

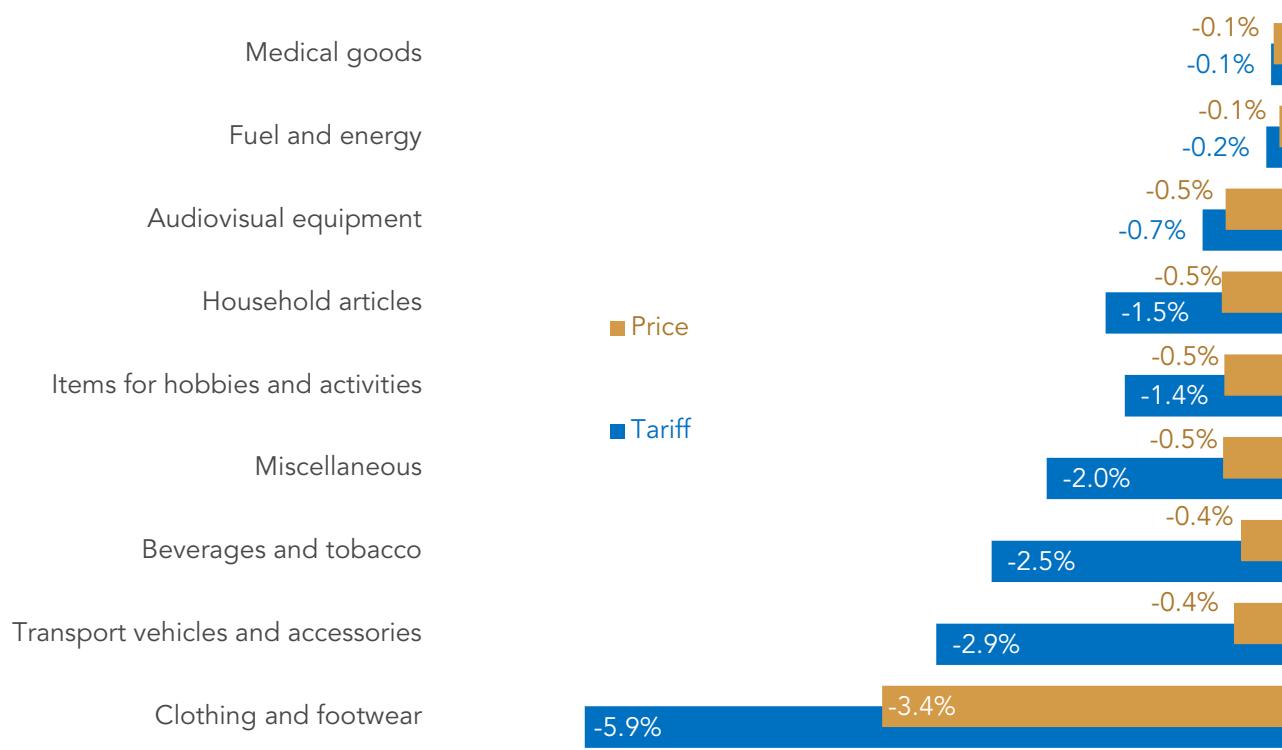
Eliminating tariffs will not significantly reduce consumer prices

We now turn to what could be the impact if the UK decided to reduce all its tariffs to zero upon leaving the EU, irrespective of whether or not other countries chose to reciprocate. What is immediately apparent is that the tariff reductions on goods will be smaller than the tariff rises under the 'MFN' Brexit scenario detailed above.

Eliminating tariffs will reduce prices, while reverting to MFN tariffs with the EU will raise prices. The effects move in the opposite direction but the impact of eliminating tariffs is smaller than if the UK reverted to MFN tariffs with the EU. Eliminating tariffs means that they remain unchanged (at zero per cent) between the UK and the EU and because a large share of UK imports comes from the EU this dampens the magnitude of the price effect. The one exception is clothing and footwear. In this case reducing tariffs to zero will involve a mean tariff reduction of 5.9 per cent and a fall in prices of 3.4 per cent.

Figure 8: Reducing UK tariffs to zero will have far smaller tariff and price effects

Change due to reducing all UK tariffs to zero - goods



Notes: See Annex and online for full modelling details

Source: Calculations by I Serwicka & L A Winters

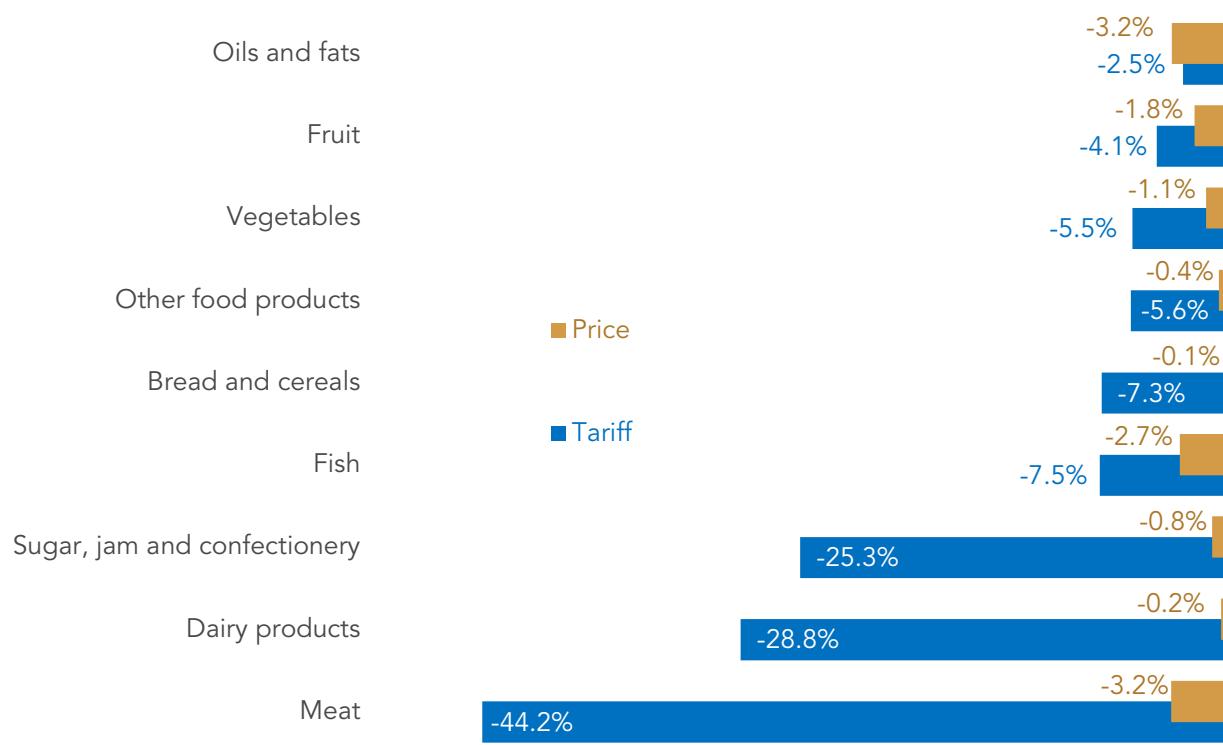
Finally we can assess the impact on food prices of reducing all tariffs to zero. Reducing all tariffs to zero involves some large tariff reductions (meat, dairy and sugar and jam stand out). At first sight, it may seem counterintuitive that there are larger tariff changes when reducing tariffs to zero than when reverting to MFN tariffs; after all, the latter increases the tariff on EU imports from 0 per cent to the MFN rate, whereas the former changes tariffs from, at most, the MFN rate to 0 per cent. However, in calculating tariffs for final consumption goods, different tariff lines are

weighted together by the value of trade with the relevant partner. Since trade patterns vary, so too can the reported average tariffs.

Despite some large tariff falls the impact on prices is far smaller. In the vast majority of cases the price falls are less than 1 per cent. The exceptions are mostly food products. Prices would fall by more than 1 per cent for oils and fats, fruit, vegetables, fish and meat. Across all food and goods categories reducing all tariffs to zero would lower prices by 1 per cent on average.

Figure 9: The price effects of reducing all tariffs to zero are smaller than reverting to MFN tariffs with the EU

Change due to reducing all UK tariffs to zero - food



Notes: See Annex and online for full modelling details

Source: Calculations by I Serwicka & L A Winters

Our estimates of the potential benefits to consumers are much lower than those suggested by Minford and Miller.^[18] This is because we focus on unilateral tariff removal only, while they also assume that 'the UK eliminates its non-tariff barriers (NTBs) with all countries'. Minford and Miller also assume that goods are homogeneous, that the UK purchases each of their four goods aggregates only from the lowest cost supplier and that UK domestic prices fall to the level charged by that supplier. While useful as a didactical device, such homogeneity is not plausible in practice, as witnessed, for example, by the fact that countries persistently import the same product from several sources. Products made in different countries are different in terms of characteristics and quality, so that there is imperfect substitutability between the varieties sold by different suppliers, as we assume. Moreover, in some cases such as certain foods, switching to non-EU suppliers may entail changes in standards and regulations which may not be welcome and could result in a loss of access to EU markets.

[18] P Minford & E Miller, *What shall we do if the EU will not play ball? UK WTO Trade Strategy in a Non-Cooperative Continent*, February 2017

Overall, we believe that our estimated impacts of reverting to MFN tariffs or reducing tariffs to zero provides a useful indication, even if we cannot consider the results to be precise point estimates of the effects we seek. Moreover, for several reasons (as outlined below) our estimates are somewhat optimistic.

We do not capture the price effect of Brexit for intermediate inputs used in UK production. For example, higher tariffs on imported components used in production of a Nissan Qashqai – ceteris paribus – will push the final price of a Qashqai up. Lower tariffs would push the price down although this could be offset by broader trading costs (such as testing and certification costs) once the UK leaves the Single Market and Customs Union.

We also assume that the UK is able to maintain the trade agreements it is party to as a member of the EU, which is unlikely in the event of failing to reach an agreement with the EU. We also do not take into account broader trade ‘frictions’ – such as testing and certification costs and costs of having goods checked at the border (in whatever way) - that are likely to arise once we leave the Customs Union and the Single Market.

There is also the possibility that if competition in the UK market is reduced once we leave the EU, or if the tariffs they face are reduced to zero, firms from other countries may choose to ease their prices up.^[19] We also do not estimate what the impact of leaving the Single Market and Customs Union will be on services (e.g. cost of driving lessons, package holidays or air fares). As services constitute around 60 per cent of total consumption for the average UK household it is important to take them into account, something we hope to do in future.

Moreover as this is a partial equilibrium model we do not estimate the effect of Brexit on production and incomes or consider non-trade aspects of Brexit such as changes in migration. As noted above we also do not consider how changes in the UK’s trade regime is also likely to bring about further changes in the value of sterling. Should the UK leave the EU without the framework of a trade deal in place then – whatever the country decides to do vis-a-vis its tariffs with the EU and the rest of the world – households will initially feel the impact in the cost of imports.

[19] Winters and Chang (2000), and Chang and Winters (2002) identified this effect in Spain and Mercosur.

Section 4

The impact on people and places

We have already discussed how the extent to which tariff changes feed through into consumer prices depends on the share of UK consumption accounted for by imports and the share of imports that come from the EU. The extent to which different individuals and households are affected by price changes is determined by the types and quantity of goods they consume.

This section uses data on the consumption patterns of households across the income distribution and in different parts of the UK to estimate how they are impacted by changing prices.

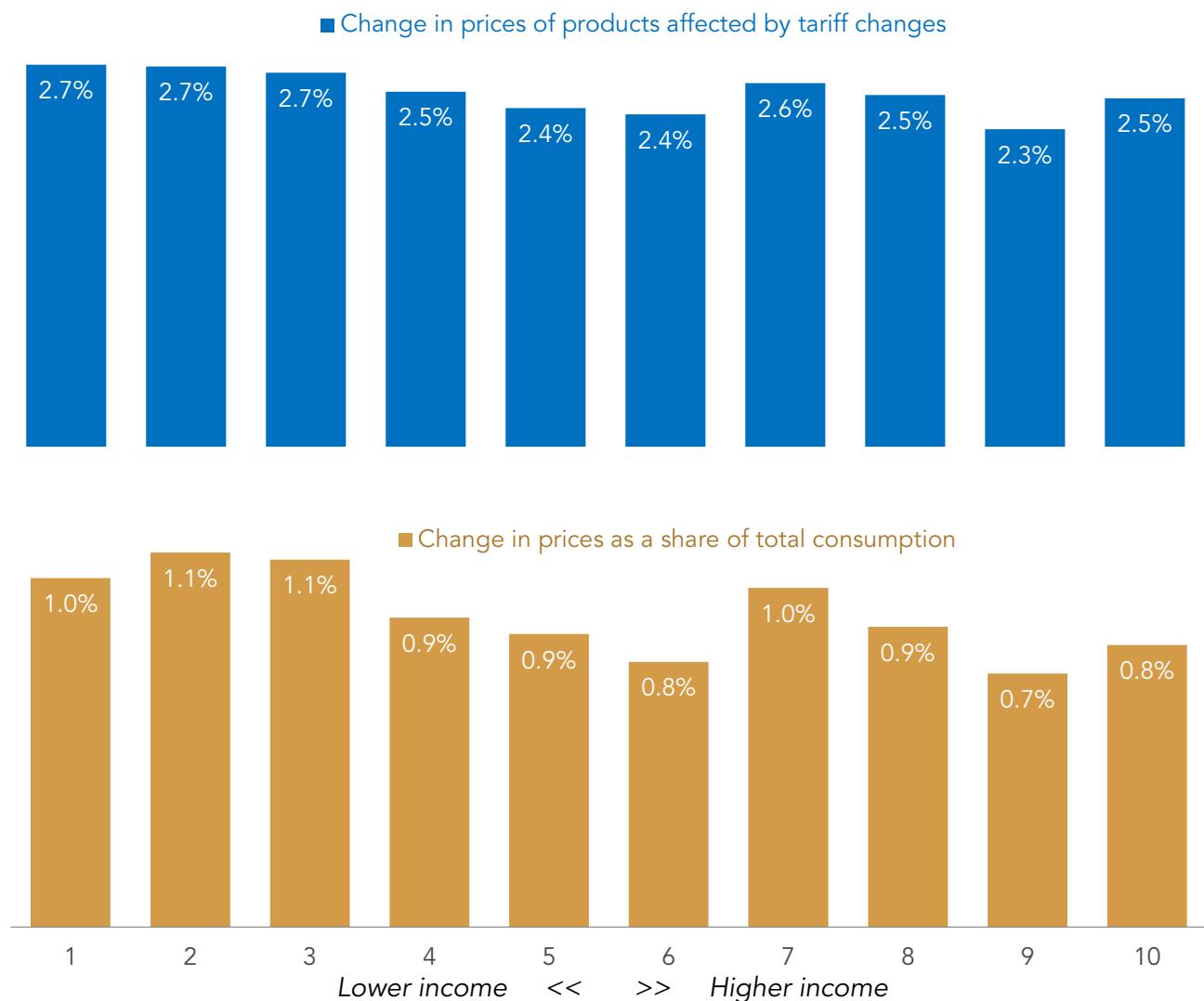
Poorer households will be more affected by a 'no-deal' Brexit

If the UK reverts to MFN tariffs with the EU the price of beef is projected to rise by 14 per cent and the price of lamb by 2 per cent. Consumers of beef will be more affected than consumers of lamb, and people who consume beef in greater quantities will be more affected. As with our analysis of the impact of the devaluation of sterling we also assume that all households are affected by same price changes. We do not know how much imported items each household consumes and so we assume that if a household consumes lamb it experiences the 2 per cent rise in the price of lamb, regardless of if the household just consumes domestic lamb.

Using price changes for 218 individual goods and data on the consumption patterns of different households, Figure 10 shows how much prices will rise for households across the income distribution if the UK reverts to MFN tariffs with the EU. Poorer households will be more affected than those higher up the income distribution. A household in the first decile of the distribution will see the prices of those good affected by tariff changes rise by 2.7 per cent, compared to 2.5 per cent for a household in the top decile. This represents 1 per cent and 0.8 per cent respectively as a proportion of their total spending and works out at around £200 per annum for the average household in the second decile of the income distribution and £260 for the average UK household.

Figure 10: Consumer prices will rise more for poorer households in the event of reverting to MFN tariffs with the EU

Change in consumer prices as a result of reverting to MFN tariffs with the EU



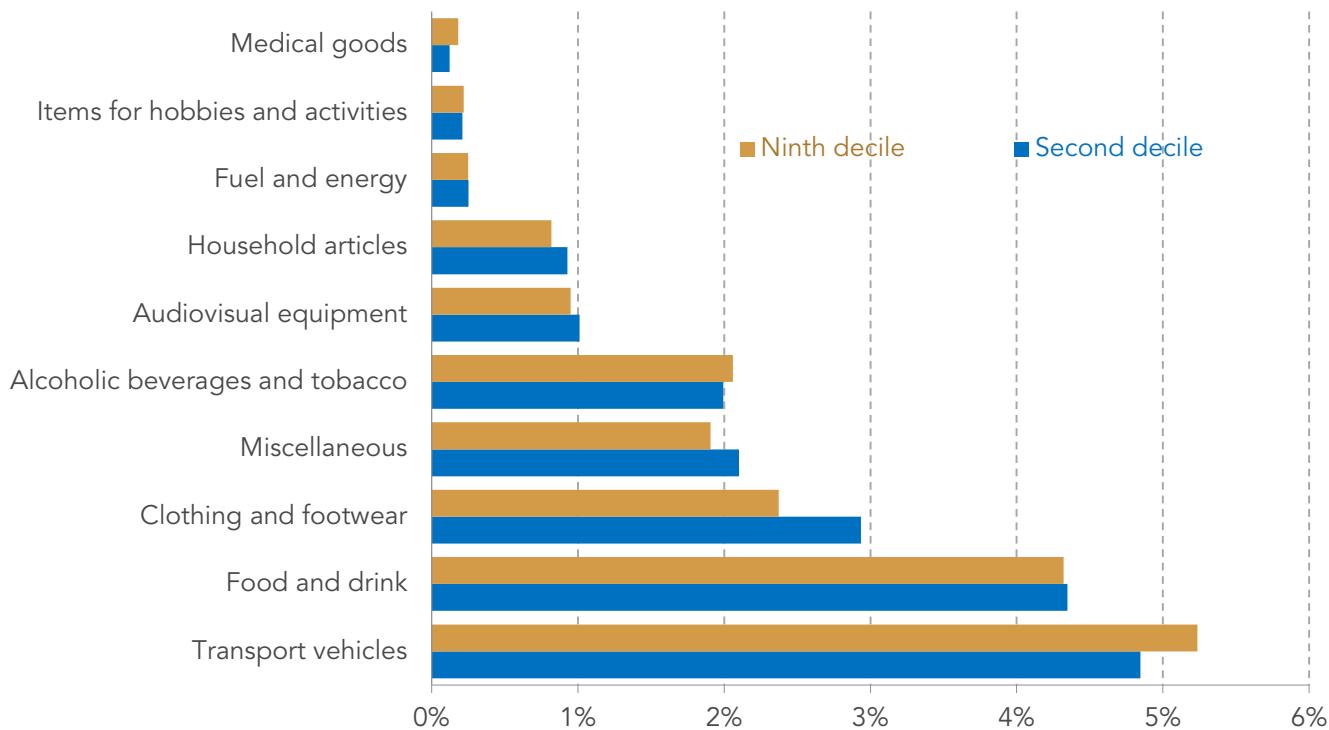
Notes: See Annex and online for full details of modelling

Source: Calculations by I Serwicka & L A Winters and RF analysis of ONS, Living Costs and Food Survey 2014 (LCFS)

What is driving these differences? Figure 11 shows how much the second and ninth deciles are affected by rising prices for a range of products. The main differences are for clothing and footwear and transport vehicles. Households higher up the income distribution spend proportionally more on transport vehicles than those lower down and so richer households are more affected by the increase in tariffs on these items. Interestingly households across the income distribution spend similar amounts on clothing and footwear but poorer households spend proportionally more on the types of clothing for which price changes are relatively high (such as undergarments) and footwear. Surprisingly, poorer households are only marginally more affected by rising tariffs on food and drink. This is because richer households tend to spend proportionally more on food such as beef, pork, and pate, all of which are affected by above-average tariff rises.

Figure 11: Rising clothing and footwear prices means that poorer households would fare worse if we revert to MFN tariffs with the EU

Change in prices per product group if the UK reverts to MFN tariffs with the EU



Notes: See Annex and online for full details of modelling

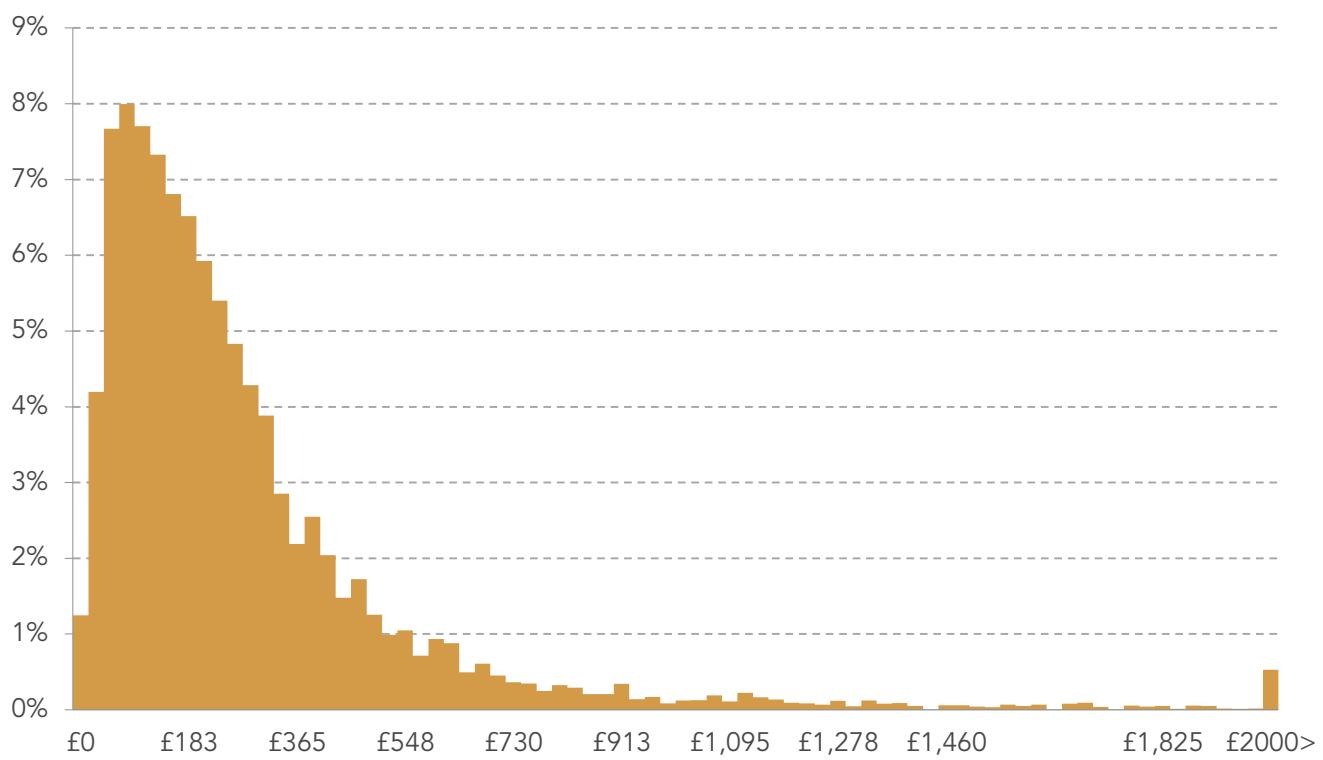
Source: Calculations by I Serwicka & L A Winters and RF analysis of ONS, *Living Costs and Food Survey 2014* (LCFS)

Differentiating the impact of price rises for households across the income distribution is important, but this does not give us a sense of the entire spread of price rises that may be experienced by households. Figure 12 looks at all households in the UK and plots how much each is affected by rising prices should the UK revert to MFN tariffs with the EU.

42 per cent of households experience price rises of between £25 and £150 and a further 27 per cent experience price rises between £180 and £290. However, there is a sizeable minority of around 3.2 million households who experience price rises of £500 or more. Some of these will be higher income households for whom an increase of £500 in how much they have to spend on goods will not have much of an impact on their living standards. However the typical UK family spent £19,770 on goods and services last year, a price rise of £500 would equate to a cut of 2.5 per cent in their annual spending.

Figure 12: A sizeable minority of households experience price rises above £500

Distribution of the increase in prices from reverting to MFN tariff with the EU

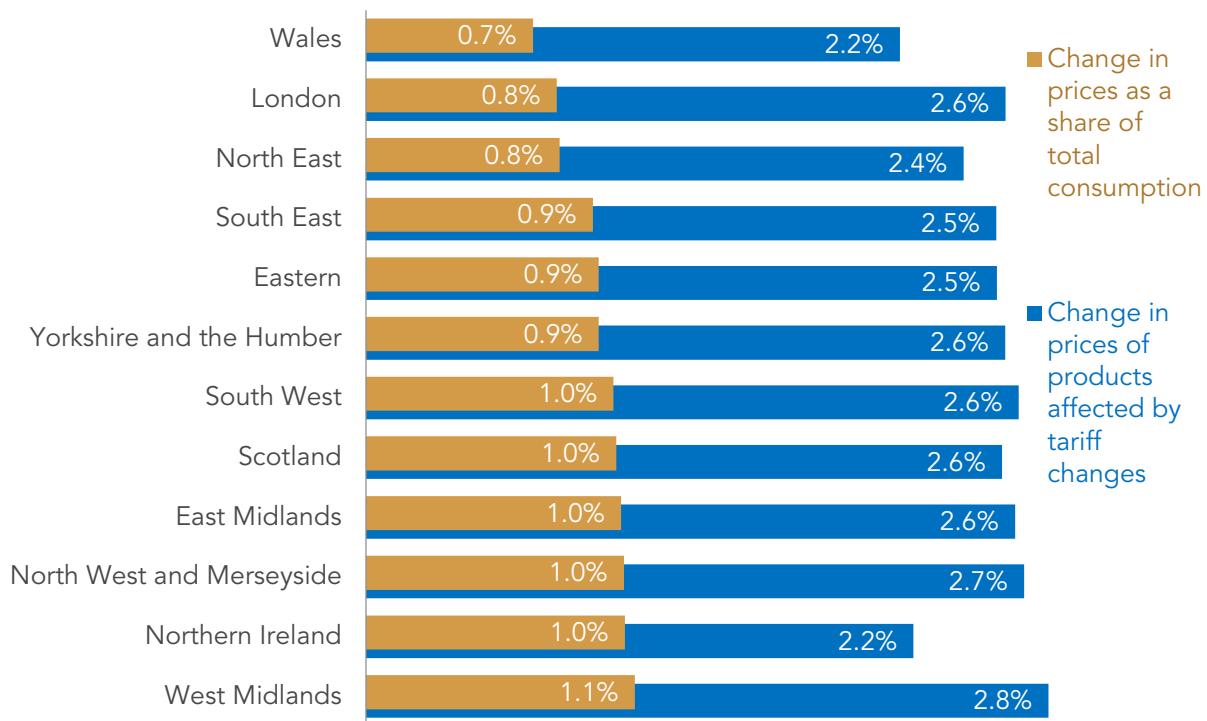
**Notes:** See Annex and online for full details of modelling**Source:** Calculations by I Serwicka & L A Winters and RF analysis of ONS, *Living Costs and Food Survey 2014* (LCFS)

Wales and London will be least affected by rising prices

In terms of regional impacts Wales and London are the least affected by rising prices, while prices rise the most for the West Midlands and Northern Ireland. Impacts vary for a range of reasons. The spending of households in London is not radically different from household spending in other parts of the UK, but the overall impact in the capital is proportionally lower because total consumption is higher. The same is true, but in the opposite sense, for Northern Ireland. The spending profile of households in Northern Ireland are similar to those in the rest of the UK (although energy prices are higher) but because total consumption is lower in Northern Ireland rising goods prices have a proportionally larger impact. Households in the West Midlands are particularly affected because of high household spending on food and drink and, to a lesser extent, transport vehicles. Households in Wales are least impacted because tariff rises have the smallest impact on their food, drink, clothing and particularly transport spending. In cash terms price rises cost the average household in Northern Ireland £270 per annum, while the cost for the average Welsh household is £190.

Figure 13: Northern Ireland and the West Midlands are most affected by a rise in tariffs

Increases in consumer prices as a result of reverting to MFN tariffs with the EU



Notes: See Annex and online for full details of modelling

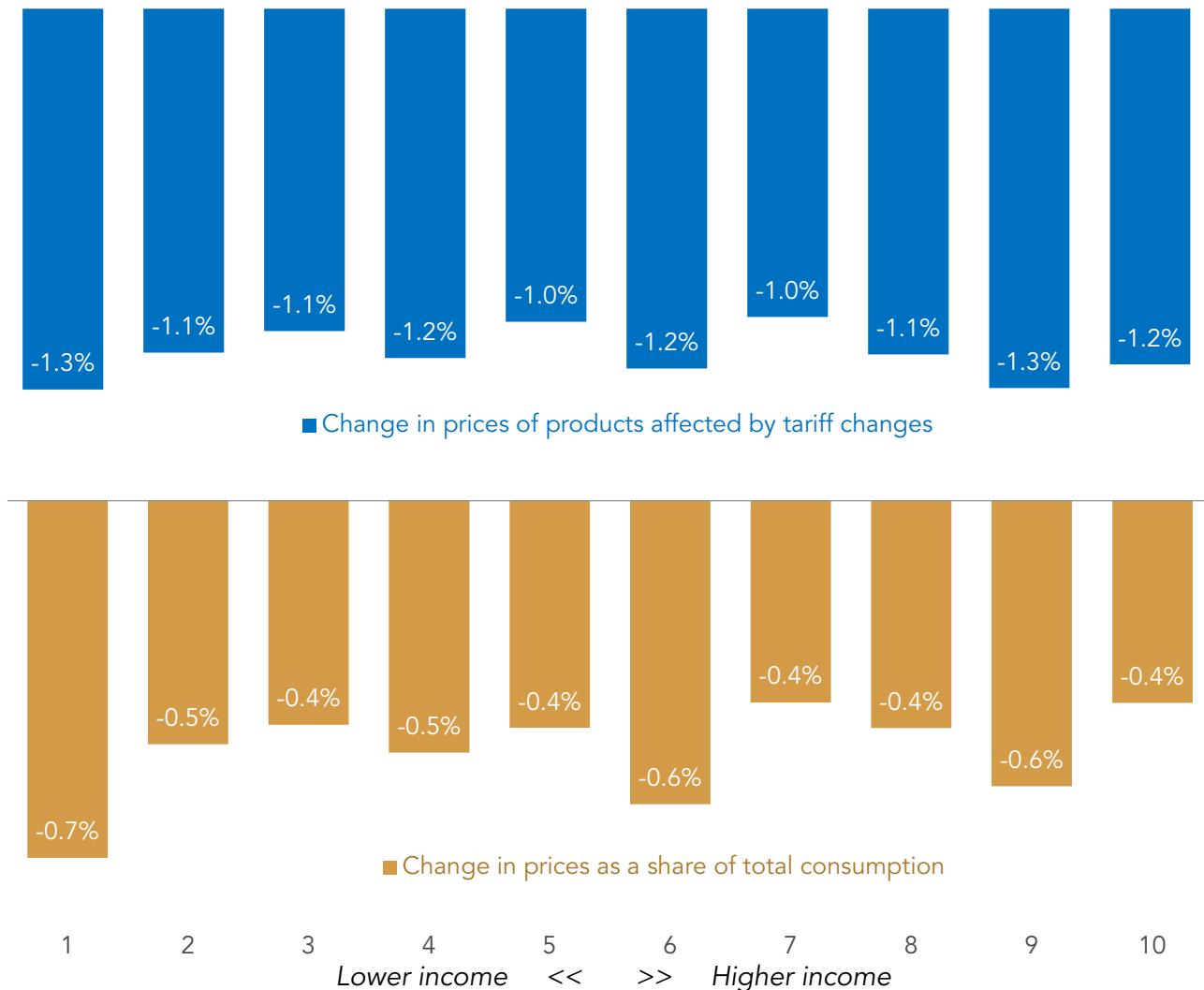
Source: Calculations by I Serwicka & L A Winters and RF analysis of ONS, *Living Costs and Food Survey 2014* (LCFS)

The benefits of reducing tariffs to zero are more evenly spread

We have seen what the impact will be if tariffs rise once the UK leaves the EU, but what about the impact if the UK lowers tariffs to zero? Figure 14 shows that, unlike the impact of rising tariffs, reducing all tariffs to zero would have a relatively even impact across the income distribution. Although households in the bottom 10 per cent of the distribution would benefit the most (as a share of their total consumption prices would fall by 0.7 per cent). Across the top half of the income distribution prices fall, on average, by 0.5 per cent, while across the bottom half of the income distribution the figure is also 0.5 per cent. Although the effect is in the opposite direction we can compare this to the impact of reverting to MFN tariffs with the EU. In this scenario prices rise by 0.8 per cent on average for households in the top half of the income distribution but by 1 per cent for households in the bottom half.

Figure 14: Reducing all tariffs to zero has a relatively even impact across the income distribution

Change in consumer prices as a result of the UK reducing all tariffs to zero)



Notes: See Annex and online for full details of modelling

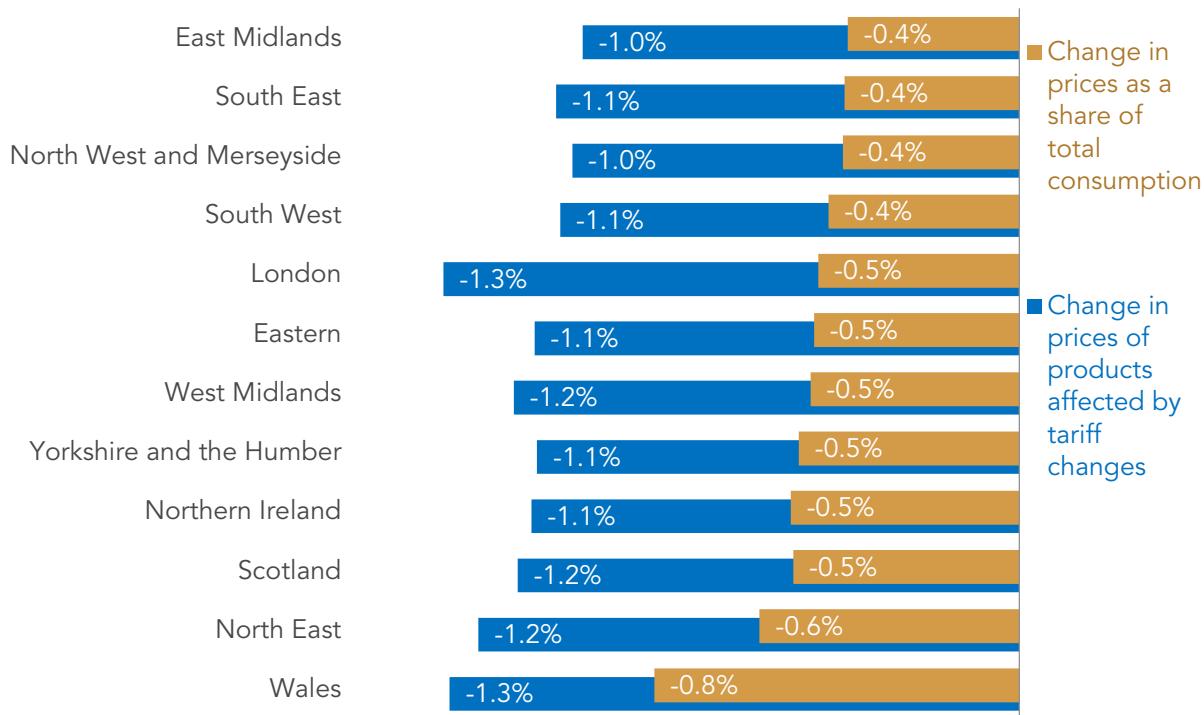
Source: Calculations by I Serwicka & L A Winters and RF analysis of ONS, *Living Costs and Food Survey 2014* (LCFS)

The overall impact of abolishing tariffs is smaller than the impact should the UK revert to MFN tariffs with the EU. The average UK household would see prices fall by 0.5 per cent (expressed as a share of their total spending) or £130 should tariffs be reduced to zero.

Finally we can analyse the impact that a reduction in tariffs will have across the nations and regions of the UK. As a share of spending on those items affected by tariff changes Wales and London see the biggest fall in prices. However, in terms of the impact on spending a share of a household's total consumption Wales and the North East benefit the most. Looking at price falls across a range of different items the evidence is that reducing tariffs to zero has relatively even effects across the regions and nations of the UK. However, because total consumption differs, it tends to be poorer regions or nations that see the biggest proportional impact. Household spending falls by around £160 in both Wales and London.

Figure 15: Wales and the North East of England would benefit most from reducing all tariffs to zero

Falls in consumer prices as a result of the UK reducing all tariffs to zero



Notes: See Annex and online for full details of modelling

Source: Calculations by I Serwicka & L A Winters and RF analysis of ONS, *Living Costs and Food Survey 2014* (LCFS)

Section 5

The impact on businesses and local economies

So far we have just looked at the impact on consumer prices of reducing the UK's tariffs to zero. However there are likely to be important impacts on producers. Furthermore, while the impacts on consumers are likely to be (bearing in mind the differences outlined above) broadly felt, the impacts on producers will be particularly unevenly distributed. In this section we will explore what impact eliminating the UK's tariffs could have on industries and parts of the UK.

Pointing out the impact of trade liberalisation should not be taken as an argument for protectionism. However it is important to recognise that, should the UK reduce all tariffs to zero, some industries and areas are likely to bear more of the brunt.

Manufacturers of food products and rural areas will be most affected by unilateral elimination of tariffs

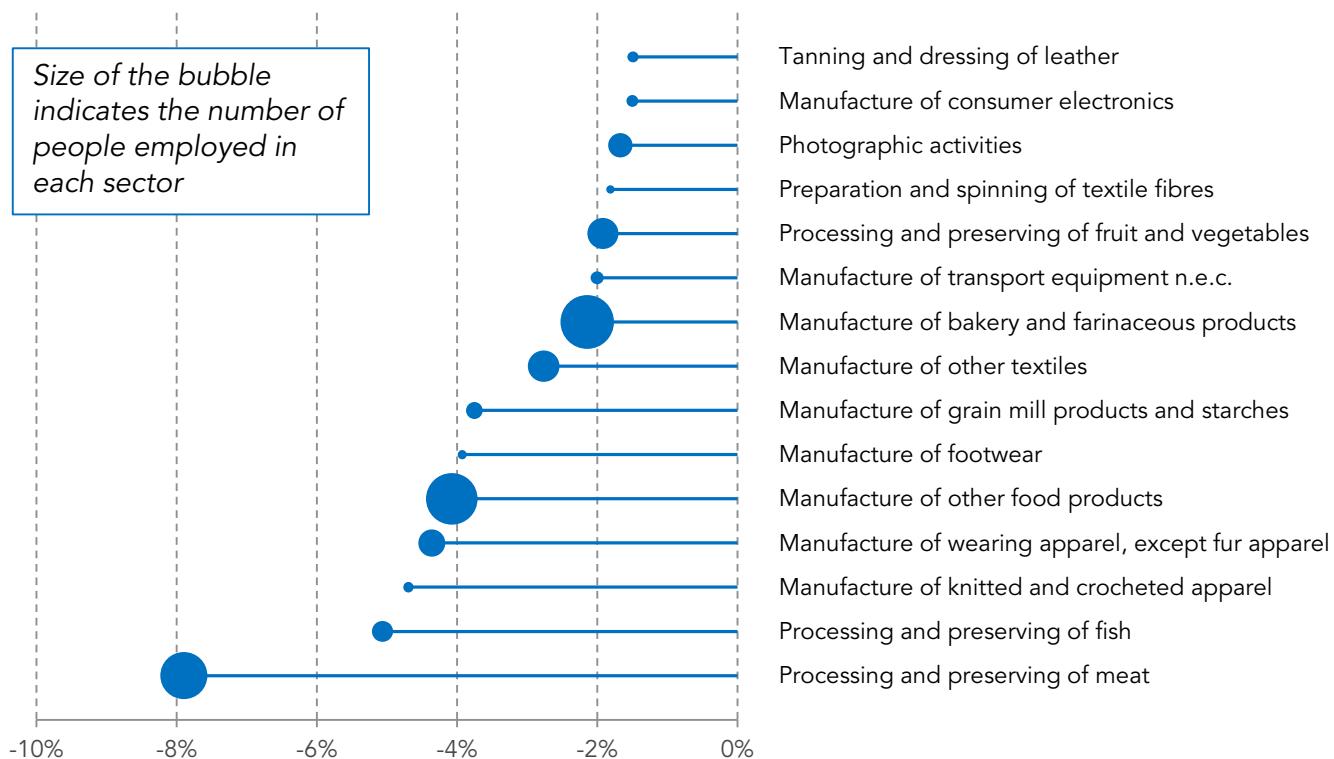
To understand which consumer goods industries are likely to be most affected we can estimate the average tariff reduction for different sectors should the UK reduce all tariffs to zero. This gives us some sense of which sectors are most exposed to tariff cuts and greater international competition.

Figure 16 shows the 15 sectors that will experience the biggest tariff cuts. Our estimates suggest that meat and fish processors and producers of other food producers, along with clothing and footwear manufacturers will be most affected. These sectors will see tariffs fall for the goods they compete with by between 4 and 8 per cent.

However in terms of the impact on employment these sectors employ different numbers of people. Around 100,000 people are employed in meat and fish processing, and a further 100,000 are employed in the manufacture of other food products. Clothing, footwear and knitted apparel manufacturers employ around 34,000 between them. It should be noted that due to a lack of data we do not know how many people are employed in various horticultural sectors and so we cannot estimate how many will be impacted. Nevertheless should the UK reduce all tariffs to zero horticultural products will obviously be affected. Tariffs on apples will fall by 3.5 per cent, berries by 1.7 per cent and root vegetables by 1.3 per cent and 420,000 people work in agricultural and horticultural businesses in Great Britain. Excluding horticulture, of those sectors for which we have employment and tariff information we estimate that 1.4 million people work in sectors which will be impacted by tariff falls on consumer goods.

Figure 16: Food producers and manufacturers will be most affected by zero tariffs

Tariff reductions as a result of UK eliminating tariffs



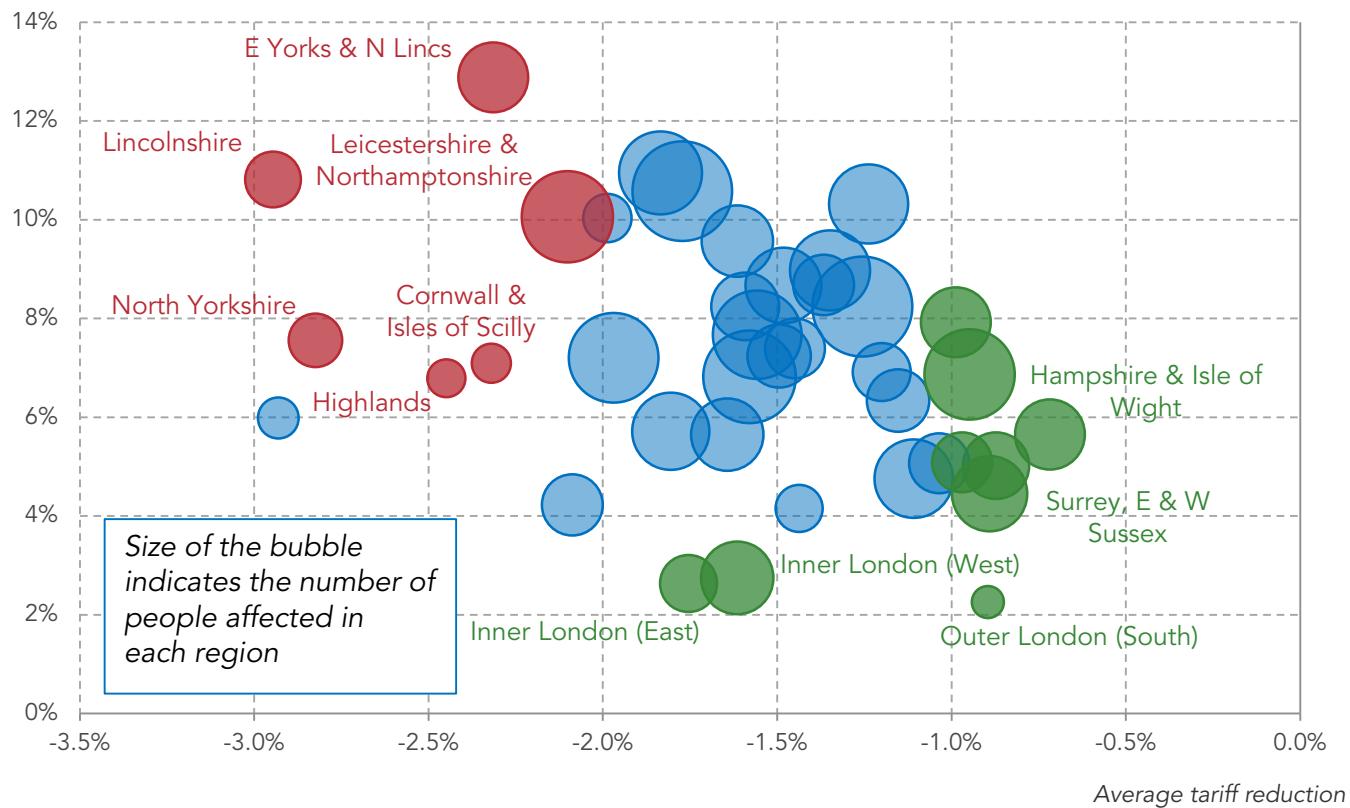
Notes: Tariff falls are produced for each three digit Standard Industrial Classification (SIC) code for UK industries. Employment data is also available at each three digit SIC code, however there is not disaggregated data on the number of people working in various horticultural sectors and so we cannot estimate how many people may be affected in these sectors.

Source: Calculations by I Servicka & L A Winters and RF analysis of ONS, Business Register and Employment Survey (BRES)

The industries affected by the unilateral removal of tariffs are not spread evenly across the country. Figure 17 shows both the share of people in each region that are likely to be affected by falling tariffs (because they work in a sector that will face competition from lower-price imports). The areas least affected are likely to be in urban areas and in areas in the South East of England. For example only 2 per cent to 3 per cent of employees are in sectors that are likely to be exposed to lower-price imports in various parts of London. There are only around 11,000 employees that are likely to be affected in Outer South London. By contrast around 10 per cent of employees are in affected sectors in Leicestershire, Rutland and Northamptonshire, representing around 90,000 people and around 50,000 people work in affected sectors in East Yorkshire and North Lincolnshire.

Figure 17: Firms in rural areas and places outside of the South East of England are likely to be most affected by tariff elimination

Share of employees in sectors impacted



Notes: Tariff falls are produced for each three digit Standard Industrial Classification (SIC) code for UK industries. Employment data is also available at each three digit SIC code, however there is no disaggregated data on the number of people working in various horticultural sectors and so we cannot estimate how many people may be affected in these sectors. The average tariff fall is calculated as an average of the tariff impact for each industry in a region, weighted by the number of people employed in each affected industry.

Source: Calculations by I Serwicka & L A Winters and RF analysis of ONS, Business Register and Employment Survey (BRES)

The areas that are likely to be most affected are those in which there are many firms in sectors that will be exposed to relatively large tariff changes (above 2 per cent) and a large proportion of people working in these sectors (above 6 per cent). As well as those areas we have already discussed, Lincolnshire, Cornwall and North Yorkshire could be particularly impacted. 2,500 people work in the meat and dairy industries in Cornwall, two sectors where tariffs are expected to fall by 8 per cent and 2 per cent respectively. Similarly around 5,000 people work in the processing of fruit and vegetables in North Yorkshire and Lincolnshire and tariffs are expected to fall by 2 per cent should the UK reduce all tariffs to zero.

By exploring which sectors and regions are most exposed to lower-price competition we are not calling for industries to be protected from international competition and do not think that consumers should be denied the benefits that freer trade can bring. Nevertheless unilaterally reducing all UK tariffs to zero would not only give up the country's most effective leverage in future trade negotiations but also expose some industries and places to relatively sharp competitive pressures, with implications for the firms affected and the jobs they provide.

Section 6

Conclusion

In this paper we have outlined some of the possible ramifications should the UK not be able to maintain its current trade policy with the EU. The paper analyses in more detail than any previously what will happen to consumer prices should the UK's trade regime change after Brexit. In particular we have looked at what the impact could be of two 'no-deal' Brexit scenarios.

The first scenario, of reverting to current MFN tariffs with the EU, is one that the government is keen to avoid, but nevertheless is still a possibility. The evidence is that this would disproportionately hit poorer households and poorer parts of the UK. The second scenario, to eliminate all tariffs, is espoused by some as a desirable outcome, but would yield small benefits, and the most well-off households would benefit as much as those on lower incomes.

To shield lower-income households from any negative impacts if or when the UK's trade policy trade changes post-Brexit, the government should remember that the effects they feel through employment and levels of government expenditure are likely to be as large as the consumer price effects we model here. That being said, maintaining the current levels of trade openness with the EU is vital. This should not be forgotten as the country looks to reduce tariffs and increase trade with other countries.

When the UK begins trade negotiations with the EU and, eventually, third countries there will inevitably be compromises that need to be made. This paper does not touch upon what UK trade policy should be in this regard. Nevertheless it provides an insight into how changes in trade may affect consumer prices and how increased competition in consumer goods may impact specific industries and parts of the UK.

Annex

Full details of the datasets and modelling approach can be found in S Clarke, I Serwicka & L A Winters, “Will Brexit raise the cost of Living”, *National Institute Economic Review* 242 (1), R1-R14, November 2017 (forthcoming). The methodology is also available online.

Data

To simulate the effect of tariff changes on consumer prices and spending in the UK, we collected detailed data on production, trade, tariffs and consumption. The sources are as follows:

- » Production data – collected from the **OECD Structural and Demographic Business Statistics** (SDBS) and the **UNIDO INDSTAT4** (manufacturing production), and the **FAO** (agricultural production);
- » Trade data – collected from the **UN COMTRADE** (manufacturing goods trade), and the **FAO** (agricultural goods trade);
- » Tariff data – collected from **UNCTAD’s TRAINS** database; data includes ad valorem tariffs and specific duties that have been converted to ad valorem equivalent tariffs.
- » Consumption data – **the ONS’ Living Costs and Food Survey (LCFS)**, data includes spending on goods and services by UK households.

Each of these – as discussed below – is based on its own product nomenclature and needs to be reconciled with the others using product concordance tables. This is something that inevitably introduces inaccuracies into individual estimates but it does not significantly affect the overall estimates on the impact of tariff changes on the cost of living.

Production data have been collected from two different sources. Data on manufacturing production have been collected at the 4-digit level of the International Standard Industrial Classification Revision 4 (ISIC4) from the OECD Structural and Demographic Business Statistics (SDBS) database and the UNIDO INDSTAT4 database. Data on agricultural production – foodstuffs that require minimal processing before consumption, such as fresh fruit, fresh vegetables or rice – have been collected from the FAO, which uses its own classification (i.e. FAOSTAT Commodity List). Manufacturing production data is expressed in value terms but for agriculture we sourced data in volume terms to minimise the effect of agricultural price distortions.

Data on trade, i.e. imports of manufacturing goods, have been sourced from the UN COMTRADE database and accessed through the World Bank’s World Integrated Trade Solutions (WITS) website that gives access to several trade-related databases. These data are disaggregated by source – UK, EU27, RHIC, EM and RoW – and reported at the 6-digit of the Harmonised Standard 2007 (HS2007). Data on imports of agricultural goods have been collected from the FAO, in volume terms.

Tariff data come from UNCTAD’s Trade Analysis Information System (TRAINS) database, accessed through the WITS website, and it is reported at the 6-digit level of the HS Combined nomenclature. Tariff data that we collect include ad valorem tariffs – those that are paid as a percentage of the import price when the good crosses the border – and specific duties^[20] – those that imply a fixed amount paid per physical unit of the good (e.g. kilogram of cheese or per cent of alcohol content). The specific duties are converted from non-ad valorem to ad valorem equivalent

[20] The overall share of specific (non-ad valorem) tariffs in total tariff lines for the WTO members is nearly 7 per cent. For the agricultural sector of the EU the share is 46 per cent. (Source: WITS Ad Valorem Equivalent (AVE) Calculator).

tariffs applying the WITS Ad Valorem Equivalent (AVE) Calculator.

Because trade data is widely available at a disaggregated level, it is the availability of production data that determines the level of sectoral disaggregation to which partial equilibrium model can be applied (Brenton and Winters, 1992). For manufacturing sectors, modelling is done at the 4-digit ISIC4, and production and trade data are reconciled using an OECD converter.^[21] Agricultural production and trade data, on the other hand, are mapped directly to 18 categories of detailed expenditure items (COI+) and modelled at this level.

The Living Costs and Food Survey (LCFS). The LCFS is an annual household survey that provides detailed information on weekly spending across over 400 goods and services coupled with a range of demographic and economic indicators. The price data are available for the same goods and services.

Sensitivity analysis

One challenge for partial equilibrium modelling is that the results might be unduly sensitive to the values assumed for the elasticities which govern behaviour in the model and for which empirical literature remains limited.^[22] To test such sensitivity we have repeated our exercises doubling the values of substitution elasticities from 10 to 20 for fresh foodstuffs, and from 5 to 10 for manufacturing. This lowers the average increase in prices to 2.6 per cent when revering to MFN tariffs with the EU, and increases the fall in prices to 1.2 per cent when reducing all tariffs to zero. Neither of these changes is of significant magnitude and nor do they change the pattern across commodities materially.^[23]

[21] OECD, Bilateral Trade in Goods by industry and End-Use ISIC Rev.4 conversion key.

[22] The multi-market partial equilibrium model features three sets of elasticities: elasticity of demand, elasticity of supply and elasticity of substitution.

[23] Further sensitivity tests of the 'MFN Brexit' results – as we halve the elasticity of substitution and halve the elasticity of supply – are reported in Clarke et al. (2017).

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- » *engaging with policy makers and stakeholders to influence decision-making and bring about change.*

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The UK Trade Policy Observatory (UKTPO), a partnership between the University of Sussex and Chatham House, is an independent expert group that initiates, comments on and analyses trade policy proposals for the UK and trains British policy makers, negotiators and other interested parties through tailored training packages. The UKTPO is committed to engaging with a wide variety of stakeholders to ensure that the UK's international trading environment is reconstructed in a manner that benefits all in Britain and is fair to Britain, the EU and the world. The Observatory offers a wide range of expertise and services to help support government departments, international organisations and businesses to strategise and develop new trade policies in the post-Brexit era.

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