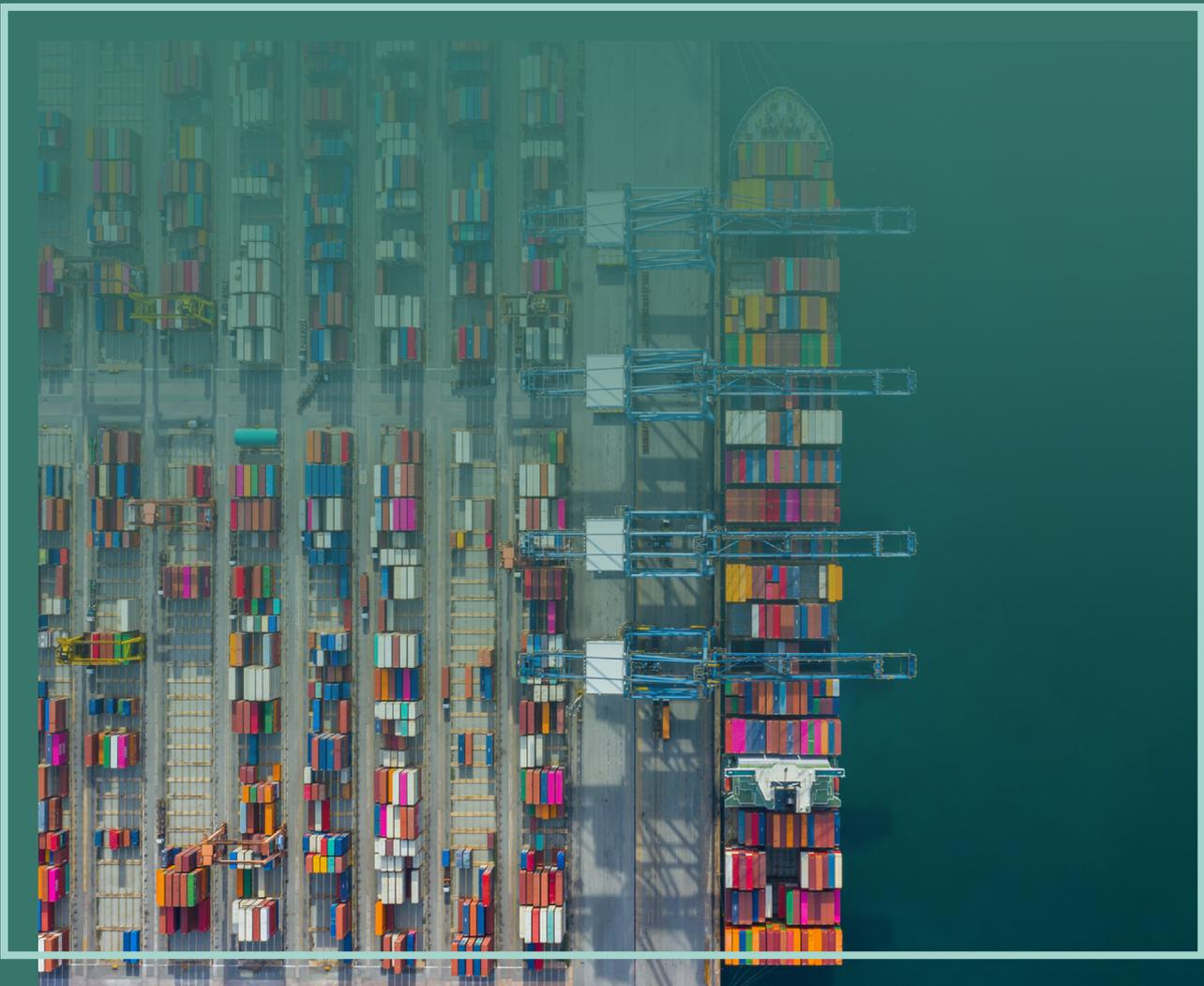


# The Big Brexit

An assessment of the scale of change to come from Brexit

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June 2022



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## The Economy 2030 Inquiry

The Economy 2030 Inquiry is a collaboration between the Resolution Foundation and the Centre for Economic Performance at the London School of Economics, funded by the Nuffield Foundation. The Inquiry's subject matter is the nature, scale, and context for the economic change facing the UK during the 2020s. Its goal is not just to describe the change that Covid-19, Brexit, the Net Zero transition and technology will bring, but to help the country and its policy makers better understand and navigate it against a backdrop of low productivity and high inequality. To achieve these aims the Inquiry is leading a two-year national conversation on the future of the UK economy, bridging rigorous research, public involvement and concrete proposals. The work of the Inquiry will be brought together in a final report in 2023 that will set out a renewed economic strategy for the UK to enable the country to successfully navigate the decade ahead, with proposals to drive strong, sustainable and equitable growth, and significant improvements to people's living standards and well-being.

## The Nuffield Foundation

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## Executive Summary

Leaving the EU represents the largest change in the UK's relationship with the rest of the world in nearly half a century. It is a profound change in economic governance that will reorient production away from trade with the EU and towards the domestic market, impacting people, places and firms across the UK.

The public discourse, as well as the pre-referendum economic modelling, has focussed on describing the anticipated overall economic effects of Brexit, creating the impression that it will have a discrete, and relatively rapid, one-off impact. But the reality is that the impact will be different from that anticipated in a number of important ways. Crucially, it will take time to fully materialise, and will occur in three distinct phases. First, in the immediate aftermath of the referendum, and in anticipation of permanent impacts, household incomes and business investment were affected. Second, trade itself responded following the implementation of the new Trade and Cooperation Agreement and the new barriers that this introduced. And third, structural changes to the UK economy will take place over the long-term, as capital and labour adjust to the new trading arrangements.

Overall, we find that the long-run impacts will mean significant change for some sectors of our economy –for example, fishing – but the aggregate effect will be to reduce household incomes as a result of a weaker pound, and lower investment and trade. This adjustment will be substantial, but we should not expect it to fundamentally alter the nature of our economy, including the UK's

overall services focus and export specialisation. Understanding the scale and nature of this change, and the extent of progress so far, is crucial for policy makers looking to reset the country's economic strategy. That is the focus of this report, part of the Economy 2030 Inquiry.

### Following the referendum, there was an immediate impact of Brexit on household incomes and business investment

Immediately after the referendum on 23rd June 2016, sterling depreciated. This brought forward the impact on household incomes of what would otherwise be a slow burn change for the UK economy. A year after the referendum, sterling settled at more than 12 per cent below its previous level, and the higher price of imports led to higher inflation, with the resulting increase in the cost of living equivalent to £870 per year.

Meanwhile, firms faced increased uncertainty about the terms on which they might be able to access the world's largest integrated marketplace, providing a major headwind to investment. UK business investment fell by 0.1 per cent a quarter on average in the three years post-referendum, compared to growth of 1.7 per cent a quarter on average growth in the previous three years, and ongoing growth in other G7 countries. Firms expect this decline in investment to taper off now that Brexit-related uncertainty has fallen, but the UK's relative investment position remains weak as we emerge from the pandemic.

The driver of investment underperformance has not been the widely expected fall in foreign direct investment (FDI), an important driver of productivity and innovation. UK FDI inflows as a percentage of EU-27 inflows has remained above pre-Brexit levels since the referendum and, despite a decline in the UK's share of global FDI, it remains in line with that in Germany and higher than France.

These impacts materialised before any new trade (or migration) barriers were introduced. Indeed, the Office for Budget Responsibility (OBR) estimates that two fifths of the overall expected impact on productivity materialised before the new

trading arrangement with the EU, in the form of the Trade and Cooperation Agreement (TCA), was implemented in January 2021.

### The expected relative decline in UK exports to the EU compared with the rest of the world has not materialised

Firms' forward-looking investment decisions responded quickly to the referendum result, but trade flows themselves have proved more resilient than expected, showing little evidence of responding to Brexit before the TCA was implemented. Some argued that sterling's depreciation would make UK exports to the EU more competitive, while others believed that the uncertainty following the referendum would depress trade flows. However, the share of UK exports to and imports from the EU changed little in the period immediately following the referendum. But significant change has taken place since the implementation of the TCA.

However, this major change to trading arrangements occurred during the Covid-19 pandemic, meaning that care is needed to disentangle the impact of these two shocks. Covid-19 affected global trade flows through supply chains and global travel disruptions, causing inflated freight costs and transport delays. In 2020, world trade fell by 8.9 per cent, the steepest fall since the financial crisis, and only the fifth time world trade has fallen on an annual basis since World War Two. Global services trade was disproportionately impacted, falling by more than 20 per cent. That was the context when the TCA entered into force a year into the pandemic. For this reason, our focus is largely on the relative performance of UK trade with the EU relative to that with the rest of the world, or on the UK's trade performance relative to similar economies during this exceptional period, rather than changes in the level of UK trade with the EU.

On the face of it, UK trade data do not show the response to Brexit that we would have expected. There was a near consensus that leaving the EU would disproportionately hit UK-EU trade, causing an enduring decline in the share of imports from and exports to the EU. The UK has now been trading under the terms of the TCA for 18 months and, although UK imports from the EU have fallen relative to the rest of the world, there is no clear evidence of this occurring for UK exports to the EU. Between December

2020 and January 2021 (when the TCA was implemented), the share of UK goods exports to and imports from the EU fell by 15.7 and 8.1 percentage points respectively. Although the share of UK goods imports from the EU has remained somewhat below its pre-Brexit level, the share of goods exports to the EU recovered in the following month, and has remained at the same level since. Services trade shows similar patterns to goods trade: the share of UK services exports to and imports from the EU declined by 0.4 and 2.6 percentage points respectively between 2020 and 2021, but this is in line with the longer-term decline in the share for exports, meaning that, here again, the expected relative decline in EU exports is not clearly observable in the UK data.

On the other hand, although not observable in the UK data, our trading partners' data does suggest that UK goods exports to the EU have fallen by more than those to the rest of the world. EU trade data shows that the UK's share of total EU goods imports fell by more than a quarter between 2020 and 2021, more than double the fall of some large non-EU partners, such as the US. However, EU and UK trade data diverged in 2021 due to measurement changes on both sides; as a result, UK exports to the EU are recorded as 10 per cent higher in the UK's data than EU-recorded imports from the UK. If the share of EU imports coming from the UK is estimated using the UK exports data, this fall would be just 13 per cent, which aligns much closer to the falls seen across non-EU partners.

**Although some see the lack of a post-TCA fall in exports with the EU as good news, it instead appears that the UK has experienced a more broad-based loss in competitiveness**

At first glance, the lack of clear evidence of the expected relative decline in UK exports to the EU seems like good news. However, developments should instead lead us to take seriously the signs that Brexit is impacting UK trade openness and competitiveness more broadly. In particular, the fall in UK trade openness since the introduction of the TCA, measured as trade as a share of GDP, has been larger than that experienced by our peers. Between 2019 and 2021, UK trade openness fell by 8 percentage points, significantly more than in countries with similar trade profiles, such as France, which experienced a 2 percentage point decline.

Furthermore, the UK is the only large European country to experience a decline in openness since 2020, with openness falling 1 percentage point; France, for example, saw openness rise by 4 percentage points. These relative declines in UK openness are driven by goods trade: UK goods exports as a share of GDP fell between 2020 and 2021, despite rising for all EU countries except Ireland. Research using the so-called 'synthetic control' method to estimate a counterfactual for UK trade flows corroborates these findings, indicating that goods exports were 15.7 per cent lower in December 2021 than they would have been in the absence of Brexit. UK openness also fell across services trade between 2020 and 2021, but, whereas the UK was almost unique in experiencing a decline in goods exports as a share of GDP, the Netherlands, Belgium and Canada saw similar declines in services trade (around 1.0 percentage point of GDP). This is unsurprising, given the lasting impact of the pandemic on international travel, which is key for trade in services.

Data on trade in international goods points to a broader loss in UK competitiveness across several of its most important markets. The UK lost market share in 2021 across three of its largest non-EU goods import markets: the US, Canada and Japan. Some have attributed this weak performance to unfavourable changes in the composition of global demand. But, although the fall in global demand for transport manufacturing imports has contributed to the fall in the UK share, our analysis shows that the change in the nature of global demand has contributed less than the decline in the UK's competitiveness: changes to sectoral demand explain £6.7 billion of lost annual exports to these markets, but the remaining £11.7 billion comes from the decline in the UK's share across products. Evidence of disruption to UK supply chains is also clear – imports have fallen, and the prices of imports have increased – and this could explain our weak export performance across trading partners, and the limited extent to which UK firms were able to exploit opportunities of the global trade recovery in 2021. It is unclear exactly how persistent these changes in non-EU trade will prove, but these are worrying signs that Brexit may have had a broader impact on the UK's openness and competitiveness than expected.

## UK firms orientated to exporting to the EU have implemented coping mechanisms, but longer-term adjustments may see UK-EU trade experience the expected relative decline

Trade relationships are long-term and sticky, suggesting that changes to trade will take time: more than 60 per cent of UK exports are via trade relationships that have existed since the 1960s. There are signs that UK firms are using 'coping strategies' to help ease the short-term adjustment to the new trading relationship with the EU. For example, the number of UK export relationships (measured as the number of country-product export 'varieties') to the EU has fallen by 30 per cent relative to the rest of world following the implementation of the TCA. Some have attributed this to a squeeze on small and medium-sized companies' ability to export, but our new analysis suggests that, given the increased regulatory burdens, UK firms may also be choosing to ship directly to a single EU destination and use EU-based distributors, rather than exporting directly to smaller markets. Consistent with this, exporters are increasingly sending trade to countries linked to the largest UK ports (specifically: France, the Netherlands and Belgium, whose share of EU imports from the UK increased by 7.5 percentage points between 2020 and 2021). Some sectors are particularly affected, such as the agriculture and forestry. Here, the number of export relationships from the UK to the EU almost halved relative to non-EU relationships, and the share of trade directed to these three port countries increased by 6 percentage points.

Overall, although we haven't seen the sort of large relative decline in UK-EU exports that was expected, Brexit appears to already be weighing on both UK openness and competitiveness. But it will take many years for the economy to fully adjust, as firms gradually wind down capital invested in EU exports, the labour market adjusts, and changes to the rate of exit and entry of firms across sectors affects the structure of our economy. Modelling the expected long-run impacts of trading with the EU under the TCA can provide evidence on the scale and distributional impacts of these longer-run structural changes.

## The new trading arrangements with the EU will lead to big adjustment for some sectors

This report provides the most detailed assessment to date of the impact of the TCA on trade flows. Many papers assessed the potential impacts of Brexit before its final form was known, but far fewer have assessed the final deal, and even fewer have modelled the granular impacts across regions and sectors of the economy. Our approach to assessing the impacts also innovates on existing modelling approaches, enabling an assessment of regional outcomes and of the adjustment paths to the Brexit shock. Based on a detailed reading of the TCA and the associated literature, the new relationship with the EU implies an increase in trade costs of 10.8 per cent for exports to the EU and 11.0 per cent for imports from the EU, and these rise to 16.2 per cent and 16.6 per cent when we account for the fact that the EU is likely to integrate further in future years.

Trade barriers look set to increase by more in agriculture and services (and particularly in more highly-regulated professional services) than in manufacturing. This is bad news for UK exports, as 20 per cent of our services exports to the EU are in the highly-regulated category of finance and insurance, and a further 18 per cent are in other highly-regulated services sectors, including legal and accounting, architecture and engineering, and air transport services. The combined share is almost twice these sectors' share of global services exports. So, although the provisions in the TCA are comparable with other agreements that are considered to be deep on services, they secure only a very small share of the services market access that the UK enjoyed as part of the single market, and this is particularly important for the UK's oversized regulated services exports. As with other comparable agreements, the services provisions in the TCA, tend to simply lock in the liberalisation that already applied to non-EU trading partners, rather than securing equivalence agreements that would replicate the pre-existing market access (an example would have been agreeing equivalence to replace EU passporting rights for financial services). These new barriers to trade with the EU are set to lead to substantial changes in output, with regulated and professional services sectors expected to be hit harder than most

other sectors. For example, the 'other professional, scientific and technical activities' sector is set to shrink by 13 per cent compared to the counterfactual of remaining in the EU.

Within the manufacturing sector, there is considerable variation in the performance of individual industries, reflecting the differing opportunities available to them to reorient to the domestic market. A few will gain, such as food manufacturing, which is expected to be 5 per cent larger, but others will see significant falls in output, such as the manufacture of basic metals. In the primary sectors, the new trade barriers (considered in isolation) are expected to deliver gains for British agriculture, but fishing is expected to be one of the hardest hit sectors, with output set to be 30 per cent lower. This is because British fishers are reliant on exporting to the EU for their revenues, and now face new barriers to sell to EU consumers. On the other hand, British farmers are set to benefit from less fierce import competition from EU producers, who had been successful in supplying produce to the UK market, and these greater domestic opportunities are expected to outweigh any lost market share overseas. However, the extent to which British farmers can take advantage of these opportunities will also depend on policy choices beyond trade, including on migration.

These shifts will mean significant labour market adjustment for the relatively small numbers of workers in the worst-hit sectors. For example, the 5,000 workers employed in the fishing sector in 2019 and the 75,000 employed in the manufacture of basic metals may face a painful adjustment, with increased job uncertainty and potentially big hits to their livelihoods. Those that do experience involuntary job loss not only face an immediate income hit but are also expected to return to jobs that pay less than the one they left. For example, our previous research showed that, in the period from 1995 to 2020, median real hourly pay growth was 1.1 per cent lower among those who had experienced an involuntary period out of work within the previous year, compared to an average of 2.1 per cent growth among all workers.

### But Brexit will not transform the nature of the economy

Despite these significant impact on some sectors, the new trading relationship with the EU will not drive a large or swift

labour market adjustment when we consider the UK economy as a whole. Our modelling suggests less than 0.5 per cent of the workforce, equivalent to an extra 132,000 people, will move from their current region-sector as a result of Brexit. This reflects that the UK's comparative advantage and the structure of the economy will not be fundamentally transformed by Brexit in the way that some hoped, and others feared. Tradeable professional services, including finance and business services, are set to lose out the most, but our analysis suggests its share of gross output will shrink by just 0.3 percentage points, to 20.2 per cent. Some hoped that Brexit would lead to a revival of manufacturing: the modelling suggests that this will not happen, and that it will decline as share of the economy, but this decline is marginal, at just 0.1 percentage point. This will leave the broad industrial structure of the UK relatively unchanged: the UK will remain a highly services-dominated economy with a smaller manufacturing sector than France.

It is more useful to think of Brexit as driving a fall in openness, rather than a big picture sectoral restructuring. Trade openness, as measured by total trade as a share of GDP, is expected to decline significantly, by 3.6 percentage points as a result of the new barriers erected under the TCA, and a further 3 percentage points relative to a situation in which the UK remained in the EU which itself is continuing to integrate. Although the volume of trade that the UK undertakes will be significantly affected, a radical shift in the export specialisation of the UK is not expected. Goods trade is expected to specialise further in line with existing comparative advantages. We estimate that exports from two of the services sectors in which the UK is most specialised – financial services and other business services – will fall by more than average, but these changes in the specialisation of exports will be small relative to even the slow pace of change in UK comparative advantage over the past decade.

In addition to the overall economic impact, much attention has been given to how Brexit could affect different regions and the extent to which it will help poorer areas to 'level up'. Our assessment finds that the North East, one of the poorest regions in the UK, will be one of the hardest hit, and that Brexit will increase its existing (and large) productivity and income gaps. Given its importance in driving measures of regional inequality,

the focus has often been on how London will fare relative to the rest of the economy. This report finds the outcome for London is uncertain. Although it has large exposure to sectors that are among those most negatively affected by Brexit, what also matters is the degree to which its exports are focused on the EU market. There is significant volatility over time in this, but there is early evidence that London is, in fact, adapting to Brexit faster than other regions: the overall volume of London's goods exports fell by less than average, but London experienced the largest fall in its share of exports going to the EU, which fell by 10 percentage points between 2019 and 2021. This could indicate that London-based firms, which are, on average, more productive, finding it easier than firms elsewhere to respond to the new trade barriers with the EU by exploiting export opportunities outside the EU. Overall, though, the differences between regional outcomes are relatively small, and are unlikely to drive large reductions in regional inequalities.

### The main impact will be a real wage and productivity hit, exacerbating the long-standing challenges faced by the UK

Brexit is not, therefore, expected to transform the nature of the UK economy, with only minor impacts likely on its industrial structure, export specialisation and pattern of regional inequalities. Instead, the impact of Brexit is better thought of as a broad-based reduction in workers' pay and productivity.

A less-open UK will mean a poorer and less productive one by the end of the decade, with real wages expected to fall by 1.8 per cent, a loss of £470 per worker a year, and labour productivity by 1.3 per cent, as a result of the long-run changes to trade under the TCA. This would be equivalent to losing more than a quarter of the last decade's productivity growth. And it should be noted that this analysis assesses only the direct impacts of the new trading arrangement, and does not account for wider impacts on investment levels or changes to migration policy.

Changes in production to focus on the UK market are a significant part of these productivity falls, and help explain why those suggesting that expanding manufacturing sectors can drive productivity gains are likely to be disappointed. Although some manufacturing sectors are expected to expand, these

are dominated by lower-productivity sectors (such as food and wood manufacturing): the average productivity of shrinking manufacturing sectors was £47 per hour, compared with just £37 per hour for growing sectors.

### Understanding the impact of Brexit is crucial for policy makers looking to renew the UK's economic strategy

Our analysis finds that, although there is uncertainty over the Brexit impacts that have occurred to date, not least because of the entangled Covid-19 impacts, we should expect the lasting impact of reduced openness to be substantial, and to lead to widespread productivity and real income shocks, much of which has already taken place. Although some sectors will be very significantly affected, changes to the broad sectoral structure of the economy and the UK's export specialisation are set to be relatively small. And, although these won't be evenly distributed across the country, Brexit is not expected to materially impact the challenge of 'levelling up' less productive parts of the UK.

Assessing the impacts of the changes to the UK-EU trading arrangement is important, not to relitigate the merits of leaving the EU decided by a public referendum six years ago, but to ensure policy makers understand how to think about the impacts that have materialised and are still to come.

## Section 1

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### Introduction

Brexit represents the largest change in the UK's relationship with the rest of the world since joining the European Communities nearly 50 years ago. It is a profound change in economic governance, changing not only the terms on which we trade but many of the broader rules controlling how the wider economy works. At a fundamental level, leaving the EU will reorient production away from trade with the EU and towards the domestic market, and this will impact people, places and firms across the UK. This report seeks to improve our understanding of the scale and nature of this change, and the extent of progress so far. This is crucial to policy makers looking to reset the country's economic strategy.

The existing focus on the aggregate impact of Brexit has created a false impression that it will have a one-off impact that will be over quickly. This is at least in part because pre-referendum economic modelling focussed on the anticipated overall economic effects of Brexit.<sup>1</sup> Instead, the impacts of Brexit will take many years to fully materialise. This report looks at how the impacts have and will occur over three distinct phases. First, in the immediate aftermath of the referendum, there were impacts to household incomes and business investment. Second, following the implementation of the new Trade and Cooperation Agreement (TCA), trade has responded to the new barriers introduced. And third, over the long term, capital and labour will adjust to the new trading arrangements.

With this in mind, the rest of this report is structured as follows.

- Section 2 provides a review of how the first two phases have played out, using data on trade, investment and incomes. The first phase of adjustment can be clearly seen in the data and has been the subject of previous studies. But, as the UK has now been trading with the EU under the arrangements set out in the TCA for 18 months, there is also more than a year's data on how these arrangements have started impacting UK trade.

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<sup>1</sup> For one prominent example, see: [The long-term economic impact of EU membership and the alternatives](#), HM Treasury, April 2016.

- Section 3 assesses the potential impacts to come over the third phase. It draws on new modelling of the TCA to estimate the scale and distribution of these impacts as firms, capital and labour across the economy adjust in the long run.
- Finally, Section 4 summarises our conclusions.

## Section 2

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### What has happened so far?

Immediately following the referendum – the first phase in which Brexit has been affecting the economy – the price of imported products increased due to a sharp sterling depreciation. This rise in inflation was equivalent to a £870 increase in the cost of living per year for the average household. Meanwhile, following the referendum, business investment growth slowed dramatically reflecting increased uncertainty and has not yet recovered.

During the second phase of the impact of Brexit, after the TCA was signed, there was a broad consensus that it would reduce EU trade, reorienting production away from the EU and towards the domestic market and the rest of the world. But while the pandemic makes it more difficult to disentangle the impact of Brexit, this relative decline of EU trade does not seem to have happened. Although UK imports from the EU have fallen, the relative fall in UK exports to the EU have not. While some see this as good news, it appears the UK has suffered a broader fall in both openness and competitiveness in 2021. Between 2019 and 2021, UK trade openness fell by 8 percentage points, significantly more than in countries with similar trade profiles, such as France which experienced a 2-percentage-point decline. The UK was also the only large European country to experience a decline in openness between 2020 and 2021.

There are also signs that UK exports to the EU are changing as UK exporters have implemented coping strategies to manage the new trading requirements. For example, a fall in the number of export relationships with the EU versus the rest of the world in 2021 seems, at least in part, to reflect exporters increasingly sending trade to countries linked to the largest UK ports (specifically France, the Netherlands and Belgium whose share of EU imports from the UK increased by 7.5 percentage points between 2020 and 2021). To the extent such coping strategies are successful, it suggests longer-term relative declines in EU trade may still be to come, as firms create their longer-term trade and investment strategies.

## The immediate impact of Brexit was to lower family incomes and business investment

In this section we start with the most immediate impacts of Brexit, in particular the post-referendum falls in income and business investment. We then move onto the impact of the TCA on trade flows. Longer-term adjustment of labour and capital is covered in Section 3.

### Sterling's fall after the referendum led to a rise in the cost of living

Currency and other financial markets had not fully priced in Brexit, and sterling depreciated sharply by 7 per cent overnight.<sup>2</sup> This was the biggest one day fall in any of the world's four major currencies since free-floating exchange rates were introduced in the 1970s.<sup>3</sup> As an asset price set by liquid financial markets, exchange rates are forward looking and able to quickly reprice, anticipating the longer-term impacts of Brexit on the UK economy. Consistent with that, financial markets continued to process the news from the Brexit shock such that, a year after the referendum, sterling had stabilised at more than 12 per cent below its previous level.

The immediate impact of this fall in the exchange rate is an increase in the cost of living, making it more expensive for families to buy imported goods. Indeed, sterling's fall was estimated to lead to a 2.9 per cent rise in the price level, effectively increasing the cost of living by £870.<sup>4</sup> The impact of a fall in sterling takes time to feed through into higher inflation. As we would expect, then, CPI inflation did not peak until November 2017 (Figure 1). This rise in inflation was concentrated in goods with high import shares such as food and non-alcoholic beverages as well as clothing and footwear, raising the cost of consumption across households in the UK and all income levels. Regions such as Wales and Northern Ireland with a smaller share of household expenditure on housing costs and a greater share on more import intensive goods were hit harder than regions such as London which spend more on housing as a proportion of their total spending.<sup>5</sup>

The fall in the value of the pound also reduced wages for workers in sectors exposed to imports. As the UK is deeply integrated in global supply chains, the sterling depreciation also increased the costs that businesses pay for imported inputs needed in production. Those firms responded to the fall in the exchange rate by putting downward pressure on wages relative to the prices they were able to charge for their output in order to maintain profits. Over time, then, real wages were lower than they would have been absent the fall in the exchange rate. Although the depreciation meant that exports conversely looked

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<sup>2</sup> Source: Bank of England, [Effective exchange rate index](#), accessed 17 June 2022.

<sup>3</sup> Reuters, [Sterling's post-Brexit fall is biggest loss in a hard currency](#), July 2016.

<sup>4</sup> J De Lyon et al., [Trading places: Brexit and the path to longer-term improvements in living standards](#), Resolution Foundation, October 2021.

<sup>5</sup> H Breinlich et al., [The Brexit vote and inflation – updated evidence](#), March 2020.

relatively cheap, this was not accompanied by a boom in exports. Recent research has identified that workers employed in the most exposed sectors experienced 2.9 percent lower pay growth than the other sectors in the three years following the referendum.<sup>6</sup> Evaluated at the mean annual wage in 2016, workers in the more affected sectors lost wages equivalent to £765 per year on average.<sup>7</sup>

Both the rise in consumer price inflation and the slowdown in wage growth represented one-off responses to the drop in the value of the pound. Consumer price inflation resulting from the depreciation lasted for about a year while wages grew more slowly in the affected sectors for about three years after the referendum.

**FIGURE 1: People in the UK immediately became worse off following the referendum**



SOURCE: ONS, CPI inflation and Labour Market Statistics.

Inflation is just one way that incomes might be impacted following Brexit. In Section 3 we explore further adjustments to output and real wages to come due to the trade impacts of Brexit.

### Uncertain firms reduced investment spending following the referendum

Following the referendum, firms faced increased uncertainty about the future of the UK-EU relationship, providing a major headwind to investment. Firms investment decisions were affected by uncertainty about the terms on which they might be able access the

<sup>6</sup> Costa et al., Real Wage Stagnation and the Brexit Exchange Rate Depreciation, 2022.

<sup>7</sup> The wage impacts lasted for three years after the referendum and represented a one-off reduction in wages as firms adjusted to the increased import cost pressures.

world's largest integrated marketplace, made up of more than 500 million consumers and 24 million companies. The lengthy negotiation process with the EU only increased uncertainty, and by 2019, more than 55 per cent of firms reported Brexit as a top three source of uncertainty.<sup>8</sup> This is important because higher uncertainty can lead firms to postpone long-term investments in physical capital which contribute to the UK's productive capacity.<sup>9</sup>

UK business investment underperformed following the referendum: falling by 0.1 per cent per quarter on average in the three years post-referendum, compared to a quarterly growth rate of 1.7 per cent in the three years prior to the referendum (Figure 2). Other G7 countries outperformed the UK in the nine quarters following the referendum.<sup>10</sup> And by 2021, monthly survey data of several thousand firms by the Decision Maker Panel found that business investment was estimated to be a total of 23 per cent lower than it would have been in the absence of Brexit.<sup>11</sup>

Firms report that Brexit-related uncertainty has fallen following the TCA implementation. In May 2022, the number of firms reporting Brexit as a top three source of uncertainty had shrunk to just over 20 per cent, the lowest level since the survey began in August 2016.<sup>12</sup> As uncertainty about the future trading relationship with the EU has been reduced, we would expect some of the postponed investment to be undertaken. Nonetheless, the lost capital expenditure between 2016 and 2021 due to Brexit will have long-term implications for the productivity of the UK. Indeed, the OBR estimates that 40 per cent of the total Brexit-related productivity shock occurred before the TCA was implemented and was driven by this uncertainty and associated investment falls.<sup>13</sup>

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<sup>8</sup> P Bunn et al., [Influences on investment by UK businesses: evidence from the Decision Maker Panel](#), Bank of England, June 2021.

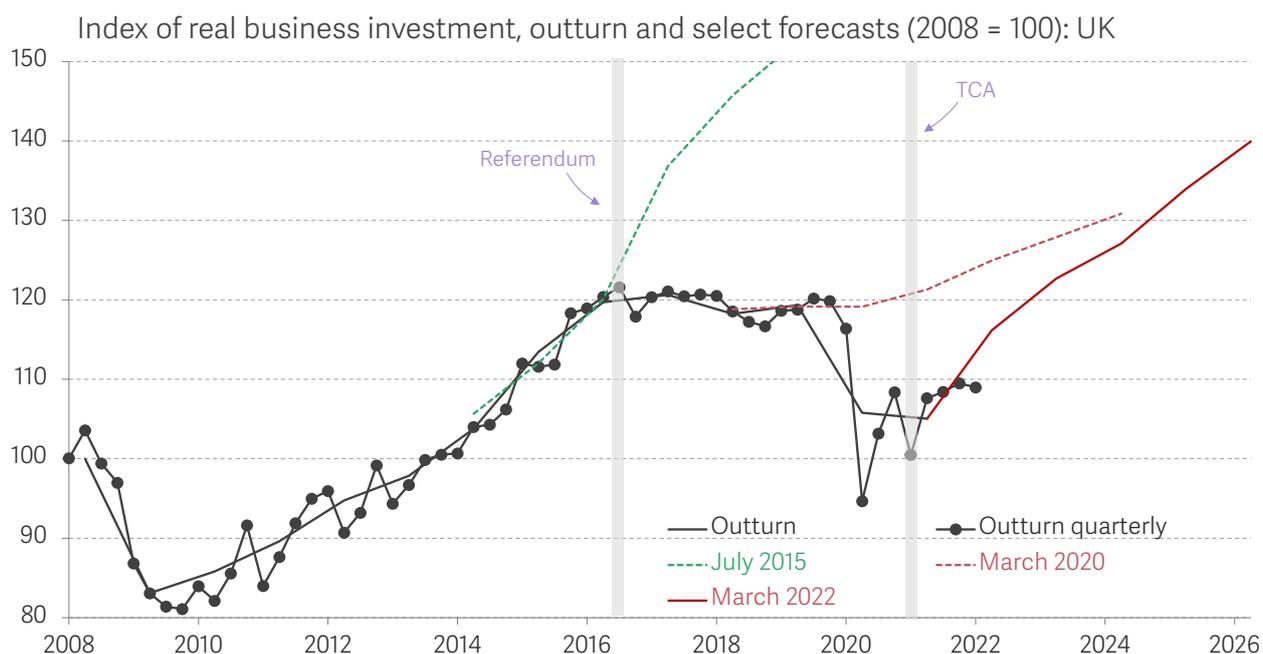
<sup>9</sup> For example, our previous work has found that differences in capital per work accounts for the UK's productivity gap with France, see: J Oliveira-Cunha et al., [Business Time: How ready are UK firms for the decisive decade?](#), Resolution Foundation, November 2021.

<sup>10</sup> OBR, [G7 growth and investment since EU referendum](#), December 2018.

<sup>11</sup> P Bunn et al., [Influences on investment by UK businesses: evidence from the Decision Maker Panel](#), Bank of England, June 2021.

<sup>12</sup> Bank of England, [Monthly Decision Maker Panel data – May 2022](#), June 2022.

<sup>13</sup> OBR, [The latest evidence on the impact of Brexit on UK trade](#), March 2022.

FIGURE 2: **Uncertainty post-referendum led to stagnating business investment**

NOTES: A version of this chart first appeared in J Leslie, [Bouncebackability: The UK corporate sector's recovery from Covid-19](#), Resolution Foundation, June 2022.

SOURCE: Analysis of ONS, National Accounts; OBR, Economic and Fiscal Outlook (various).

However, foreign direct investment doesn't appear to have been affected by Brexit so far

Another important area where we might have expected Brexit to have a rapid impact is on foreign direct investment (FDI) flows. These flows can contribute to the UK economy by improving the productivity and innovation of firms receiving foreign investment. Suppliers and customers of these firms can also benefit from spillover effects of these improvements.<sup>14</sup> FDI has been shown to incentivise growth in employment, sales and R&D investment.<sup>15</sup>

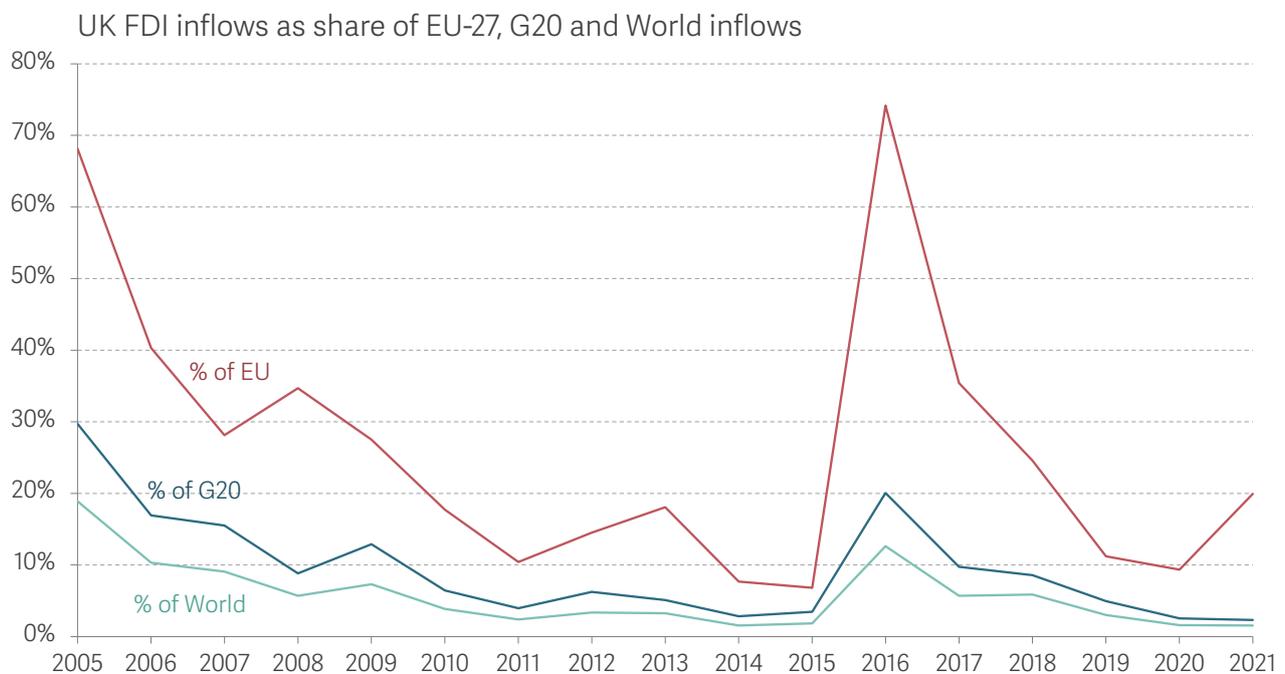
But, despite recent declines the UK's share of global FDI, there is not the clear post-referendum slowing that some predicted. While the UK has been one of the most attractive FDI destinations for the past 20 years, inward FDI flows have been declining: in 2005, the UK received 19 per cent of global FDI; by 2016, inward FDI had fallen to 13 per cent, and by 2021 this had fallen to just 2 per cent. Despite this, the UK's share of global FDI remains in line with Germany, and continues to be stronger than France. And UK FDI inflows as a percentage of EU-27 inflows have remained above pre-Brexit levels since the referendum, as shown in Figure 3.

<sup>14</sup> S Dhingra et al., [UK trade and FDI: A post-Brexit perspective](#), Papers in Regional Science, December 2017.

<sup>15</sup> For example, see: M Guadalupe, O Kuzmina & C Thomas, [Innovation and Foreign Ownership](#), American Economic Review Vol, 102 No.7, December 2012.

Inwards FDI data can spike due to large M&A activity, as seen in 2016 when four high value deals accounted for around 85 per cent of the total value of inwards M&A to the UK. In 2016, the average value of inward M&A (£825.6 million) reached more than three times the average value in 2015 (£229.9 million). This activity was unlikely to have been influenced by the Brexit referendum as these large deals typically take years to finalise, for example, AB InBev (Belgium) first publicly discussed its interest in acquiring SABMiller (UK) in 2014, formally announced the deal in October 2015, and only finalised the acquisition in 2016 after almost a year of seeking regulatory approvals across four continents.

**FIGURE 3: UK share of world FDI is following a long-term decline while UK inflows as a percentage of EU-27 FDI inflows remains above pre-Brexit levels**



NOTES: The EU represents the EU27 (excluding the UK).

SOURCE: Analysis of OECD, Foreign Direct Investment Statistics.

## A relative decline in EU trade has not materialised as expected

Although firms were forward looking when it comes to investment decisions, trade flows themselves showed little evidence of a Brexit impact before the TCA was implemented. Some argued that sterling depreciation would make UK exports to the EU more competitive, while others believed that the uncertainty would depress trade flows following the referendum.<sup>16</sup> Research found uncertainty over future market access to the EU modestly deterred firms entering the UK, but this didn't seem to materialise in the

<sup>16</sup> B Broadbent et al., *The Brexit vote, productivity growth and macroeconomic adjustments in the UK*, VoxEU, February 2020.

aggregate trade data.<sup>17</sup> In particular, the share of UK exports to and imports from the EU remained unchanged post-referendum but before new trading arrangements with the EU were implemented.<sup>18</sup>

The implementation of the TCA has come during a period in which trade flows have been significantly affected by Covid-19 meaning that we need to work harder to identify the impact of the new arrangements. After years of negotiations, the TCA was agreed in December 2020 and now governs all UK trade with the EU. It is broadly equivalent to existing deep free trade agreements (FTAs), for example the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) agreement and the EU-Canada Comprehensive Economic and Trade Agreement which are both scored as seven out of seven for depth in the Design of Trade Agreements database.<sup>19</sup> However, this is still significantly more restrictive than the pre-existing relationship with the EU. Less than a year before this was implemented, the pandemic led to a huge shock to global trade flows through supply chains and global travel disruptions. In turn, this has prompted soaring freight costs and widespread transport delays.<sup>20</sup> In 2020, world trade fell by 8.9 per cent, the steepest fall since the global financial crisis, and only the fifth time world trade has fallen on an annual basis since World War Two. Global services trade was disproportionately impacted, falling by more than 20 per cent.<sup>21</sup> The arrival of Covid-19 means that we need to be particularly careful when estimating the impact of Brexit.

The near consensus was that leaving the EU would disproportionately hit UK-EU trade, causing an enduring decline in the share of exports to, and imports from, the EU. However, the UK has now been trading under the terms of the TCA for 18 months, without clear evidence that this has occurred, especially to UK exports. Figure 4 shows that immediately after the implementation of the TCA the share of UK goods exports to and imports from the EU fell, 15.7 and 8.1 percentage points respectively between December 2020 and January 2021. However, this effect was short lived for UK goods exports to the EU which immediately recovered to pre-Brexit levels in the following month. This is despite the strict controls imposed by the EU on British exports immediately following TCA implementation compared with the more limited checks on EU imports by Great Britain. And while the UK's share of goods imports from the EU remained below its pre-Brexit level at 47.8 per cent during 2021, compared with from 54.5

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<sup>17</sup> M Crowley et al., [The Looming Threat of Tariff Hikes: Entry into Exporting under Trade Agreement Renegotiation](#), AEA Papers and Proceedings, May 2020.

<sup>18</sup> S Dhingra & T Sampson, [Expecting Brexit](#), CESifo Working Paper No. 9541, February 2022.

<sup>19</sup> Source: Design of Trade Agreements Database Depth Index.

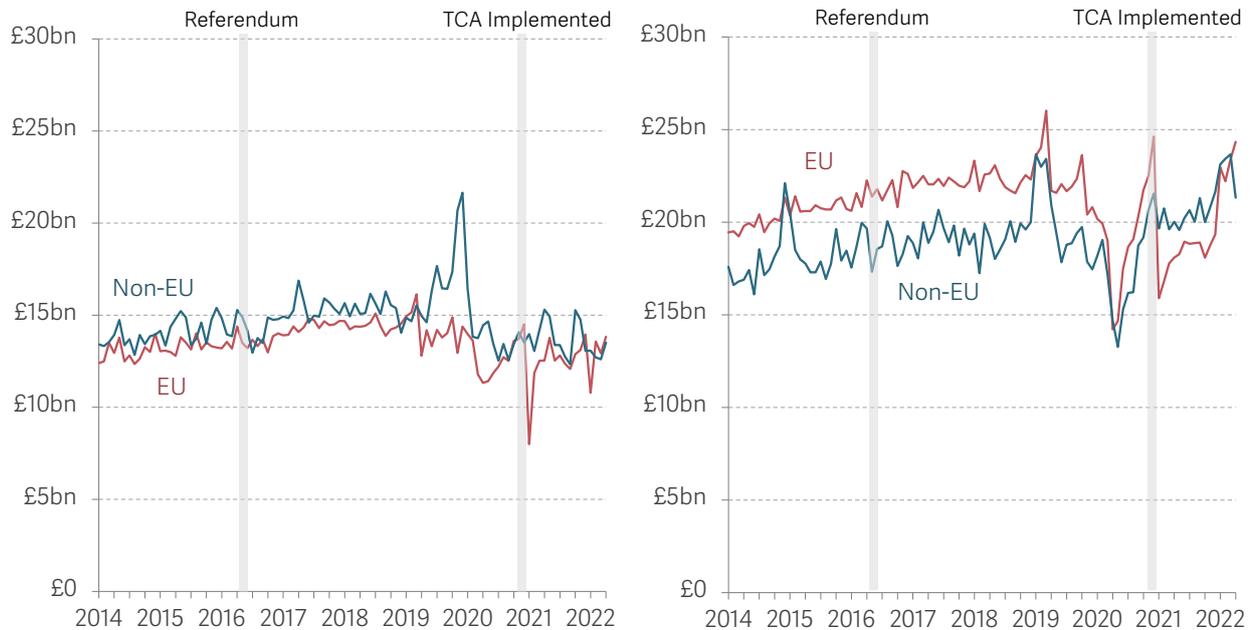
<sup>20</sup> Global shipping costs rose 350 per cent between May 2020 and July 2021. Source: Bloomberg, [Global supply chains are being battered by fresh Covid surges](#), August 2021.

<sup>21</sup> Bank of England, [How has Covid affected global trade](#), July 2021.

per cent in 2019, data measurement changes in January 2022 contributed to this share returning to its pre-Brexit levels in April this year.<sup>22</sup>

**FIGURE 4: While goods trade has fallen, EU shares of exports have not responded**

EU and non-EU goods exports (left chart) and imports (right chart): UK

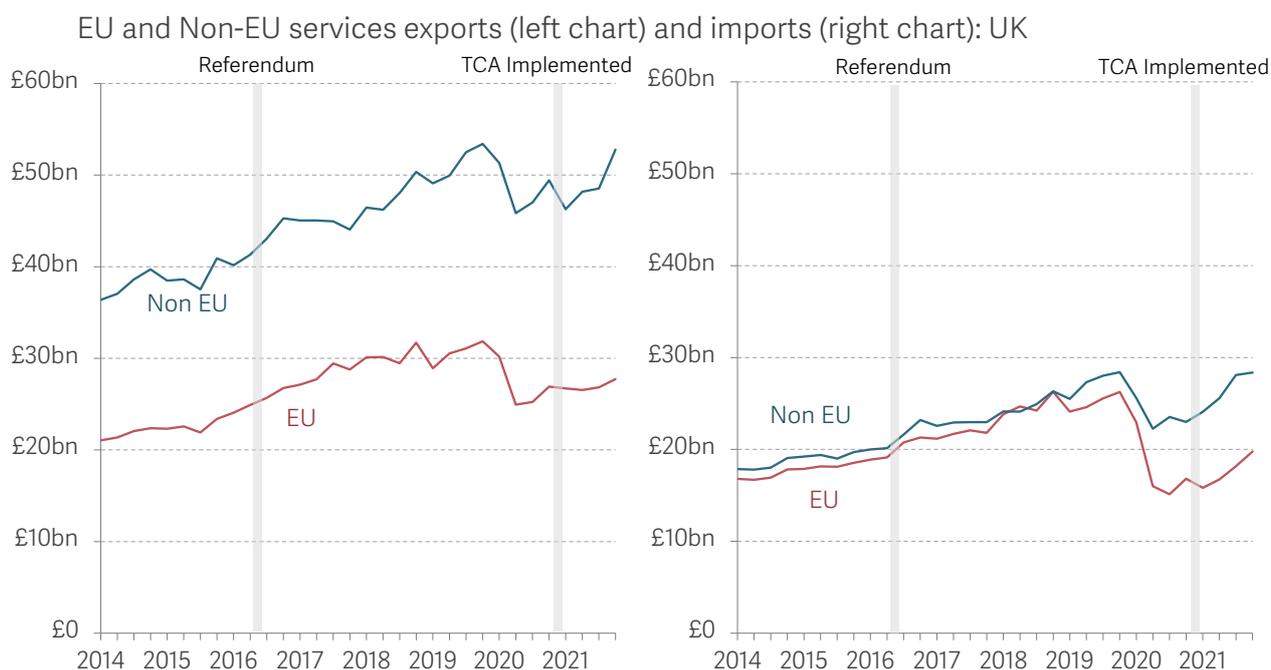


NOTES: Trade in goods is chained volume measured and seasonally adjusted.  
SOURCE: ONS, UK trade time series, June 2022.

The pattern in services trade is very similar to that in goods. While the share of UK services exports to, and imports from, the EU has declined by 0.4 and 2.6 percentage points respectively between 2020 and 2021, for exports this was in line with the longer-term decline in this share. So, once again, the expected relative decline in EU exports is not obvious.

<sup>22</sup> In January 2022, HMRC changed import data collection from Intrastat survey to custom declarations data. The scale of the change in January was high compared with normal changes. January change HMRC is still exploring the scale of the impact. See: Office for National Statistics, [UK Trade](#), April 2022.

**FIGURE 5: For services, the EU share of imports has fallen further than the EU share of exports**



NOTES: Services trade shown in current prices.

SOURCE: ONS, UK trade in services: service type by partner country, seasonally adjusted, April 2022.

Although not observable in the UK data, trading partners' data does suggest that UK goods exports shows some signs of divergence between EU and non-EU trade performance. In particular, EU trade data shows that the UK's share of total EU goods imports fell by more than a quarter between 2020 and 2021, more than double the fall seen with large non-EU partners, such as the US. However, in 2021 EU and UK trade data diverged due to measurement changes on both sides.<sup>23</sup> This resulted in UK exports to the EU being reported as 10 per cent higher than EU reported imports from the UK. If the share of EU imports coming from the UK was estimated using the UK recorded exports to the EU, in place of EU recorded imports from the UK, this would fall would by 13 per cent which aligns much more closely with the falls seen across non-EU partners.

While changes in the quantity of EU trade are not clear to date, there are emerging signs of price effects driven by the new agreement. Research suggests that the TCA is causing additional import-related inflation from sectors exposed to EU trade, which includes essential sectors such as food.<sup>24</sup> In 2015, 77 per cent of vegetables, tubers and roots came

<sup>23</sup> For example, imports are collected by HMRC rather than via the intrastat survey as of January 2022. In January, exports were affected by an operational change at ports causing a delay in data collection, see: M Hughes, [Understanding the latest changes to UK trade figures with the EU](#), National Statistical, March 2022.

<sup>24</sup> J Bakker et al., [Post-Brexit imports, supply chains, and the effect on consumer prices](#), UK in a changing Europe, April 2022.

to the UK from the EU. Research attributes a 3 per cent increase in these food prices in both 2020 and 2021 to Brexit contributing to the cost of living crisis and already high inflation.<sup>25</sup>

## The UK has become less open and less internationally competitive

At first glance, the relative resilience of UK exports to the EU appears to be good news, but there are signs that Brexit is impacting UK trade openness and competitiveness more broadly. Indeed, the fall in UK trade openness, measured as the ratio of trade flows to GDP, has been larger than those of comparable countries since the introduction of the TCA. Between 2019 and 2021 UK trade openness fell by 8 percentage points. This is significantly more than in countries with similar trade profiles (high relative specialisation in professional services exports) to the UK, such as France which experienced a 2-percentage-point decline. Meanwhile, the EU saw trade openness increase by 8 percentage points on average. Since 2020, UK openness has fallen 1 percentage point while France rose by 4 percentage points. Further, the UK experienced a decline in overall openness, with a 0.4 percentage points fall in goods exports as a share of GDP between 2020 and 2021, despite these measures both rising for all EU countries (except Ireland).<sup>26</sup>

Research using so-called ‘synthetic control’ to estimate a counterfactual for UK trade flows corroborates these findings. They estimate that goods exports were 15.7 per cent lower, and imports 7.8 per cent lower by December 2021 than they would have been in the absence of Brexit.<sup>27</sup> UK openness fell across both goods and services trade between 2020 and 2021. But while the UK was almost unique in experiencing a decline in goods exports as a share of GDP, the Netherlands, Belgium and Canada saw similar declines in services trade as a share of GDP.

International trade data show the UK’s goods exports have lost competitiveness across several of its most important markets. The UK lost market share with three of its largest non-EU goods import markets in 2021 – the US, Canada and Japan, as shown in Figure 7.<sup>28</sup> Evidence of disruption to UK supply chains is clear – imports have fallen and prices of imports have increased – and this could explain weak export performance across trading partners and the limited extent to which UK firms were able to exploit the opportunities from the global trade recovery in 2021.<sup>29</sup>

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<sup>25</sup> J Bakker et al., [Post-Brexit imports, supply chains, and the effect on consumer prices](#), UK in a changing Europe, April 2022.

<sup>26</sup> Based on OECD trade openness data.

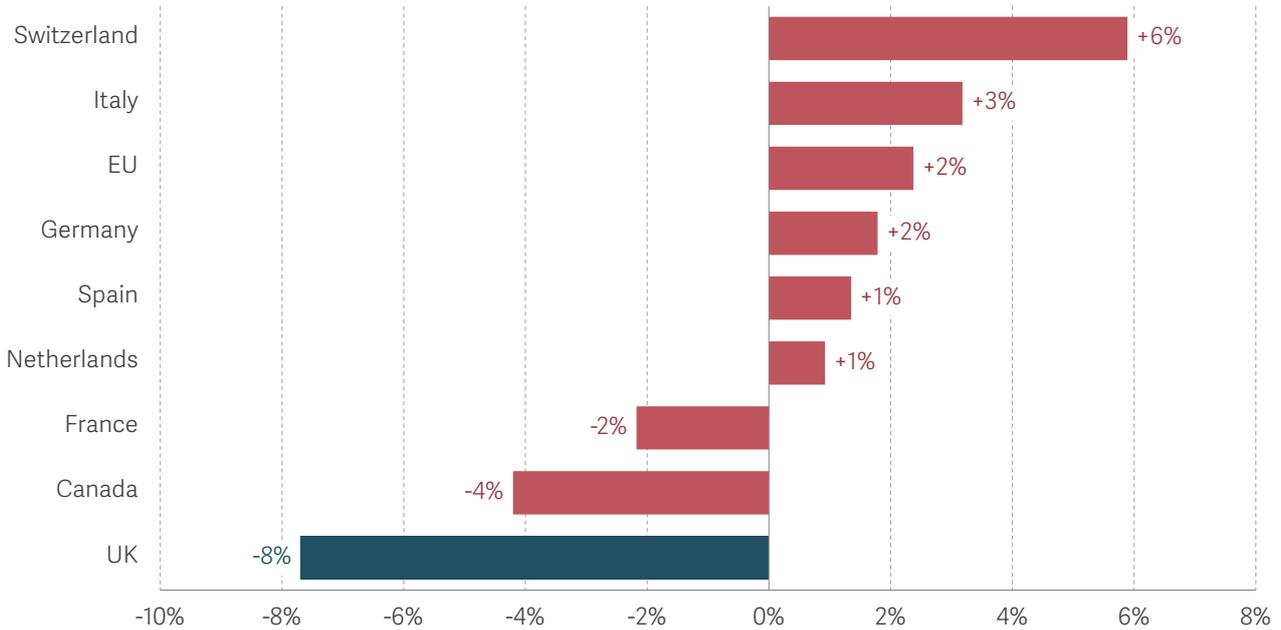
<sup>27</sup> J Springford, [The Cost of Brexit: December](#), Centre for European Reform, March 2021.

<sup>28</sup> EU imports data and UK exports data diverged in 2021 due to a change in measurement approach, resulting in UK exports to the EU being recorded as 10 per cent higher than EU recorded imports from the UK. If the share of EU imports coming from the UK was estimated using the UK exports data, this fall would be just 13 per cent which aligns much closer to the falls seen across non-EU partners. In addition, EU goods imports grew faster in 2021 than the other countries presented in Figure 7. EU imports grew 21 per cent, while the average growth across the other trading partners was 19 per cent. This suggests even if the UK’s share of EU imports fell slightly, the EU share of UK exports could remain the same.

<sup>29</sup> Bank of England, [Monetary Policy Report](#), February 2022.

**FIGURE 6: Trade openness has fallen more than peers**

Change in trade openness (total trade as a share of GDP): 2019 to 2021

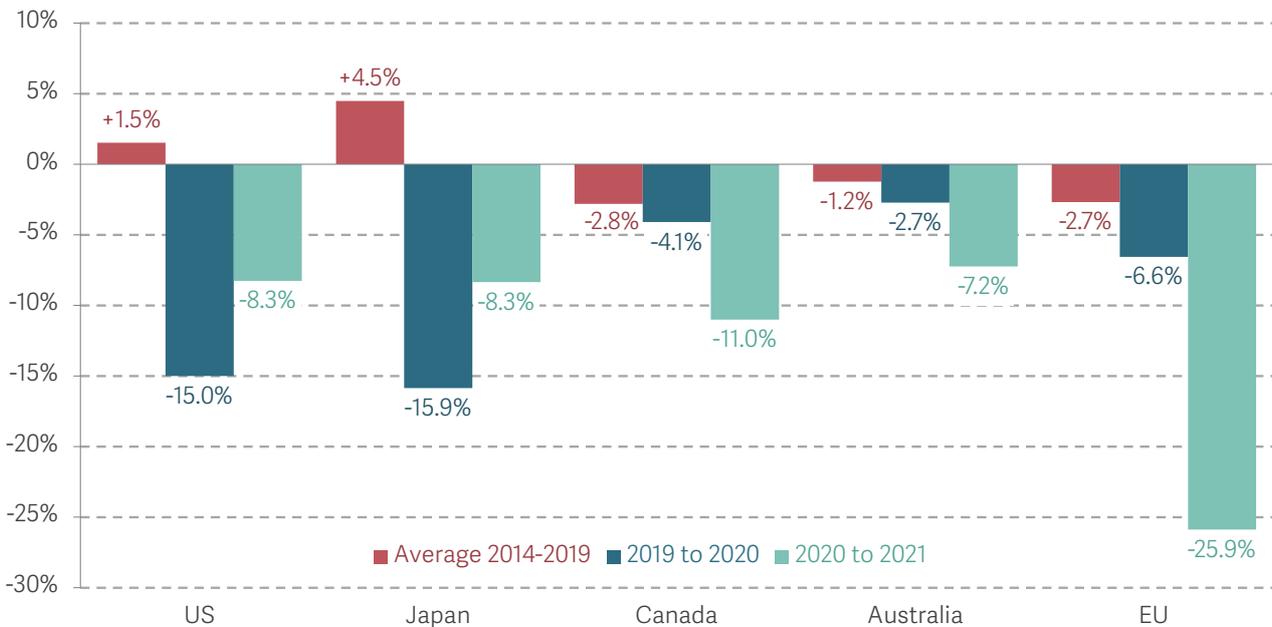


NOTES: Change in trade openness measured relative to 2019 as EU trade shock is not discernible pre-2021 but 2019 is pre-covid which impacted global trade.

SOURCE: OECD, Trade in goods and services as a per cent of GDP.

**FIGURE 7: UK goods exports have continued to underperform during the global trade recovery of 2021**

Percentage change in the UK's share of partner's imports (excluding mineral and fuels)



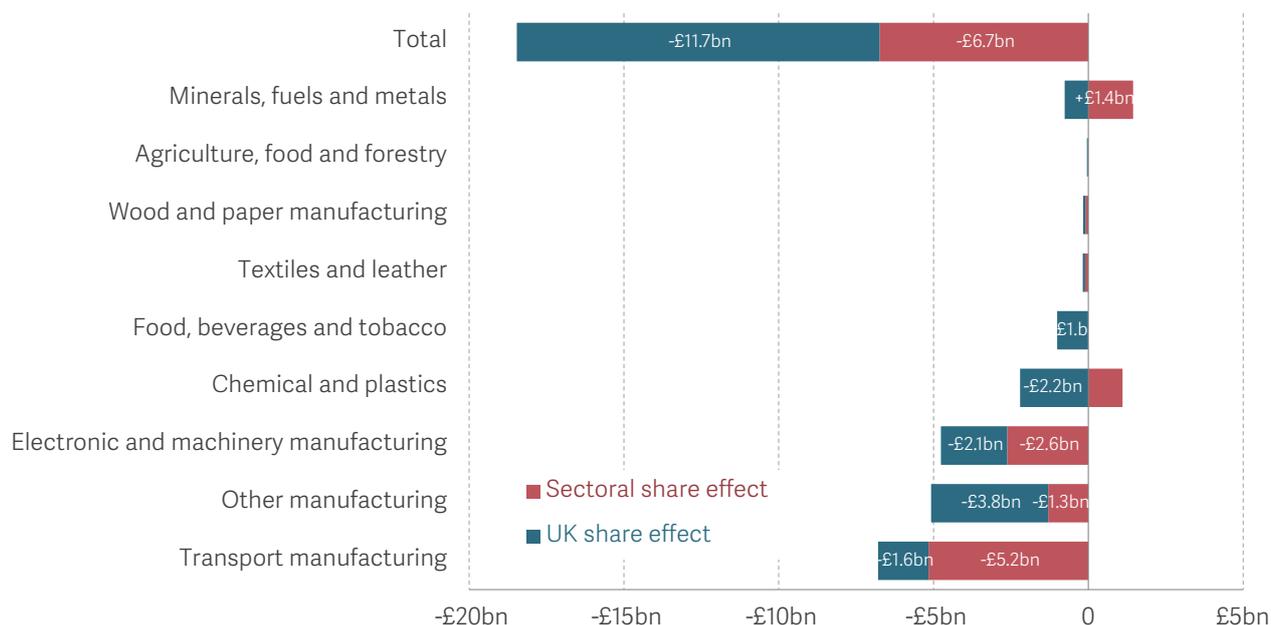
NOTES: This uses partner countries imports from the EU which are equivalent to UK exports to these countries, although measurement difference lead to differences in the estimated values.

SOURCE: Analysis of ITC Trademap import data for US, Japan, Canada, Australia and the EU.

Some have attributed this weak performance to unfavourable changes in the composition of global demand, as the world recovers from Covid.<sup>30</sup> However, by breaking down the changes in the UK's share of imports from the changes to the sectoral composition of goods demanded, it is possible to show changes in global demand contributed less to the fall in the UK share of key non-EU markets (the US, Japan and Canada's) imports than the decline in UK share across products. Figure 8 shows changes to sectoral demand explains £6.7 billion of lost UK exports to these markets, but the remaining £11.7 billion comes from the decline in UK share across products.<sup>31</sup> UK competitiveness fell in every sector, both for industries benefitting from the pandemic related demand such as chemicals and plastics, and those which suffered such as transport manufacturing. And this suggests that Brexit has been weighing on the competitiveness of UK firms, limiting the extent to which they were able to exploit the opportunities from the global trade recovery in 2021.

**FIGURE 8: While changes in global demand explains some UK export weakness, the UK lost market share across all goods sectors**

Change in UK trade with the US, Japan and Canada between 2019 and 2021, associated with changes in sectoral composition and the UK's share of imports



NOTES: Shift share analysis undertaken HS4 level and then aggregated into industries.  
SOURCE: Analysis of ITC Trademap.

<sup>30</sup> For example, see: BBC, UK economic growth slows as supply problems hit the recovery, November 2021.

<sup>31</sup> This 'shift share' analysis separates the change over time in the UK's share of a sector's trade (blue bars) from the change over time of the relative size of demand for each sector (red bars) in Figure 8.

## Trade will continue to adjust and UK-EU trade may still experience the expected relative declines

Trade relationships are long-term and sticky, suggesting that changes to trade will take time. Research shows that 60 per cent of UK exports are via trade relationships that have existed since the 1960s with the older relationships tending to be the most valuable.<sup>32</sup> These long-term relationships will not unwind quickly despite higher barriers from the TCA.

There are signs that UK firms are using coping strategies as they adjust to the terms of the TCA and these could be temporarily inflating trade with the EU. Recent research has shown that trade is concentrating into fewer product-country varieties, a proxy for trade relationships, with the number of UK export relationships to the EU falling by 30 per cent relative to the rest of world following TCA implementation.<sup>33</sup> Replicating this analysis to assess the impact on export values and the number of export relationships across sectors, shows that almost all sectors saw a negative hit to export relationships, without the equivalent hit to the value of exports, except transport manufacturing which saw global declines in trade due to Covid, shown in Figure 9.<sup>34</sup>

One explanation for the fall in export relationships is that SMEs which were exporting to the EU are no longer able to afford the costs of non-tariff trade barriers and rules of origin requirements under the TCA. In 2019, 80 per cent of SME exporters traded with the EU as opposed to 48 per cent with non-EU (this difference is smaller for large firms).<sup>35</sup> Sectors, such as agriculture, which have seen a 51 per cent fall in varieties also had a high share of exports originating from SMEs (25.9 per cent between 2017 and 2019 compared with 7.1 per cent on average across goods sectors). Given SMEs are relatively more exposed to EU trade, and are more likely to have low value relationships, this could be consistent with the observed fall in varieties and wouldn't necessarily imply a fall in the value of EU trade.

However, this report suggests at least part of this is explained by exporters, small and large, increasingly sending trade to countries linked to the largest UK ports (specifically France, the Netherlands and Belgium whose share of EU imports increased by 7.5 percentage points between 2020 and 2021). UK firms may be choosing to ship directly to a single EU destination and use EU-based distributors, rather than exporting directly to smaller markets, in order to reduce the regulatory burden faced. Some sectors are particularly affected, such as agriculture and forestry which saw export relationships

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<sup>32</sup> Bank Underground, [UK Trade going steady since the 1960s](#), April 2018.

<sup>33</sup> R Freeman et al., [Unravelling deep integration: UK trade in the wake of Brexit](#), CEP discussion paper, April 2022.

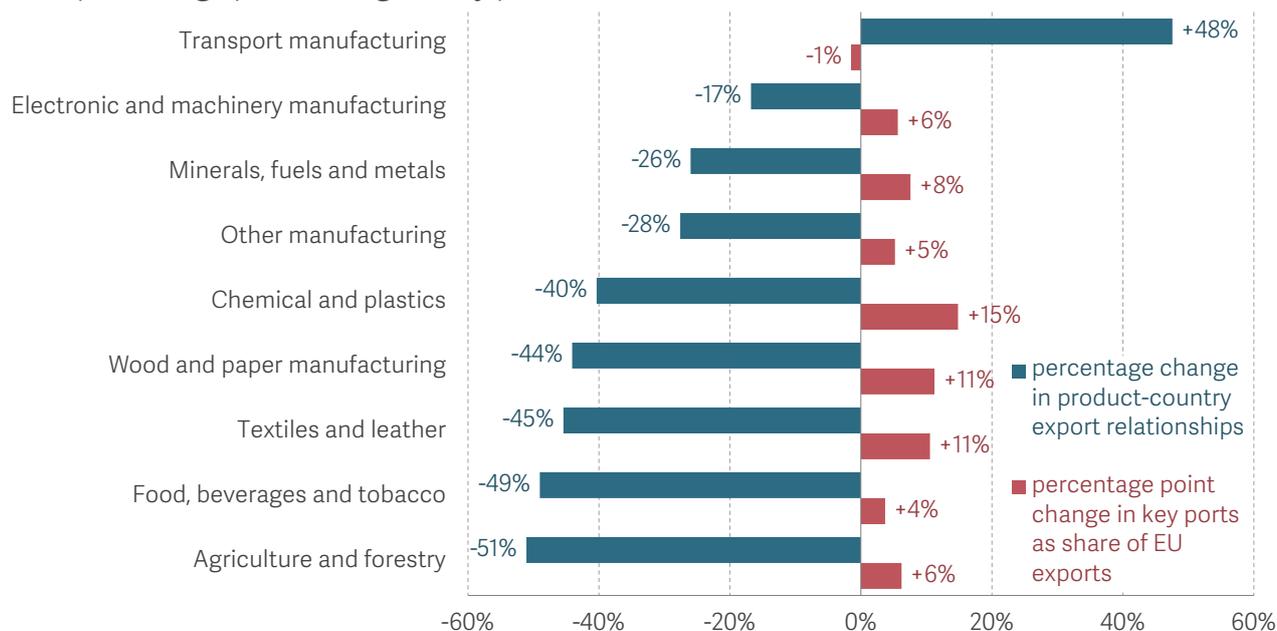
<sup>34</sup> Analysis using the approach of R Freeman et al., [Unravelling deep integration: UK trade in the wake of Brexit](#), CEP discussion paper, April 2022 replicated at the SIC industry level.

<sup>35</sup> HMRC, [UK Trade in Goods by Business Characteristics](#), 2019. Some firms trade with both EU and non-EU firms and therefore the total exporters will add up to more than 100 per cent.

to the EU more than half relative to non-EU varieties and also saw the share of trade directed to port countries increase by 6 percentage points as shown in Figure 9.

**FIGURE 9: The UK’s export relationships to the EU fell relative to the rest of the world while trade with key ports increased across all sectors**

Percentage change product-country export relationships (varieties) by sector, and percentage point change in key ports as share of EU trade: UK



NOTES: Varieties are calculated at HS4 level for product-country relationships; varieties effect replicates work and adds sectoral categories from Freeman et al, Unravelling Deep Integration: UK Trade in the Wake of Brexit, 2022; Changes calculated between Q4 2020 and Q4 2021; Key EU ports are France, the Netherlands and Belgium.

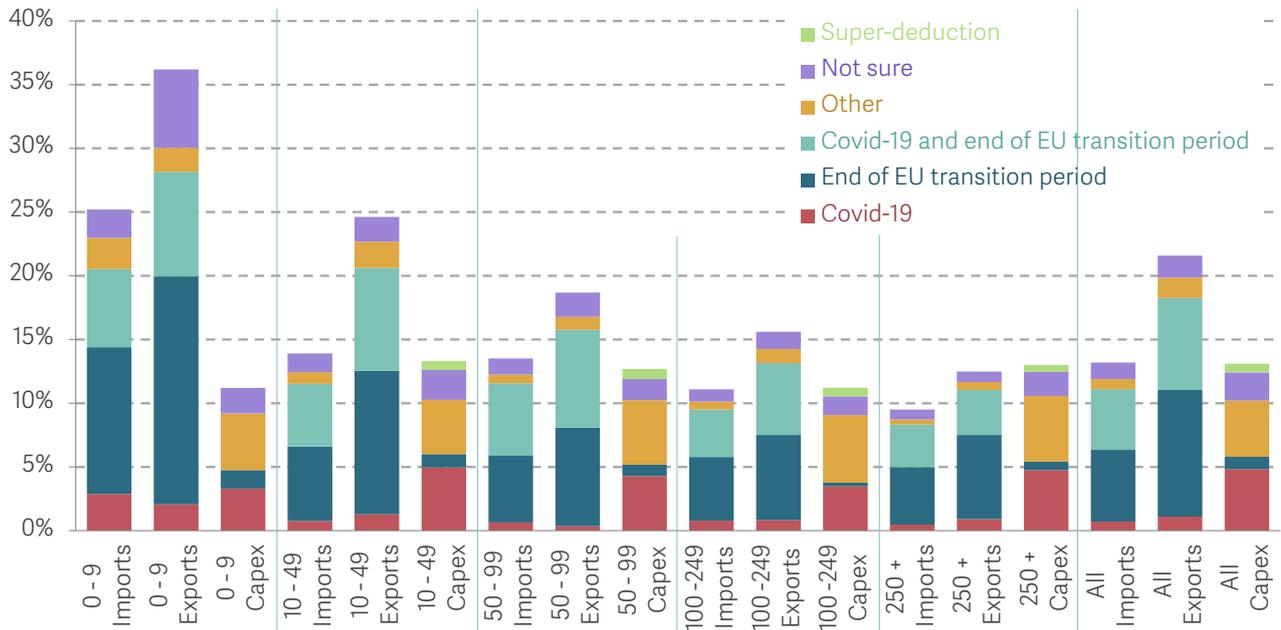
SOURCE: UK trade in goods monthly country exports by commodity, in current prices, non-seasonally adjusted, ONS; data as sourced R Freeman et al, Unravelling Deep Integration: UK Trade in the Wake of Brexit, April 2022.

Firms continue to report that the TCA is affecting exports and imports relative to the same period the previous year. While 14 per cent of small businesses reported ongoing challenges related to exporting due to the end of the EU transition period, less than 3 per cent of all firms reported Covid-19 as a cause of disruption in March 2022 compared with March 2021 (Figure 10). It is noteworthy that only a small share of firms (2 per cent) listed the end of the EU transition period as a major reason for disruptions to investment in 2022.<sup>36</sup>

<sup>36</sup> Office for National Statistics, Business Insights and Conditions Survey (BICS) Wave 54 & Wave 52, 2022. As these questions were not asked before the TCA was implemented it is not possible to compare this with earlier waves but it does suggest few firms now consider Brexit to be a major barrier to investment, despite the evidence of large-scale investment declines in recent years.

**FIGURE 10: Firms are continuing to report trade disruptions due to the end of the EU transition period**

Reasons cited by firms experiencing less or no exporting, importing or capex expenditure compared to the same period in previous year by business size: UK



NOTES: Exports and imports questions from Feb 7th to March 6th; Capex questions from Feb 21st to March 6th. Super-deduction only applies to Capex. Combined Covid-19 and end of EU transition period only applies to exports and imports.  
 SOURCE: Analysis of BICS Survey; waves 54 and 52.

Clearly Brexit has already affected the UK through inflation and reduced real wages in the immediate aftermath of the referendum. Business investment also fell, and is facing a slow recovery from Covid. But Brexit has also started having a material impact on UK trade since the implementation of the new Trade and Cooperation Agreement. While Covid-19, has simultaneously disrupted global supply chains and trading patterns, there are early signs that the new agreement is reducing openness and the competitiveness of the UK, as well as raising prices on key import-reliant goods such as food. This is despite little effect on the UK share of exports to the EU, and visible but small falls in the UK share of imports from the EU. Further assessment of the data suggests firms may be using short-term coping strategies to respond to the new barriers introduced. The next section of the paper explores what longer-term impacts we should expect as capital and labour adjust to the new trading arrangements. To do this, we use new modelling which assesses the depth of the TCA in its final form to provide evidence on the scale and distributional impacts still to come over the next decade.

## Section 3

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# The economic impact of the implementing the Trade and Cooperation Agreement

The previous section covered the first two phases of the Brexit impact – those immediately following the referendum and the TCA. But full adjustment to the new arrangements is likely to take many years. This is partly because full implementation of the new trading arrangement will take time, but also because it will take time for capital and labour to adjust. In this section we provide the most detailed assessment to date of the impact of the TCA on trade, prices and the longer-term structure of the economy. The approach to this assessment innovates on existing modelling approaches, allowing for dynamic adjustment to the new structure of the economy, and for a regional dimension.

The new trading arrangements with the EU will lead to big adjustment for some sectors. Trade barriers are set to increase by more for services sectors – leading to large falls in output shocks – than for manufacturing. This is bad news for UK exports, as 20 per cent of our exports to the EU are in the highly-regulated category of finance and insurance; and a further 18 per cent are in other highly-regulated services sectors, including legal and accounting, architecture and engineering and air transport services. This reflects the fact that the TCA secures only a small share of the services market access that the UK enjoyed as part of the single market.

Within the primary and manufacturing sectors there is considerable variation in impact. Some industries are set to gain from the lower import competition from the EU, for example agriculture and food manufacturing. But others are set to see some of the biggest output shocks, resulting from lost access to an important consumer market. For example, fishing and manufacturing of basic metals which face 30 per cent and 14 per cent estimated negative output shocks, respectively. These shifts will

mean significant labour market adjustment for the relatively small numbers of workers in the worst hit sectors.

However, these substantial sectoral shocks are not expected to transform the overall nature of the economy in the way that some hoped and others feared. While tradeable services and manufacturing industries are set to shrink, this is likely to represent only modest declines in their contribution to total gross output of just 0.3 and 0.1 percentage points, respectively. This leaves the overall sectoral structure relatively unchanged. The UK will remain a highly services-dominated economy with a relatively small manufacturing sector.

Although structural change is expected to be small, the impacts will not be evenly spread across regions. The North East, one of the poorest regions in the UK, is highly exposed to the EU, and is expected to be among the hardest hit. Given the importance of London for measures of UK regional inequality, the outlook for London has had a lot of scrutiny. This report finds that the outcome for London, and therefore overall regional inequality, is uncertain. While it has large exposure to sectors that are among those most affected by Brexit, the degree to which its exports are focused on the EU market matters hugely. There is significant volatility over time in this, and early evidence suggests that London is in fact adapting to Brexit faster than other regions. Overall, Brexit is unlikely to drive the large improvements in regional inequalities hoped for by some.

Finally, the lasting impact of a less open UK, looks to be suppressed real wage and productivity growth over the next decade. We estimate that, by 2030, the UK will be 7 percentage points less open, have 1.3 per cent lower productivity, and real wages will be around 1.8 per cent lower than in the absence of Brexit. The changes to UK production to focus more on the domestic market means it tends to be less productive sectors that gain, for example manufacturing sector growth is concentrated in lower productivity sectors – the weighted average productivity of shrinking manufacturing sectors was £47 per hour but it was only £37 per hour for growing sectors.

## The new arrangements with the EU will introduce big barriers to trade in services

This report undertakes a new modelling assessment of the TCA in order to provide evidence on the scale and distribution of the impacts of Brexit still to come over the next decade. This is important because adjustment to leaving the EU will take time: it will take

time for the new trading arrangements to be implemented in full; and capital and labour will move slowly.

A number of papers have assessed the overall impact on the UK of leaving the EU.<sup>37</sup> These typically modelled an average or deep free trade agreement scenario, alongside other scenarios covering a range of outcomes such as no deal, remaining in the single market or in the customs union. Yet few have revisited these assessments to re-evaluate the expected impacts now the scope and provisions of the final deal are available for assessment.

One study which has provided an assessment of the TCA in its final form, is the paper by the UK Trade Policy Observatory (UKTPO), and our assessment of the deal in this report builds upon this.<sup>38</sup> This approach taken provides an assessment of the new barriers faced by firms in three key areas:

1. Regulatory costs associated with 'rules of origin' requirements which some firms must meet to access the preferential zero rate tariffs available in the TCA. These barriers are estimated to be equivalent to between a 3 and 5 per cent tariff across sectors.
2. Regulatory costs associated with other non-tariff barriers introduced as the UK leaves the single markets for goods. Econometrically estimated trade barriers for deep trade agreements are used for sectors assessed to have sufficiently broad equivalence provisions in the TCA – specifically motor vehicles, aircraft and pharmaceuticals. Other goods sectors take the without trade agreement estimate as the provisions are not considered sufficient to meet the required depth.
3. Regulatory barriers facing services providers as a result of the UK leaving the single market for services. This draws on past econometric estimates of the difference between barriers in the single market and under most favoured nation (MFN) services market access, estimated to have a trade distorting effect equivalent to a tariff of between 5 and 26 per cent.

Our assessment uses a Quantitative (Computable) General Equilibrium model with regionalised inputs and a dynamic adjustment driven by regional and sectoral labour-market variation. It models the global economy, providing projections of the impact of trade barriers on people, firms and places in the UK. Box 1 provides further details on the adjustments to the model and the full specification of the trade models used in this report are set out in Annex 2.

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<sup>37</sup> For example, see: S Dhingra et al, [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017; Ebell & Warren, 2016; [HM Government, 2018](#)

<sup>38</sup> I Fusacchia, L Salvatici & A Winters, [The consequences of the Trade and Cooperation Agreement for the UK's international trade](#), Oxford Review of Economic Policy, Volume 38, January 2022.

## BOX 1: The trade model and adaptations

The analysis uses a richer formulation of the Centre for Economic Performance (CEP) quantitative trade model, a quantitative Computable General Equilibrium model, used for several past assessments of Brexit.<sup>39</sup>

The adaptations to the model include:

### 1. Regionalised input-output tables

The model has also been regionalised for the UK at the ITL1 level (UK nations plus nine English regions) by combining the World Input-Output table with the regional shares from EUREGIO (a global input-output database with regional detail for Europe).<sup>40</sup> This enables the model to produce a regional assessment of the impacts and adjust the inputs for different regions, utilised to assess the Northern Ireland Protocol, by adjusting the barriers applicable to Northern Ireland.

### 2. Dynamic outputs based on labour market adjustment

A dynamic adjustment mechanism is added to the model, to represent the fact labour market adjustments to a shock often take time to materialise. It uses labour market data on workers moves between sector-regions in the LFS (between 2009 – 2021) with data on real wage changes, to determine a

labour market elasticity. This controls the rate of movement of workers across different regions and sectors following the trade shock and enables the model to assess the time path of structural adjustment in the economy.

### 3. Dynamic inputs accounting for delayed implementation and gradual forgone integration

The newly dynamic model allows for the time path of barriers to be set. Our central scenario assumes that had the UK remained a member of the EU it would have been party to gradual further EU integration between 2021 and 2030, equivalent to an average 5.6 per cent tariff reduction across sectors which is aligned to the LSE's past assessments of an optimistic soft Brexit scenario. Delayed customs checks on UK imports and temporary equivalence granted to financial services providers can also be included.

However, as the dynamic adjustment to the model necessitated the model containing less disaggregated sectors (from 55 to 19 sectors), the static version of the model is also used in places to provide more detailed sectoral insights.

<sup>39</sup> For example, see: S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017. This version is the fully specified dynamic model of Calendo, Dvorkin & Parro (2019) which features regions and region-sector mobility of workers. It is parametrized based on data for the UK economy.

<sup>40</sup> M Thissen et al., [EUREGIO: The construction of a global IO DATABASE with regional detail for Europe for 2000-2010](#), Tinbergen Institute, October 2018.

The new assessment undertaken in this report has five key features which help us to present the fullest and most detailed assessment of the TCA to date. The first two relate to improvements made to the UKTPO assessment of the TCA and the final three are made possible due to the regional and dynamic assessments to the model. These features are listed below:

1. Tariffs:

Most assessments have assumed that, in the absence of a 'no deal' Brexit, tariffs will remain at zero across tariff lines. But, as firms now face higher regulatory barriers to access these preferential tariffs (relating to rules of origin requirements), some other assessments have adjusted upwards the non-tariff barriers estimate. The trade data shows many UK firms are actually paying tariffs to export to the EU, as they are either unable to, or find the costs of meeting the requirements exceed the benefits from not paying the tariff. This assessment uses preference utilisation rate to account for the paid tariffs – which adds up to a further 4.5 percentage points (for manufacture of textile) to estimates non-tariff barriers. It assumes costs of complying with rules of origin requirements are choosing to use preferential tariffs are included in the non-tariff estimates.

2. Services trade:

The UKTPO assessment compared the barriers without a deal to those within the single market. This assessment reduces this increase in barriers, to account for the services provisions within the TCA. However, although the provisions in the TCA are comparable with past EU trade agreements considered to be deep on services, such agreements have not in the past been successful at securing substantial services market access. Reflecting this, the TCA only secures a very small share of the services market access the UK enjoyed in the single market (between 80 per cent and 100 per cent of their levels in the absence of a deal). As with other trade agreements covering services, provisions in the TCA typically lock-in the liberalisation already applied to non-EU trading partners rather than securing additional liberalisation, for example equivalence agreements that would replicate the existing market access such as replacing EU passporting rights for financial services

3. Northern Ireland Protocol (NIP):

Under the protocol, EU free movement of goods rules and EU Customs Union rules still apply to Northern Ireland but not the rest of the UK. To reflect this in the modelling, the barriers to goods trade are not implemented between Northern Ireland and the EU, and instead as

checks will instead take place on goods moving from Great Britain to Northern Ireland in line with the current implementation of the NIP.

#### 4. EU Integration:

Over time the EU has deepened integration by introducing further measures to align regulatory standards and practices across member states. This is expected to continue over the next decade, but as the UK will be outside the EU it will not benefit from these lower barriers. Our assumption on further integration is aligned with past analysis by the CEP, which assumes further EU integration will be equivalent to a 5.6 per cent tariffs on all trade in their optimistic 'soft' Brexit scenario of how UK-EU trade will evolve.<sup>41</sup> However, instead of a flat 5.6 per cent ad valorem equivalent barrier applied across sectors, in this analysis, EU integration varies across sectors to account for higher expected future integration in sectors the EU has successfully liberalised in the past. For example, it is assumed to be higher for professional services, and lower in sectors it has been less successful, for example utilities.

#### 5. Delayed implementation of barriers:

The dynamic nature of the model allows for delayed implementation of certain barriers. To reflect this, 25 per cent of the goods barriers introduced on EU imports to the UK are delayed to account for the implementation period for customs checks, and 50 per cent of the financial services barriers on imports from the EU were delayed until 2024 to account for the temporary permissions regime which enabled financial services firms already operating in the UK to continue doing so.

No changes have been modelled to non-EU trade barriers. This means we assume the rolled over trade agreements were successful in maintaining market access to these markets, while new agreements signed, with Australia and New Zealand, and those being negotiated, for example with India, are not assessed. This is in line with the OBR assumptions that new trade deals with non-EU countries will not have a material impact.<sup>42</sup> However, our previous work has looked at the potential impacts of these agreements on the UK.<sup>43</sup>

The full details on the methodology for assessing the TCA are available in Annex 1.

### Estimated barriers under the TCA

Based on this detailed assessment of the deal, trade barriers are expected to increase by more in primary and services sectors than for manufacturing, as shown in Figure 11. The

<sup>41</sup> S Dhingra et al., *The costs and benefits of leaving the EU: trade effects*, Economic Policy 32(92), October 2017.

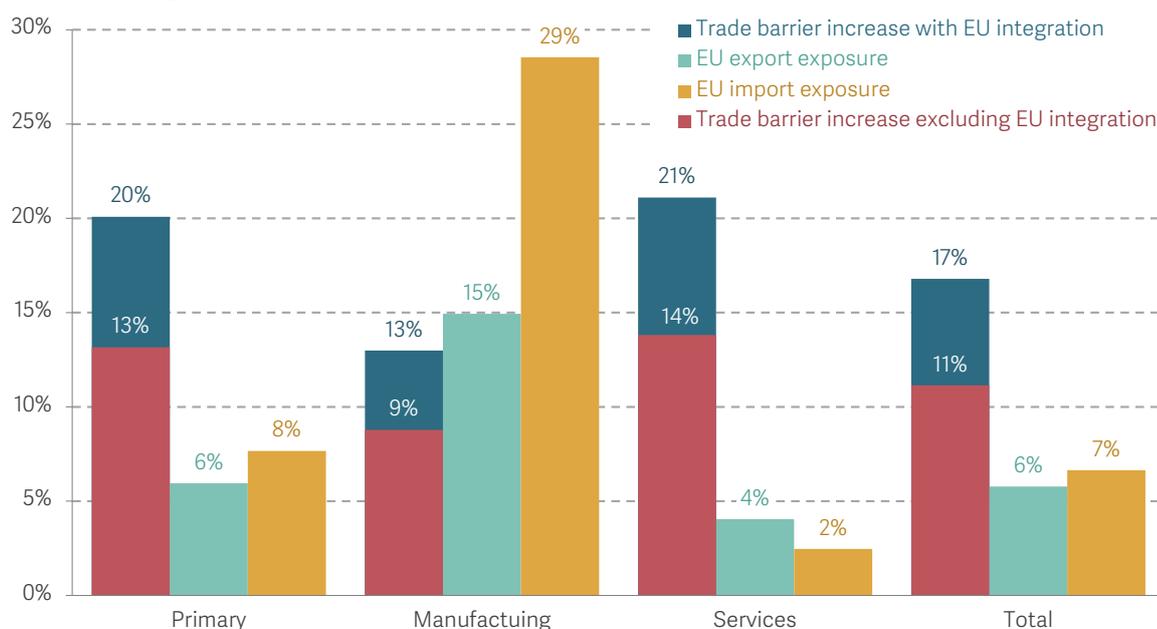
<sup>42</sup> OBR, *Brexit analysis – current assumptions and judgements*, 2022.

<sup>43</sup> See: S Hale, *A presage to India: Assessing the UK's new Indo-Pacific trade focus*, Resolution Foundation, January 2022 and S Hale and J Smith, *More trade from a land down under*, Resolution Foundation, December 2021.

new frictions in trade with the EU are measured in ad valorem equivalent terms – this is the tariff or border tax that would have an equivalent impact on trade as the changes to regulatory measures. The estimated barriers are equivalent to a 9 per cent increase in tariffs for manufacturing, and a 14 per cent increase for services. This rises to 13 percent and 21 per cent as forgone EU integration over time is included. The high agriculture trade barriers are driven by the TCA achieving little in terms of regulatory equivalence on sanitary and phytosanitary regulatory restrictions (quarantine and biosecurity measures which are disproportionately applied to food, chemicals and plant or animal-related products to protect human, animal or plant life or health) which are particularly high for agricultural products.

**FIGURE 11: Barriers rise most for services and agriculture but manufacturing is more exposure to the EU market**

Increase in trade barriers and exposure to EU exports and imports by aggregated industry in 2014



NOTES: Exposure is assessed in the base year data of the model which is 2014. EU export exposure measured as EU exports as a share of gross output and EU import exposure is EU imports as a share of gross output. Trade barriers include both tariffs and non-tariff barriers and are presented in ad valorem equivalent terms, which gives the tariff / import tax that would have an equivalent trade distortionary effect.

SOURCE: Analysis of TCA with and without EU integration and World Input Output Database (2014).

Within services, more highly-regulated professional services sectors will see even larger barriers. For example, the trade barriers for financial services are estimated to be equivalent to a 26 per cent tariff, but the barriers for the construction sector are just 8 per cent. This is vital for UK exports, where 20 per cent of our services exports to the EU are in highly-regulated finance and insurance, and a further 18 per cent are in other highly-regulated services sectors, including legal and accounting, architecture and

engineering and air transport services. This is almost twice the global share of services exports for these regulated services categories. However, as the manufacturing sector remains more exposed to EU trade, as measured by EU exports and imports as a share of sectoral output, even these smaller shocks have the potential to garner a relatively large trade response.<sup>44</sup>

There is also variation across how big a trade shock regions experience, due to their sector composition and their varying exposure to the EU. Northern Ireland output is the most exposed to the EU (trade with the EU as a share of gross output is greater than the UK average), but the Northern Ireland adjustment reduces the scale of the new trade barriers. Meanwhile London, the South West and Scotland are among the least exposed in our base data. As there is some uncertainty about how firms located across multiple UK regions operate, an alternative specification of the model is also run as a sensitivity which equalises the EU exposure of sectors across regions and the results are discussed in Annex 3.

The overall scale of these new barriers is large. The new relationship with the EU implies an increase in trade costs of 10.8 per cent for exports to the EU and 11.0 per cent for imports from the EU – which rises to 16.2 per cent and 16.6 per cent when forgone EU integration is included. By comparison, the US-China trade war, increased the average tariff on Chinese imports from 4 percent to 21 per cent, a 17 percentage point increase.<sup>45</sup> This is similar in scale to the average increase in barriers with the EU, however the scope of the new barriers in the US was much smaller as services were not affected and US-China trade makes up a much smaller share of total US trade.

The core scenario used throughout this section includes EU integration, but where relevant, the results without the forgone EU integration are shown to demonstrate the direct impact of the new barriers introduced by the implementation of the TCA relative to the longer-term losses from forgone integration.

## These new trade arrangements will lead to big adjustment for some sectors

The large overall shock to trade is not evenly distributed across sector as shown in Figure 12. Some sectors are set to see large shocks to both imports and exports, such as agriculture, while for others the shock is more asymmetric, such as financial services where imports are expected to fall by 55 per cent (the second largest fall across sectors) but exports by only 22 per cent (slightly less than the average fall in exports). The manufacturing sector is important as it accounts for around 40 per cent of UK exports

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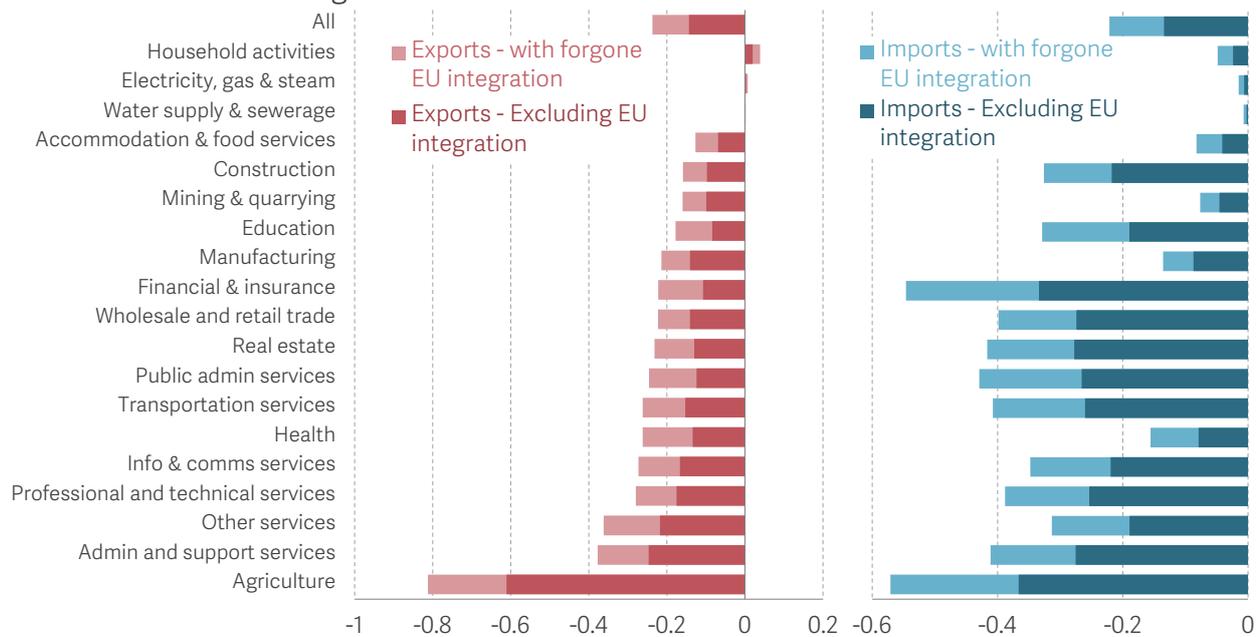
<sup>44</sup> The elasticity of trade also varies between sectors and is highest in agriculture and lowest across manufacturing sectors.

<sup>45</sup> C Brown, [US-China Trade War Tariffs: An Up-to-Date Chart](#), Peterson Institute for International Economics, April 2022.

and, although the shocks to manufacturing are both below average, UK exports are expected to perform worse than imports.

**FIGURE 12: UK trade falls across sectors, with the biggest export falls in agriculture and services**

Percentage change in UK exports and imports, with and without further EU integration, relative to remaining in the EU: 2030



SOURCE: Analysis uses CEP trade model from S Dhingra et al., *The costs and benefits of leaving the EU: trade effects*, Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey.

These trade shocks feed into changes in output across sectors – lower exports will drag on a sectors economic performance, while lower imports will lead to less import competition, but also have knock on impacts on the price of inputs. We can use a static version of the model to provide a more disaggregated assessment of which subsectors will experience the biggest output shocks as shown in Figure 13.<sup>46</sup>

Professional services, including finance, professional and technical services and information and communication services, are expected to have the largest trade barriers introduced in the transition to trading with the EU under the TCA. Almost all of the sectors within this industry experience larger than average output shocks and none are among the few sectors expected to grow.

The UK’s primary industries (agriculture and mining) see more variation in the impact across sectors. For example, while changes to the trading arrangement with the EU are

<sup>46</sup> The static model gives a different scale of results but the relative impacts between regions and sectors closely aligns to the dynamic model – see Annex 3 for a full explanation.

expected to bring gains for British agriculture, it will also deliver a 30 per cent negative output shock to fishing, which is expected to be one of the hardest hit sectors.

How do we reconcile this with the fact British farmers have been among the most vocal about the challenges they have faced post-Brexit?<sup>47</sup> The highly responsive (high trade elasticity) agriculture sector is expected to see the largest fall in exports of any sector as shown in Figure 12, with more than a 90 per cent fall in exports to the EU expected. For existing exporters this will be a painful adjustment. Yet a much broader base of agricultural producers are expected to gain from the fall in import competition from the EU for domestic consumers. Imports are expected to fall by more than 50 per cent as consumers substitute from the now more expensive EU goods to domestically produced agriculture. However, Brexit has not only impacted trade policy, it has also impacted migration policy which has a direct effect on the availability of seasonal labour required in the agriculture industry. These wider policy changes and their impact on labour costs are not accounted for in the modelling and, as such, gains from agriculture are unlikely to materialise as suggested. Meanwhile British fishers that are highly reliant on EU exports for their revenues now face new barriers to sell to EU consumers, and the cost associated with these barriers outweigh the gains from less competition from EU fish exporters.

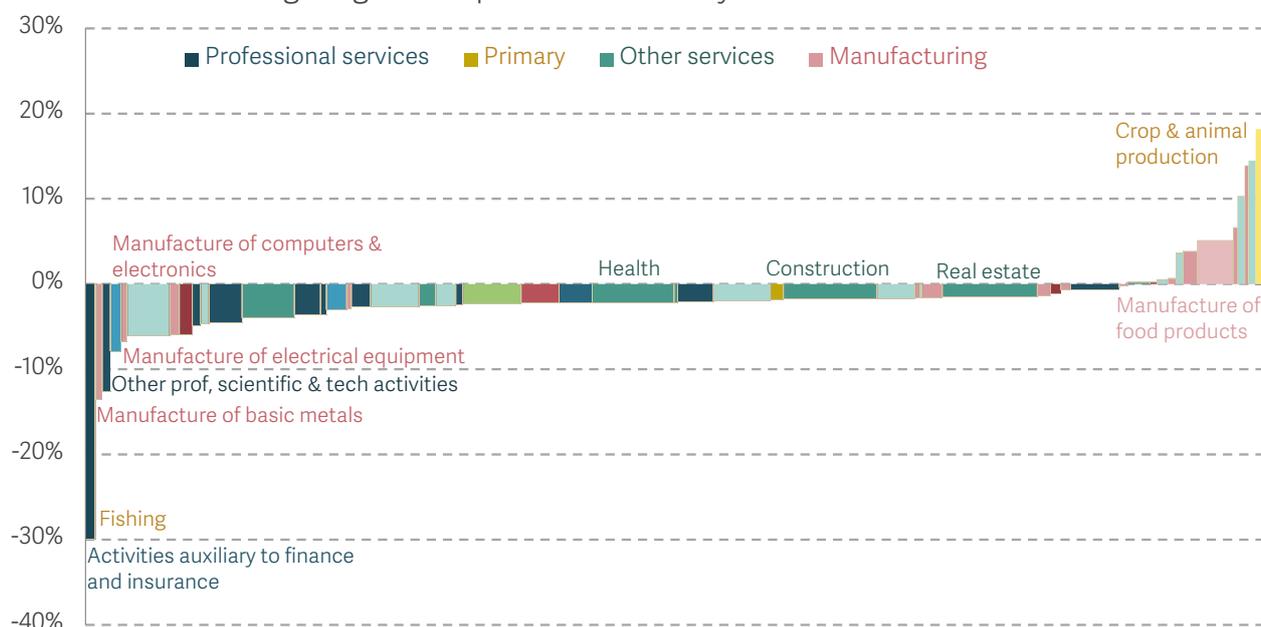
This variation in subsector performance is also likely to be evident in the manufacturing sector. Figure 13 shows the impact on manufacturing subsectors are relatively polarised – with some sectors set to experience big negative output hits, while others grow. Manufacturing of food and beverages is the largest manufacturing sectors that is likely to grow, with output set to be 5 per cent larger as a result of Brexit. On the other hand, manufacture of electrical equipment and of basic metals are both estimated to experience the largest negative output shocks, with output expected to be 7 and 14 per cent smaller than inside the EU respectively. The difference in the outcome for these sectors is also driven by their relative exposure to EU exports and imports – as manufacture of food is more exposed to EU imports the benefits from lower import competition exceed the negatives from lost market access.

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<sup>47</sup> For example, see: [Brexit: Tonnes of beetroot left to rot as EU firms look elsewhere](#), BBC News, accessed 20 June 2022; [Why has Boris Johnson's Brexit deal caused UK milk and cream exports to plunge?](#), Independent, accessed 20 June 2022.

**FIGURE 13: Some sectors expected to see substantial negative output shocks, while other grow**

Estimated change in gross output due to Brexit by sector in 2030: UK



NOTES: Width of bars represent the size of the sector (gross output in the baseline). Static form of the model is used as it can provide a more detailed sectoral breakdown of the results. See Annex 3 sensitivities for more information of the difference between the two models results.

SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database.

Some of these sectors are relatively small in terms of their contribution to output or overall employment. For example, just 5,000 workers were employed in the fishing sector in 2019 and a further 75,000 in the manufacture of basic metals.<sup>48</sup> However, these workers and others in the worst-affected sectors face painful adjustments with big hits to livelihoods and increased job uncertainty. Our previous work found that those experiencing involuntary job loss not only face an immediate income hit, but face a longer period in unemployment (compared to those moving voluntarily) and are expected to return to jobs that pay less than the one they left. For example, between 1995 to 2020, median real hourly pay growth was -1.1 per cent among those who had experienced an involuntary period out of work within the past year, compared to 2.1 per cent among all workers.<sup>49</sup>

<sup>48</sup> Source: ONS, [Earnings and hours worked, UK region by industry by two-digit SIC: ASHE Table 5](#), 2019.

<sup>49</sup> N Cominetti et al., [Changing jobs?: Change in the UK labour market and the role of worker mobility](#), Resolution Foundation, May 2021.

## But Brexit is not expected to transform the nature of the economy

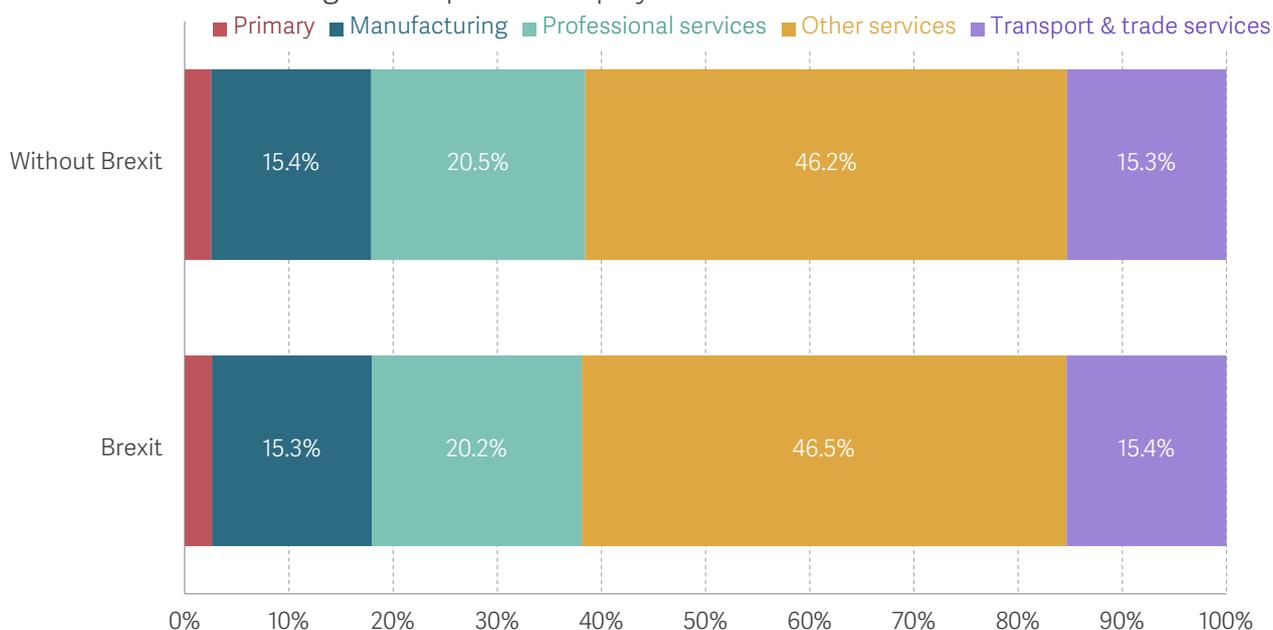
Despite the variation in trade and output shocks across sectors, our assessment of the long-run impacts suggests the change to the broad sectoral structure of the economy, trade specialisation and regional inequality will be relatively small.

The UK's broad sectoral structure will not see radical changes

As expected, given the scale of barriers introduced, tradeable and professional services, such as finance and business services, are set to see the largest output losses. We estimate that the contribution of these sectors to gross output will fall by 0.3 percentage points, from 20.5 per cent to 20.2 per cent of gross output, as shown in Figure 14.

**FIGURE 14: The share of output from professional services is expected to fall due to Brexit**

Estimated share of gross output made up by broad industries in 2030: UK



NOTES: Primary industry includes agriculture and mining sectors, professional services includes finance and insurance, information and communication services and professional, scientific and technical services, transport and trade services includes transportation services and wholesale and retail trade, other services includes all other services sectors.

SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey.

The share of gross output from the manufacturing sector is also set to shrink marginally, by 0.1 percentage point in the core EU integration scenario, falling from 15.4 per cent to 15.3 per cent of gross output. In aggregate, this impact is obviously very small, amounting to less than half of the average year's decline in manufacturing share of the economy this century. However, this disguises variation within subsectors and regions, and this

can drive small gains in alternative specifications of the model (see Annex 3 for more information on the sensitivities modelled).

All this means that the impact of Brexit on the structure of the economy and labour market will be contained. The labour market is set to experience relatively small and gradual disruption. Indeed, our assessment suggests that less than 0.5 per cent of the workforce, equivalent to 132,000 people, will move from their current region-sector as a result of Brexit, and the moves that do occur will be spread over many years. So, while Brexit looks set to put further downward pressure on real wage growth – in the context of the ongoing cost of living crisis – it is not expected to lead to large scale movement of workers to new regions or sectors in search of work.

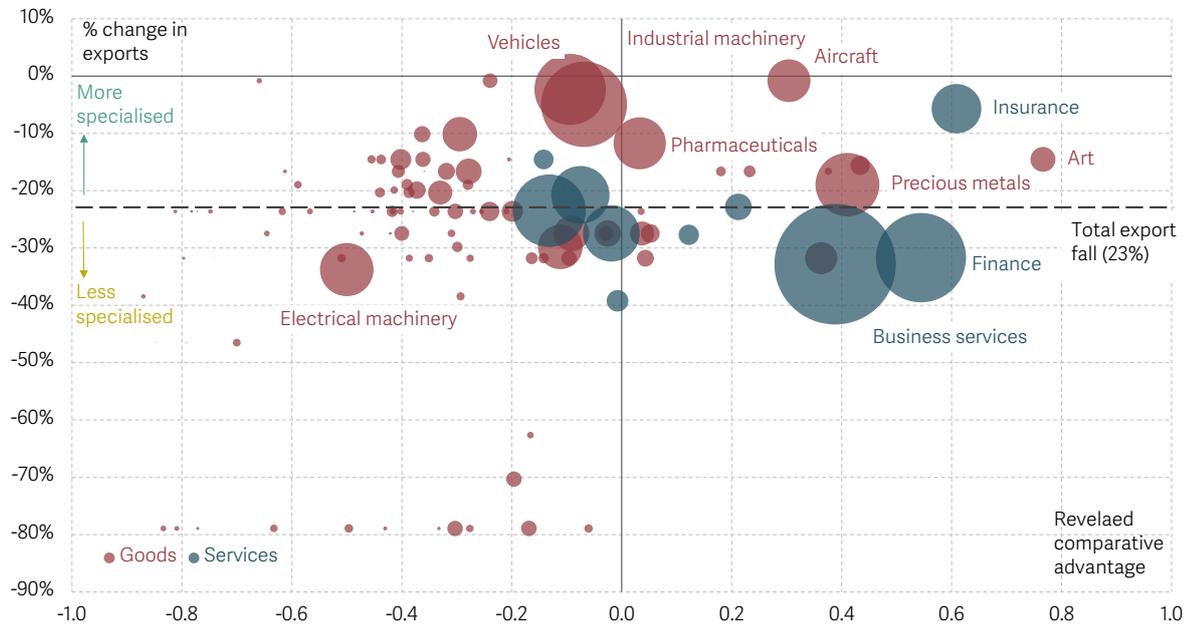
### The UK's trade specialisation will only change a small amount

The assessment of the impact of the new trading arrangement with the EU also suggested substantial variation in the trade shocks experienced across sectors. But what does this pattern of trade shocks mean for the trade specialisation of the UK economy? Again, using the static modelling to benefit from more sectoral disaggregation, Figure 15 shows that the economy is expected to become less specialised in services overall, while goods trade is set to specialise further in line with existing specialisation, for example in vehicles, aircraft and pharmaceuticals. The fall in services specialisation is driven by larger-than-average falls in exports of two large exporting sectors in which the UK is highly specialised: financial services and other business services. Insurance stands out here as the only service sector that the UK is highly specialised and that is expected to see an increase in specialisation due to Brexit.

The largest goods sectors set to see increased specialisation are transport and industrial machinery manufacturing, which are relatively inelastic so are expected to see smaller trade responses to trade shocks. By contrast agricultural sectors, which are much more highly elastic, have seen larger expected falls in exports. Overall, this leads the UK to increase its specialisation in existing goods export strengths.

**FIGURE 15: The UK is specialising along existing goods specialisation but less in services overall**

Long-term estimated change in exports due to Brexit by sector and revealed comparative advantage in 2019: UK



NOTES: Revealed Comparative Advantage (RCA), a measure of the UK’s relative export specialisation compared to global exports, in 2019 is along the vertical axis. Change in the share of UK exports is on the horizontal axis. Sectors from the model are matched to the HS2 and EBOPS sectors (the classification typically used for sectors and products in international trade data) used to estimate the RCA. SOURCE: Analysis of RCA from: J De Lyon et al., *Enduring strengths: Analysing the UK’s current and potential economic strengths, and what they mean for its economic strategy, at the start of the decisive decade*, Resolution Foundation, April 2022; change in exports uses CEP trade model from S Dhingra et al., *The costs and benefits of leaving the EU: trade effects*, Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database.

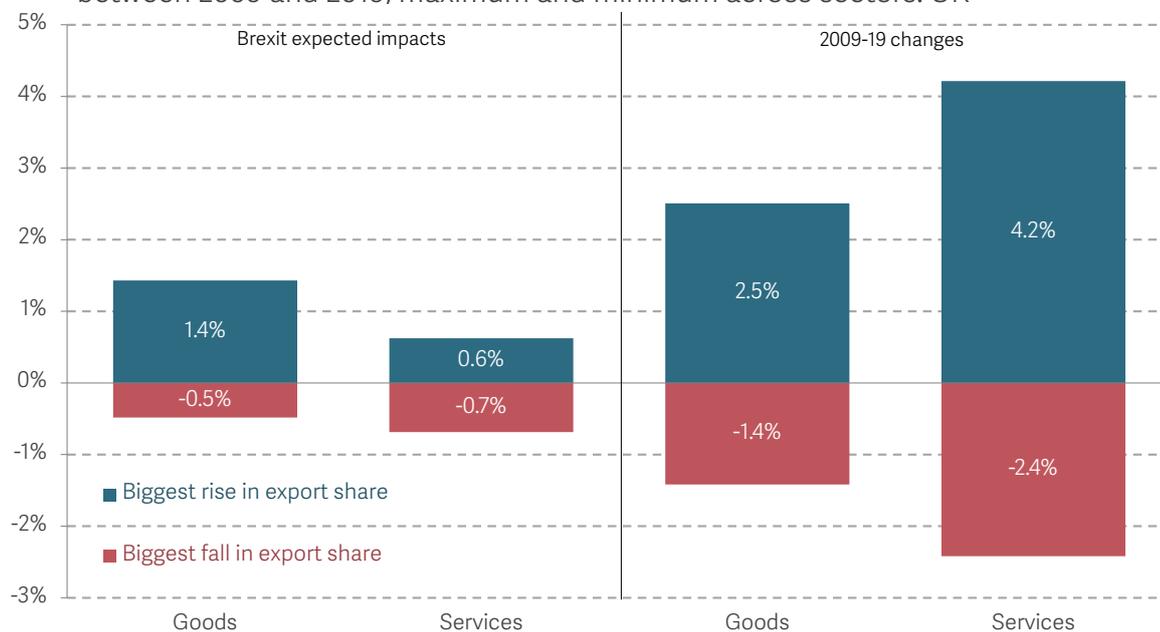
Although the scale of the fall across exports is large and there is variation across sectors, the overall change in the broad specialisation of exports is small. As shown in Figure 16, the overall change in the export shares of goods and services is limited, and is smaller than the change in export share experienced over the past decade. The normal pace of change in UK trade specialisation, experienced over the past decade (2009 to 2019), was itself considered slow as comparative advantage are highly persistent over time.<sup>50</sup>

This suggests that although the destination of our exports and our level of openness will be transformed, the type of exporter and comparative advantages of the UK economy are unlikely to fundamentally shift as a result of Brexit.

<sup>50</sup> J De Lyon et al., *Enduring strengths: Analysing the UK’s current and potential economic strengths, and what they mean for its economic strategy, at the start of the decisive decade*, Resolution Foundation, April 2022.

### FIGURE 16: The changes to specialisation are small relative to historical changes

Long-term estimated Brexit impact on export shares and change in export shares between 2009 and 2019, maximum and minimum across sectors: UK



NOTES: Modelled sectors outcomes are matched to the HS2 and EBOPS sectors (the classification typically used for sectors and products in international trade data) with a total of 95 goods sectors and 10 services sectors.

SOURCE: Analysis of Brexit impacts uses CEP trade model from S Dhingra et al., *The costs and benefits of leaving the EU: trade effects*, Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database; 2009-2019 values from analysis of Harvard Growth Lab, Atlas of Trade Complexity; OECD-WTO, *Balanced Trade in Services*; IMF, *World Economic Outlook 2022*.

Although there is some uncertainty about the regional impacts, overall it is clear that Brexit will not help significantly with 'levelling up'

The variation in experience sectors means that the overall impact will not be evenly spread across geographies.

In the public debate on Brexit, a lot of attention has been given to the extent to which Brexit will worsen or improve existing levels of regional inequality.<sup>51</sup> Here, our assessment is that the North East is expected to be among the hardest hit from Brexit in terms of output, while the East of England and Scotland are consistently expected to somewhat outperform the average. The North East, one of the poorest regions in the UK, is highly exposed to the EU market and by 2030 will see manufacturing output fall by 2.7 per cent relative to the baseline, as well as falls in regulated services such as professional, scientific and technical, and finance and insurance of 4.1 and 4.0 per cent. This is likely to further increase the region's existing substantial productivity and income challenges.

<sup>51</sup> For example, see: S Dhingra, S Machin and H Overman, *Local economic effects of Brexit*, CEP Brexit analysis, November 2017; Chen et al 2018; Los et al 2017.

Northern Ireland also looks set to fare less badly than most, driven by the Northern Ireland protocol (NIP), with total output declining by just 0.7 per cent relative to the baseline. When the NIP is removed, Northern Ireland falls to the fourth least affected, with an output shock of 1.1 per cent, which is still better than the UK average of 1.3 per cent. For all other regions, the NIP has a very small positive effect, reducing the fall in output by approximately 0.01 percentage points.

A significant amount of public attention has been given to how London will fare relative to the rest of the economy, given its importance to regional inequality. Previous papers have shown London to be either the most or least affected region by Brexit.<sup>52</sup> Where the impact on London was found to be below average this was attributed to the fact that London has a relatively low exposure to EU trade, which was equivalent to just 7 per cent of London's output, lower than all other UK regions.

Overall, we find that the outcome for London – and therefore overall regional inequality – is uncertain. In contrast to earlier work by CEP, London's sectoral trade shares with different countries are used to model the exposure to Brexit. And product and labour markets within the country are assumed to be integrated, albeit not perfectly, with the rest of the UK. However, London's exposure differs across years. This results in uncertainty over just how exposed London's output is to a change in EU market access, but not uncertainty over the sectors most affected. The core EU integration scenario is presented alongside various sensitivities tested in Figure 17. While the core EU integration scenario suggests that London experiences a smaller than average decline in output, which would marginally widen existing regional inequalities, changing the base year data to 2018 reverses this conclusion as London becomes the worst hit region. The difference is driven by the differences in the underlying data on EU exposure of London across sectors, which moves from below average in 2014 to above average in the 2018 data.<sup>53</sup>

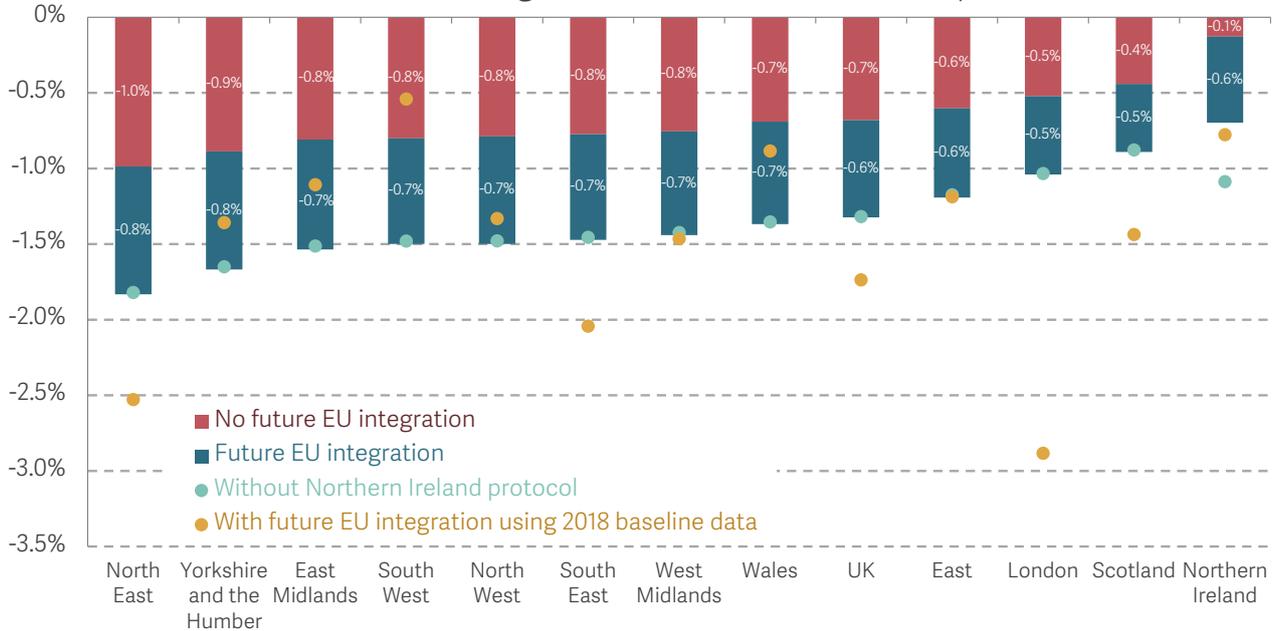
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<sup>52</sup> For example, see: Los et al., 2017 for London least affected; S Dhingra, S Machin & H Overman, *Local economic effects of Brexit*, CEP Brexit analysis, November 2017 for London most affected.

<sup>53</sup> This report uses 2014 base year data in the core scenario as this pre-dates any possible Brexit impacts. The 2018 base year sensitivity is used to test how results vary when modelling is based on more recent data that reflects the structural adjustment that has occurred over this period. The two base years are based on different data sources so are not fully comparable – 2014 uses the world input and output tables with regional shares from EUREGIO, while 2018 uses OECD input output tables with UK regional trade data. More details on sensitivities scenarios and data sources are available in Annex 2 and 3.

**FIGURE 17: Output shocks are expected to be largest for the North East, and smallest for London, Northern Ireland and Scotland relative to a no Brexit scenario**

Estimated falls in gross output by region relative to a no Brexit scenario, shock shown with contribution of future EU integration, and the Northern Ireland protocol: UK, 2030



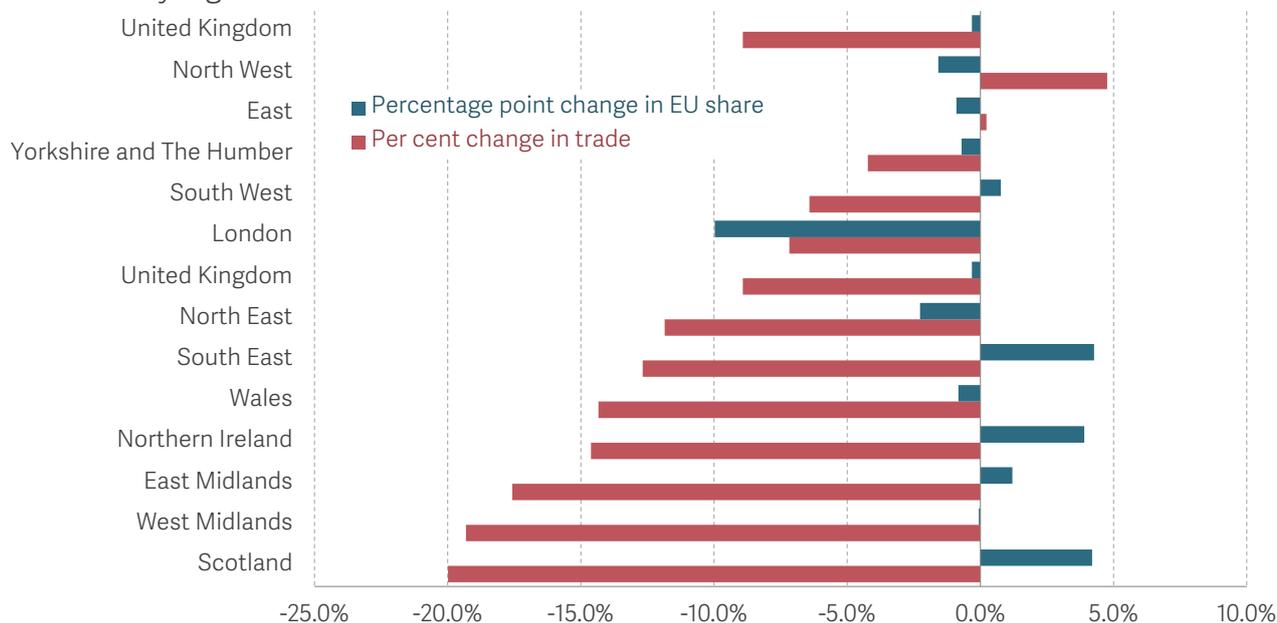
NOTES: The LSE model uses 2014 data so that any early effects of the Brexit referendum do not affect the results. A sensitivity is calculated with 2018 base data shown in this chart. More details on this sensitivity can be found in Annex 3.

SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey; 2018 baseline data uses OECD Input Output tables and ONS, regional trade statistics.

Early evidence suggests London is, in fact, adapting to Brexit faster than other regions. Regional goods trade data for London shows that while the overall volume of exports fell by less than average, London is leading all other regions in the fall in its share of exports going to the EU between 2019 and 2021, which fell by 10 percentage points. More productive London-based goods-producing firms appear to be finding it easier to respond to the new trade barriers with the EU by exploiting export opportunities outside the EU. However, this assessment is limited as equivalent services data is not available but is particularly important to London’s overall trade.

**FIGURE 18: London's EU share responded the most of any region even though it experienced a below average change in the value of exports**

Percentage change in regional goods exports relative to a no Brexit scenario and percentage point change in the EU market share of goods exports between 2019 and 2021 by region: UK



SOURCE: Analysis of HMRC Regional Trade Statistics Q4 2021.

But overall, the differences between regional outcomes are relatively small and will not drive the large regional productivity improvements suggested by some who advocate Brexit will help poorer areas to 'level up'.

## The larger, long-lasting impact of a less open UK will be lower real wages and productivity growth over the next decade

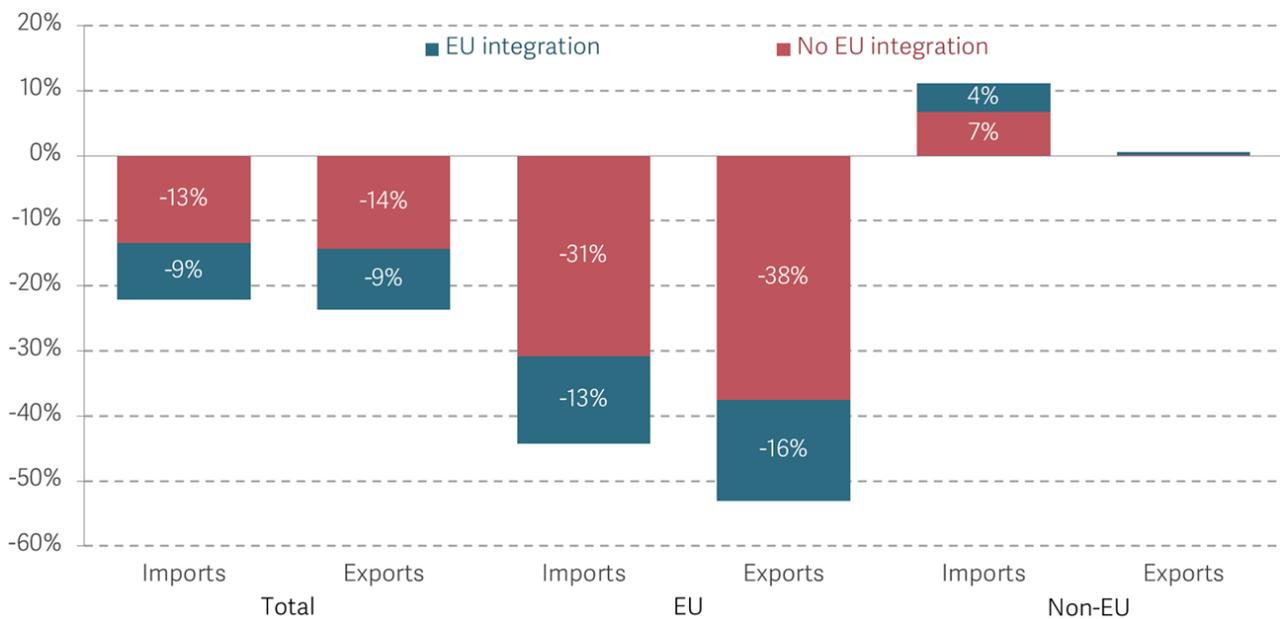
While Brexit is not expected to be transformational for the structure of the UK economy, it will lead to a broad-based reduction in workers' productivity and pay. Introducing new trade barriers with as large and close a trading partner as the EU is widely expected to reduce the UK's trade openness to an extent that it cannot be easily offset with other trade policy. The UK is limited both in its ability to liberalise trade with partners that represent a large share of trade and to deliver agreements of comparable depth to the Single Market.<sup>54</sup> In turn, a less open UK will mean a poorer and less productive one by the end of the decade. Below we discuss the results of our assessment of what all this will mean for the eventual, long-run impact on the UK economy along with the adjustment to date.

<sup>54</sup> J De Lyon et al., *Trading places: Brexit and the path to longer-term improvements in living standards*, Resolution Foundation, October 2021.

Exports to the EU are expected to be 38 per cent lower than they would have been inside the EU by 2030, with a further 16 per cent decline due to forgone further integration with the EU. As shown in Figure 19, this means that, by 2030, the share of UK exports to – and imports from – the EU is expected to have declined by 17 percentage points. In the latest trade data, the share of imports from the EU had fallen by less than 5 percentage points, and for exports the share remained unchanged. This indicates significant further trade adjustment is still to come, as global trade normalises, and with it further falls in real incomes and output.

**FIGURE 19: Trade will decline with the EU relative to outside the EU**

Estimated falls in exports and imports with the EU, outside the EU, and with the world in 2030: UK

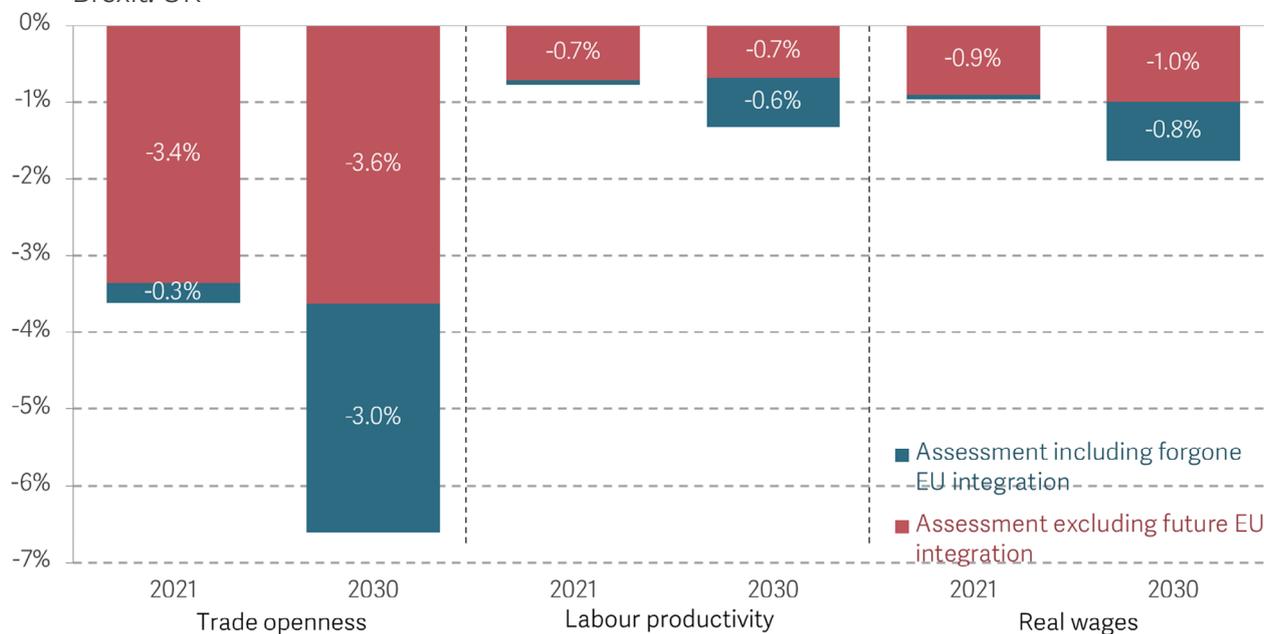


SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey.

Trade openness is expected to be 6.6 percentage points lower by the end of 2030 due to Brexit, with slightly more than half this trade impact expected to materialise in 2021 (Figure 20). However, although this assessment can provide insights into the scale and expected path of adjustment that might occur, it does not account for the disruptive impacts of other policy changes and other global shocks, such as Covid-19. As discussed in Section 2, Covid-19 has disrupted global supply chains and could be contributing to some of the disruption to UK trade, although it should be expected to wane over time as pandemic restrictions have eased.

**FIGURE 20: The fall in trade openness, output and real wages will materialise over time**

Estimated falls in trade openness, gross output and real wages in 2021 and 2030 due to Brexit: UK



SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey.

A less open UK is expected to be a poorer and less productive. We estimate that the fall in trade openness will be accompanied by a 1.3 per cent fall in labour productivity and 1.8 per cent fall in real wages, equivalent to a loss of £472 per worker per year, by the end of 2030. This is equivalent to losing a quarter of the productivity growth over the past decade. Almost half of these impacts are driven by forgone EU integration, which makes the relative size of the barriers with the UK even larger for EU firms, who now face even smaller frictions within the EU.

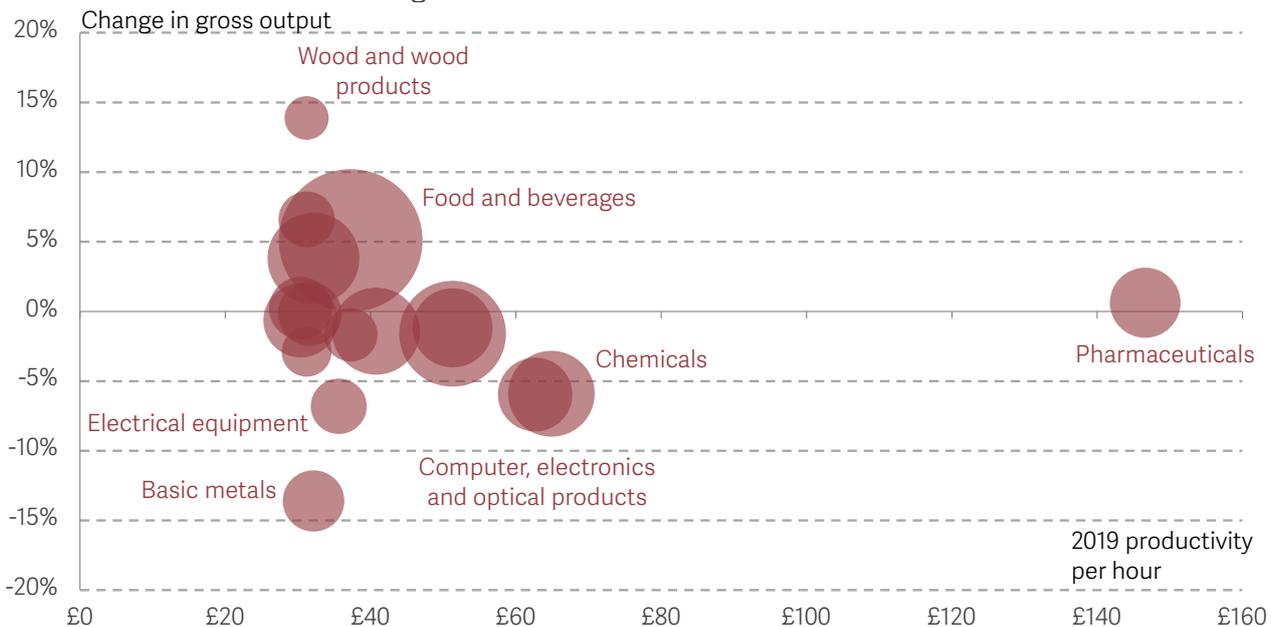
The manufacturing subsectors that are likely to grow will tend to be lower productivity ones

In response to the new trading arrangement, UK firms and sectors will adjust by reorienting production to focus on the UK markets. Some have suggested that Brexit could set into motion a revival of British manufacturing that could deliver productivity gains. However, our assessment suggests the overall contribution of manufacturing to the economy is not expected to radically change. Moreover, unfortunately given the UK's dire ongoing productivity performance, the transition towards a focus on the domestic markets will create the largest gains for the lower productivity sectors that were less internationally competitive and previously struggled to compete with EU imports. Figure 21 shows that growing sectors tended to have below average productivity in 2019, and

the weighted average productivity of shrinking manufacturing sectors was £47 per hour compared with £37 per hour for growing sectors. This highlights that, even if leaving the EU does lead to a small manufacturing revival, this is unlikely to be a recovery led by new, high value-added manufacturing jobs and instead, new opportunities are expected to be in lower productivity, lower-paid manufacturing sectors.

**FIGURE 21: Growing manufacturing sectors tend to be lower productivity**

Expected long-run percentage change in gross output compared to productivity per hour across manufacturing sectors: UK



NOTES: Bubble size represents relative gross output of the sector after Brexit.  
 SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and ONS, Nominal output per hour by industry (2019).

While the overall scale of the productivity impact (a 1.3 per cent fall in the long run) is small compared to the headline figures from other studies, we are focused on the impact coming through trade. For example, OBR estimates on the productivity impact are based on a range of studies, using an average value for the total impact to productivity of 4 per cent. However, our analysis only assesses the direct impacts coming through the trade channels. It does not, for example, account for the impacts on investment, nor changes to other policy areas, for example migration. Earlier analysis found that a reduced-form approach to modelling, which would capture a broader range of channels for the impact of Brexit on productivity. In particular, previous work suggests that including the impact

on investment and FDI, would more than triple the overall impact, with income losses from the same scenario increasing from between 1.3 and 2.7 per cent to between 6.3 and 9.4 per cent.<sup>55</sup>

Estimates of the trade impacts of Brexit in comparable models show similar results. Previous modelling of the trade impact of an average FTA – that is, similar to the final TCA but with a higher future EU integration than assumed here – found a 2.5 per cent fall in incomes per capita by 2030.<sup>56</sup> General equilibrium modelling by the IMF finds that UK GDP would fall by 2.5 per cent in an FTA scenario similar to the final TCA.<sup>57</sup>

Section 1 showed the impact of Brexit on investment was substantial and began well before the new trade barriers were implemented, although the evidence is less convincing on any material impact to FDI flows. The OBR assumes two-fifths of its 4 per cent estimated productivity shock happened before the TCA was implemented, leaving just 2.4 per cent to occur from the changes to UK trade post implementation of the TCA.<sup>58</sup>

Overall, then, our estimated impact on output, and therefore productivity, should be interpreted as a lower bound – capturing just the direct impacts through changes to trade. Brexit will create other shocks to the UK economy through related policy reforms and through the impact on investment, much of which have already materialised.

Real wages are set to be lower, with larger falls in regulated services and manufacturing

The impact of Brexit on wages will take time to emerge. Using the dynamic version of our model suggests that around 59 per cent of trade barriers were introduced by 2021, and around 54 per cent of falls in real wages had come through. This adjustment is essentially complete by 2030. This reflects the delayed implementation of certain barriers and that it takes time for the labour market to adjust. As a result, headline real wages are expected to be 1.8 per cent lower than they would if the UK remained in the EU, equivalent to £470 per worker every year, but real wage falls vary across regions and sectors.<sup>59</sup> Figure 22 highlights that the impact on wages is largest for finance and insurance, where real wages are estimated to decline by 3.4 per cent on average, equivalent to a £1,260 fall per person every year. Other service industries also experience large real wage impacts: for example, in professional, scientific and technical, and information and communication, wages are set to be 2.9 per cent and 2.3 per cent respectively, equating to wage falls of £950 and £860 per worker every year.

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<sup>55</sup> S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017.

<sup>56</sup> Bevington et al. [The economic impact of Boris Johnsons Brexit proposals](#), The UK in a Changing Europe, October 2019.

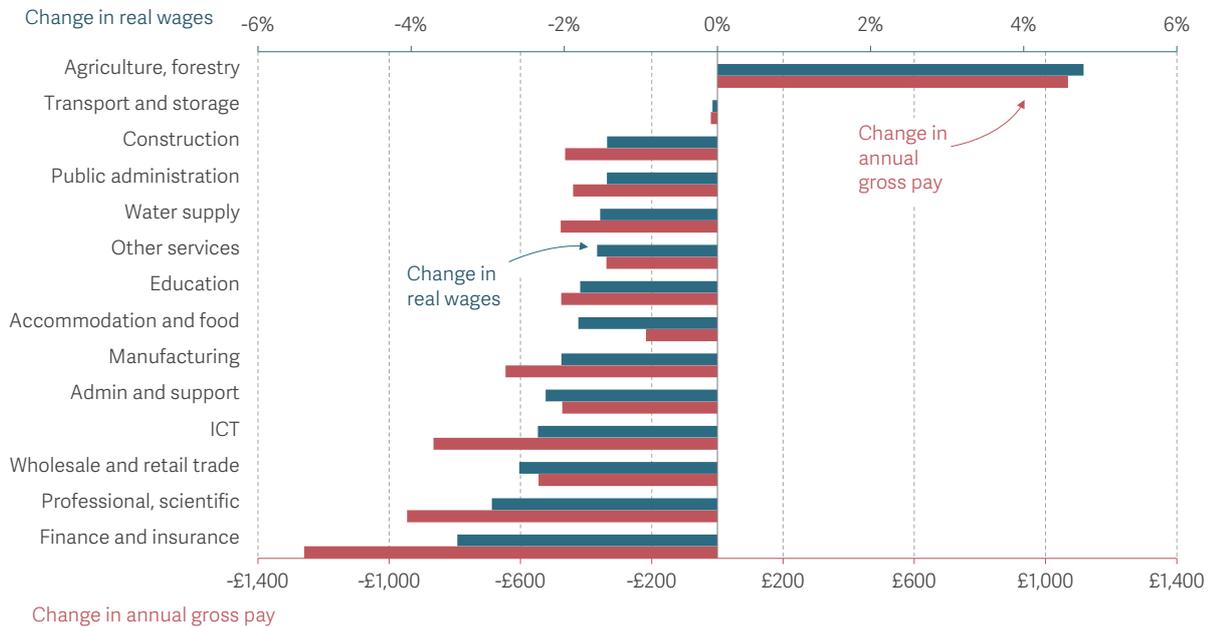
<sup>57</sup> [United Kingdom: Selected issues](#), IMF, November 2018

<sup>58</sup> [The latest evidence on the impact of Brexit on UK trade](#), OBR, March 2022.

<sup>59</sup> Calculation of annualised gross weekly earnings, 2021 from Annual Survey of Hours and Earnings, Office for National Statistics.

**FIGURE 22: Wages are set to fall in most service sectors, although manufacturing wages also fall relative to a no Brexit scenario**

Annual wage falls by selected sectors: UK, 2030



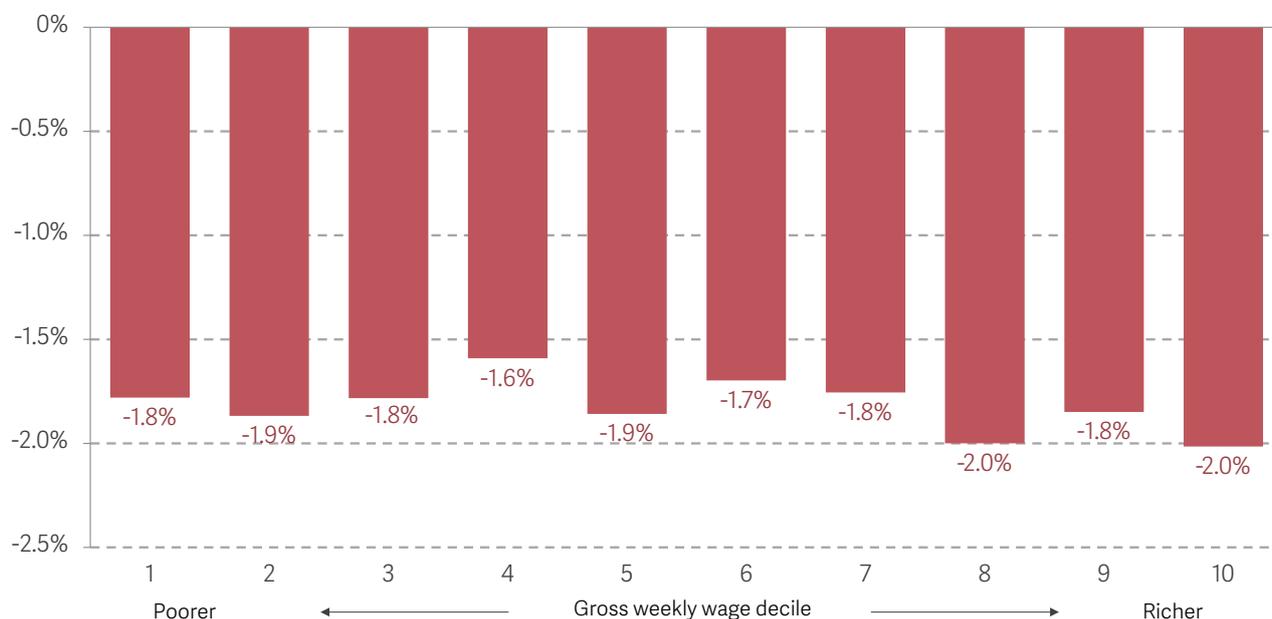
NOTES: For sector-region wages with missing values, this is calculated as UK sector wage multiplied by (average region wage divided by UK average wage). Real wages are calculated using 2021 region-sector medians.

SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey; wages values from ONS, Annual Survey of Hours and Earnings.

The distribution of real wage impacts across sectors also leads to differentiation in the expected real wage impacts across workers in different wage deciles. Figure 23 shows that those in the lowest three weekly wage deciles will see real wages fall by 1.8 per cent by 2030 compared with a no Brexit scenario, whereas those in the top wage decile will experience a decline in real wages of 2.0 per cent per person.

**FIGURE 23: Real wages fall more in higher wage deciles than low and middle wage deciles relative to a no Brexit scenario**

Annual wage falls by weekly wage deciles: UK, 2030



NOTES: Sector-region wages with missing values are calculated as UK sector wage multiplied by (average region wage divided by UK average wage). Deciles are created using weekly wage data between 2017 and 2021 to identify proportions of each industry falling into each wage decile. Wage falls are calculated using the proportion of an industry in a wage decile multiplied by the percentage fall by industry multiplied by labour-weighting by industry.

SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey; labour shares also from ONS, LFS.

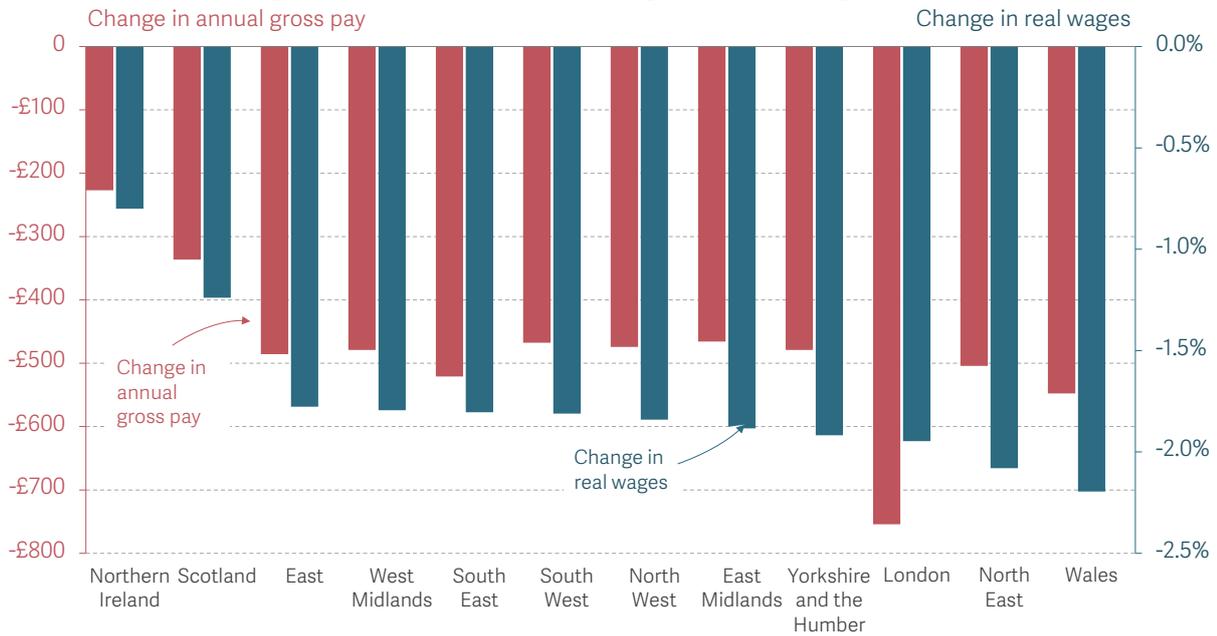
Real wages will decline across the board with London, the North East and Wales experiencing the largest falls

Regional differences in real wage falls relative to a no Brexit scenario are driven by the sectoral composition and wage variation across regions in the UK. Real wages fall by most in London with gross annual pay down by £750 per person, per year, reflecting a real wage decline of 1.9 per cent (Figure 24). And although Wales and the North East experience the highest percentage wage falls of 2.2 and 2.1 per cent respectively, this amounts to a fall in gross annual pay of £550 and £510 per person, per year, which is only just above UK average.<sup>60</sup>

<sup>60</sup> Sensitivities on real wages were run with 2018 baseline data to compare regional and sectoral outcomes, see Annex 3 for further details. Using 2018 baseline data, London and the North East continue to see the largest falls in real wages. However, Wales moves from the highest real wage of 2.2 per cent shock relative to a no Brexit scenario to the second lowest wage shocks of 1.2 per cent.

**FIGURE 24: London has the largest fall in wages, although the North East and Wales experience greatest percentage falls relative to a no Brexit scenario**

Annual real wage falls and effect on annual gross pay by region: UK, 2030



NOTES: For sector-region wages with missing values, this is calculated as UK sector wage multiplied (average region wage divided UK average wage). Real wages are calculated using 2021 region-section medians.

SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey; wage values from ONS, Annual Survey of Hours and Earnings.

## Section 4

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### Conclusion

The impacts of Brexit will be wide reaching, affecting firms, workers and places. Rather than seeking to relitigate the merits of leaving the EU that was decided by a public referendum six years ago, this report has provided an assessment of how Brexit is affecting sectors and regions in order to improve our understanding of the scale of economic change to come. This is vital information for policy makers looking to renew the UK's economic strategy.

#### Income and productivity hits will be widespread but structural adjustment will be relatively small

Income, investment and productivity have already been impacted across the UK following the referendum, and trade openness and the competitiveness of UK exports have declined during 2021. Yet further adjustment is expected as firms respond to new trade barriers by changing their business model – shifting their exporting behaviour to focus more on non-EU markets and displacing EU imports to meet domestic demand. It will take years for firms – particularly capital-intensive ones – to fully adjust. And we estimate that further hits to income and productivity are still to come.

While a less open UK will have varying impacts across sectors, policy makers should not expect radical changes to the nature of the economy. Brexit will not mean the end for UK manufacturing, but nor will it revive it. Neither should it be expected to transform the UK's long-enduring export specialisation. And although these winners and losers won't be distributed evenly across places, they are not expected to significantly reduce the challenge of 'levelling up' the economy.

Instead, the long-lasting legacy of Brexit is likely to instead be slower real wage and productivity growth over the next decade. Workers across most sectors and all regions should expect further real wage hits as the economy continues to adjust to Brexit. This will affect those in employment at a time when real wages have been stagnating for more than a decade, and workers face a sharp rise in the cost of living downward pressure from high inflation.

Productivity implications will also be far reaching. This report finds that manufacturing sectors that are set to gain most will tend to also be those with below average productivity. This suggests policy makers should expect any additionally created manufacturing jobs to be concentrated in lower-productivity firms, which disproportionately benefit from Brexit as they are typically less reliant on exports.

Overall, then, there are some uncertainties inherent in the impact of Brexit to date, not least because the pandemic has also had a profound impact on trade flows during the same period. However, we should expect the lasting impact of reduced openness to be substantial and widespread productivity and real income shocks – much of which has already taken place. We do not expect deep shifts to the UK's industrial structure or trade specialisation, but policy makers should be aware of the widespread real wage impacts and the implications on the competitiveness and productivity of the UK.

## Annex 1

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# Trade and Cooperation Agreement model inputs

This report provides a new assessment of the depth of the TCA across sectors for the purpose of modelling the overall impacts the agreement will have in the long-run. This annex provides a description of how the assessment of the TCA was undertaken to produce sectoral estimates of barriers for use as model inputs, covering the estimated tariff inputs and the increase in the non-tariff barriers for goods and services sectors.

## Tariff inputs

Although the Trade and Cooperation Agreement maintained zero tariffs on all goods trade, exporters are now required to meet rules of origin (ROO) requirements. These requirements prevent some firms from utilising the preferential access set out in the agreement, either because the goods they export do not meet the requirements (for example they contain a high share of foreign value added from inputs sourced from outside the EU) or because the regulatory burden to meet them is perceived to exceed the cost of paying the tariffs (especially where the most favoured nation, or MFN, tariffs are relatively small). Past work has estimated costs for business associated with rules of origin requirements are equivalent to between a 3 and 5 per cent tariff.<sup>61</sup>

The EU collects data on the utilisation of preferential tariff rates on its imports across products and trading partners. Since the implementation of the TCA, this includes the UK. This data can be used to calculate two related but distinct measures:

Preference utilisation rates which are the share of trade using preferential tariffs over the share of trade where the MFN tariff is not zero.

Tariff-free trade which is the share of tariffs which paid no tariff over the total value of trade.

## Issues with using preference utilisation rates to inform tariff inputs

Although preference utilisation rates provide evidence on the value of trade that is paying tariffs to enter the EU despite the zero preferential tariffs available, there are some concerns when using them to inform modelling inputs addressed below.

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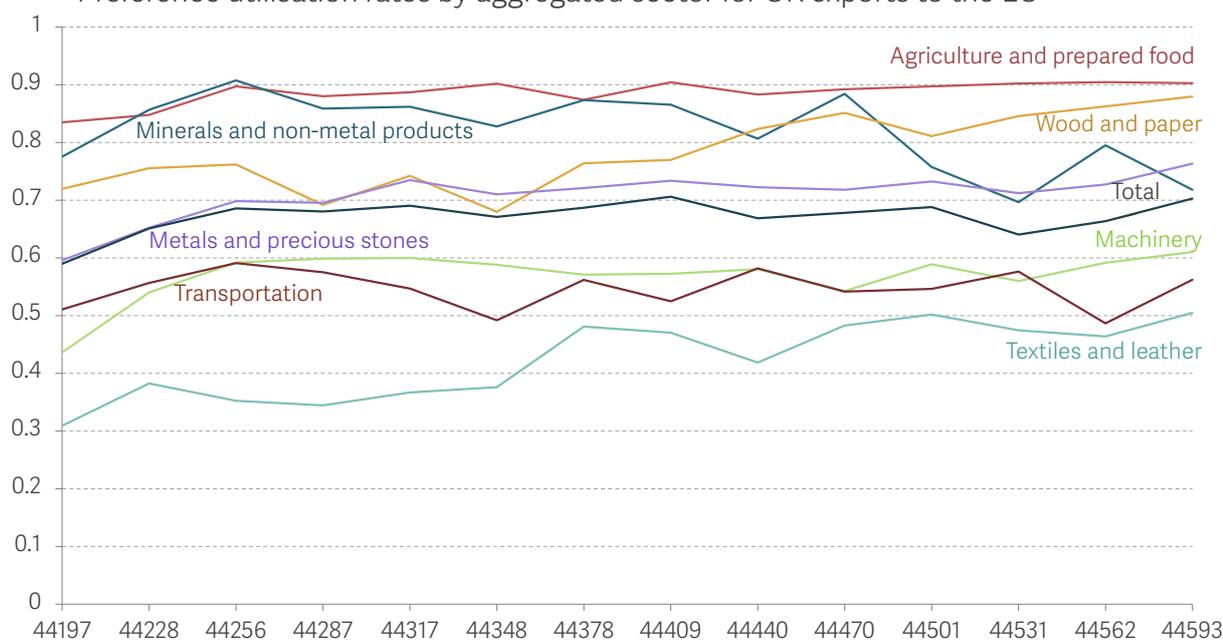
<sup>61</sup> I Fusacchia, L Salvatici & A Winters, *The consequences of the Trade and Cooperation Agreement for the UK's international trade*, Oxford Review of Economic Policy, Volume 38, January 2022.

### 1. Preference utilisation rates increase over time

Over time, preference utilisation tends to rise as firms learn how to utilise the preferences available, adapt supply chains to meet ROO requirements, where beneficial to do so, and stop trading where tariffs have put them at a disadvantage. The UK is no exception and tariff utilisation has increased in many products over time, rising overall from 59 per cent in January 2021 to 71 per cent in August 2021. However, since August the rate has not increased but has been maintained around 70 per cent. As preference utilisation rates are generally not increasing month to month, using the latest preference utilisation rates gives a reasonable estimate of the share of trade that fails to utilise preferences and instead pays tariffs.

**FIGURE 25: Utilisation of tariffs increased in the first half of 2021 but have remained flat since August 2021**

Preference utilisation rates by aggregated sector for UK exports to the EU



NOTES: Preference utilisation rates are calculated as the share of trade imported using preferences over total trade imported using preferences or MFN non-zero tariffs.  
SOURCE: Eurostat adjusted extra-EU imports by tariff regime.

### 2. Preference utilisation rates are endogenous

Preference utilisation rates are not independent of the barriers introduced in the agreement. The rates have been established as firms optimised behaviour following the implementation of the UK-EU agreement, for example some firms unable to meet rules of origin may have already dropped out. However, our judgement is they still give a useful sense of the potential tariff costs across sectors to inform the estimated relative barriers facing firms.

Given these issues, UK utilisation rates are compared against those for exporters based in countries with similar EU agreements, specifically Canada, South Korea and Japan. For sectors where UK utilisation rates are below the minimum of the other three countries, the median preference utilisation rate is used as a proxy.

## Method for estimating model tariff inputs

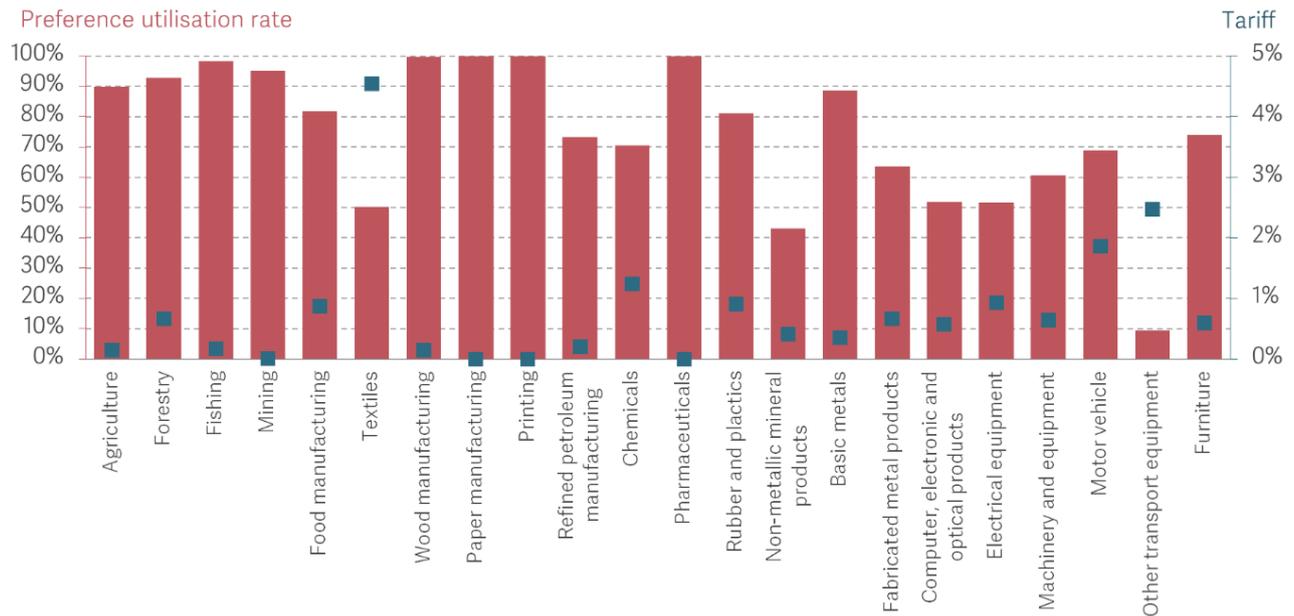
As preference utilisation rates are below 100 per cent, we expect that some firms will continue paying tariffs, even in the long-run. The method below uses tariff utilisation rates to estimate tariff barriers between the EU and UK across sectors after the UK left the EU:

1. Calculate the most recent 3-month preference utilisation rate and tariff-free rate using the EU trade data (December 2021 – February 2022).
2. Adjust preference utilisation rates for products where the UK preference utilisation rate is below the expected level based on comparators. This applies to musical instruments, beverages, articles of apparel, man-made filaments and special woven fabrics.
3. Adjust the average HS2-digit MFN tariffs to exclude zero tariff lines from the averages. To estimate the average tariff on goods that have non-zero tariffs for each HS2 product, divide the average tariff rate by the share of trade with a non-zero tariff.
4. Estimate the average tariff paid by sector under the TCA, by multiplying the adjusted non-zero tariff rate by the share of trade which pays a tariff (equal to total trade minus zero MFN trade and zero preferential trade).
5. Convert the HS2 tariffs to WIOD sectors, weighting lines using UK-EU trade in 2021.

In this methodology we implicitly assume the costs of complying with rules of origin for firms utilising preferences is captured in the non-tariff measures (NTM) estimates applied separately. Remaining tariffs are generally very low as preference utilisation and MFN tariffs are generally low.

**FIGURE 26: Remaining tariffs are mostly small except for textiles and other transport, where preference utilisation rates are low**

Implied tariff rate increases and preference utilisation rate by WIOD sector



NOTES: Preference utilisation rates are calculated as the share of trade imported using preferences over total trade imported using preferences or MFN non-zero tariffs.  
 SOURCE: Eurostat adjusted extra-EU imports by tariff regime and WITS weighted average applied tariff data.

## Goods non-tariff inputs

NTMs are estimated in line with UKTPO’s assessment of the Trade and Cooperation Agreement.<sup>62</sup> This approach is based on an academic study which estimates ad valorem equivalents of the non-tariff barriers, which differentiates between barriers with and without a deep regional trade agreement (RTA).<sup>63</sup> This paper also uses the UKTPO’s assessment of which sectors have provisions sufficiently deep to warrant the deep RTA estimates, based on the Annexes to the TBT Chapter of the TCA.

The only sectors considered to have sufficiently broad and deep mutual recognition of conformity-assessment are the vehicles and pharmaceuticals sectors.

<sup>62</sup> The method is that of O Cadot & J Gourdon, ‘Non-tariff measures, preferential trade agreements, and prices: new evidence’, *Review of World Economics*, Vol. 152, pages 227-249, May 2016. For its application to the TCA, see: I Fusacchia, L Salvatici and A Winters, *The Consequences of the Trade and Cooperation Agreement for the UK’s International Trade*, *Oxford Review of Economic Policy*, Volume 38, Issue 1, Spring 2022.

<sup>63</sup> O Cadot & J Gourdon, *Non-tariff Measures, Preferential Trade Agreements, and Prices: New Evidence*, *Review of World Economics*, Vol. 152, pages 227–249, May 2016.

TABLE 1: Goods NTM estimates

Sector	NTM
Crop and animal production, hunting and related service activities	20.7
Forestry and logging	11.8
Fishing and aquaculture	20.5
Mining and quarrying	9.4
Manufacture of food products, beverages and tobacco products	18.7
Manufacture of textiles, wearing apparel and leather products	5.6
Manufacture of wood and of products of wood and cork	6.5
Manufacture of paper and paper products	3.3
Printing and reproduction of recorded media	3.3
Manufacture of coke and refined petroleum products	9.4
Manufacture of chemicals and chemical products	7.9
Manufacture of basic pharmaceutical products and preparations	5.4
Manufacture of rubber and plastic products	7.0
Manufacture of other non-metallic mineral products	9.4
Manufacture of basic metals	5.8
Manufacture of fabricated metal products	5.8
Manufacture of computer, electronic and optical products	6.7
Manufacture of electrical equipment	6.7
Manufacture of machinery and equipment n.e.c.	6.7
Manufacture of motor vehicles, trailers and semi-trailers	7.9
Manufacture of other transport equipment	7.9
Manufacture of furniture; other manufacturing	5.5

A difference between the UKTPO approach and the approach taken in this paper, is this paper assumes border and rules of origin costs are captured in the Cadot and Gordon non-tariff estimates.

## Services inputs

The following data is used:

1. The OECD Services Trade Restrictiveness Index (STRI), Intra-EEA STRI and General Agreement on Trade in Services (GATS)-STRI.

The OECD STRI identifies, catalogues, and quantifies cross-cutting barriers to trade across services sectors. The STRI represents the applied MFN services barriers. The OECD also calculated a GATS-STRI, which estimates the maximum level of restrictiveness a country could have whilst still meeting commitment made in the WTO General Agreement on Trade in Services. Finally, the Intra-EEA-STRI estimates the maximum level of restrictiveness that any European Economic Area (EEA) members (EU members plus Iceland, Liechtenstein and Norway) can apply towards another EEA member.

2. Department for International Trade assessment of services restrictions in the UK-Canada Comprehensive Economic and Trade Agreement (CETA) and UK-Japan Economic Partnership Agreement (EPA).

The Department for International Trade has commissioned trade experts to produce STRI scores for certain UK trade agreements including UK-Canada CETA and UK-Japan EPA.

3. Developing Trade Consultants ad valorem equivalent estimates of MFN and EEA trade barriers.

Other studies provide estimates of UK services barriers, both within the EEA and facing countries outside the EEA (facing MFN barriers) and are the estimated barriers used in the UKTPO TCA assessment. They use the governments commissioned estimates by Developing Trade Consultants (DTC) combined with estimates from another study:<sup>64</sup>

‘For each of the MFN and EEA barriers we calculate a GDP-weighted average across the four UK nations and take the difference as a Single Market effect. DTC’s results map closely to GTAP sectors in seven cases; in the remaining four we scale up the Fontagne-based results by the (UK-trade-weighted) average ratio of DTC to Fontagne results.’

TABLE 2: **Difference between MFN and EEA treatment estimates**

Services sectors	MFN - EEA
Repair and installation of machinery and equipment	15
Electricity, gas, steam and air conditioning supply	0
Water collection, treatment and supply	0
Sewerage; waste collection, treatment and disposal activities	0
Construction	8

<sup>64</sup> L Fontagné, C Mitaritonna & J Signoret, *Estimated Tariff Equivalents of Services NTMs*, USITC Economics Working Paper 2016-07A, 2016; Developing Trade Consultants, *Non-tariff Measures and the United Kingdom Internal Market*, Department for Business, Energy and Industrial Strategy, 2019.

Wholesale and retail trade and repair of motor vehicles and motorcycles	8
Wholesale trade, except of motor vehicles and motorcycles	8
Retail trade, except of motor vehicles and motorcycles	8
Land transport and transport via pipelines	15
Water transport	13
Air transport	20
Warehousing and support activities for transportation	14
Postal and courier activities	16
Accommodation and food service activities	15
Publishing activities	16
Motion picture, video and television programme production, sound recording and broadcasting activities	16
Telecommunications	4
Computer programming, consultancy; information service activities	21
Financial service activities, except insurance and pension funding	26
Insurance, reinsurance and pension funding	11
Activities auxiliary to financial services and insurance activities	22
Real estate activities	12
Legal and accounting; activities of head offices; management consultancy	12
Architectural and engineering activities	9
Scientific research and development	12
Advertising and market research	12
Other professional, scientific and technical activities;	12
Administrative and support service activities	12
Public administration and defence; compulsory social security	19
Education	19
Human health and social work activities	19
Other service activities	15

### Methodology for calculating services NTMs

#### 1. Create combined bound and applied STRI indices

Calculate indices which combine the applied and bound restrictions, with bound restrictions weighted so the impact of removing water (i.e. locking in elements of existing services liberalisation) is valued at 40 per cent of the changes to the applied

restrictions, in line with recent academic work and the Department for International Trade methodology for estimating NTM changes.<sup>65</sup>

$$\begin{aligned} & \text{Total restrictiveness index} \\ & = \text{Applied trade restrictiveness index} \\ & + 0.4 \times (\text{Bound restrictiveness index} - \text{applied restrictiveness index}) \end{aligned}$$

For the within EU index, the applied restrictiveness index is the lower of the STRI and the intra-EEA STRI for each sector. The bound restrictiveness index is the Intra-EEA STRI.

For the MFN index the applied restrictiveness index is the STRI and the bound restrictiveness index is the GATS-STRI.

2. Estimate the share of water removed in existing EU agreements and adjust for differences in the TCA

Calculate the average of the Department for International Trade published estimates of water removed by EU agreements with Canada and Japan to represent a typical deep EU FTA.<sup>66</sup>

Adjust the average deep EU FTA in sectors where the depth of provisions in the TCA goes above or below the Canada and Japan agreements. Based on an assessment of the coverage and provisions of the TCA three sectors are adjusted: audio-visual services, legal and telecoms. Audio-visual liberalisation is removed as it is not covered by the TCA; legal and telecoms both have novel and deeper provisions, so liberalisation is boosted by 50per cent.<sup>67</sup>

3. Estimate the TCA restrictiveness composite index and use this to estimate the change in the services barrier

$$\begin{aligned} & \text{TCA restrictiveness index} \\ & = \text{MFN restrictiveness index} \\ & - 0.4 \times (\text{GATS STRI} - \text{STRI}) \\ & \times \text{estimated share of water removed under the TCA} \end{aligned}$$

Use the TCA index to estimate the share of the EU liberalisation that is captured under an FTA by calculating the difference between the TCA and EU index over the difference between the MFN and EU index. This percentage is then applied to the difference between the estimate of the EEA and MFN ad valorem equivalent services barriers.

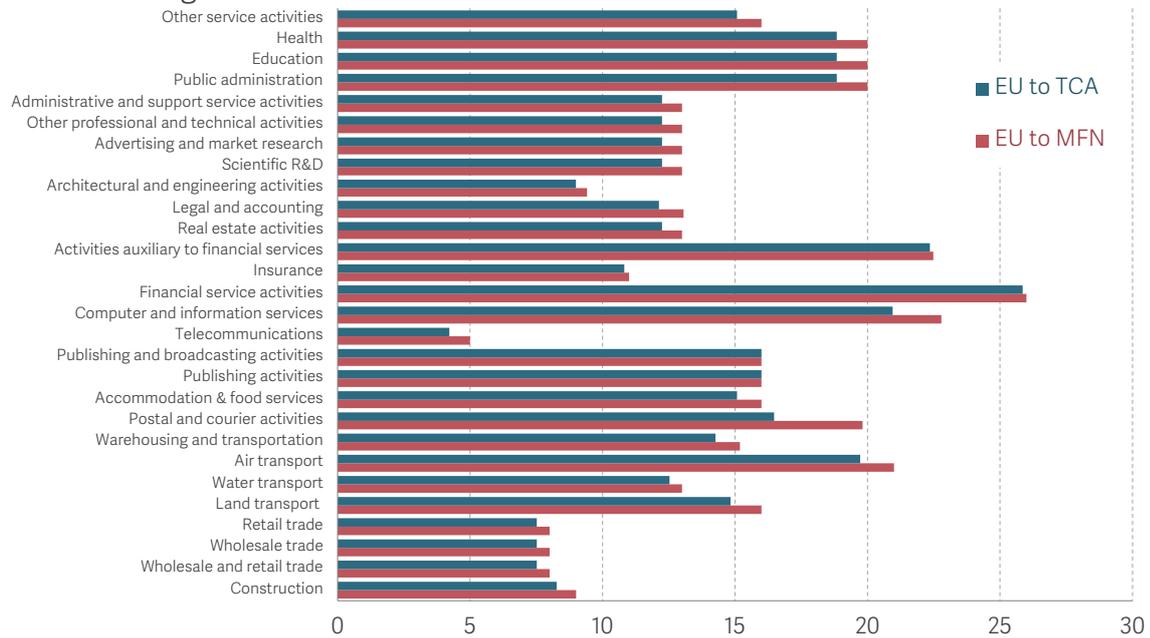
<sup>65</sup> D Ciuriak, A Dadkhah & D Lysenko, [The Impact of Binding Commitments on Services Trade](#), World Trade Review, Volume 19, Issue 3, July 2020.

<sup>66</sup> Department for International Trade, [CPTPP scoping assessment technical annex](#), June 2021.

<sup>67</sup> Legal services includes a general principle of market access for UK lawyers in the EU (and EU lawyers in the UK) under their home title practice and telecoms includes a data adequacy decision.

**FIGURE 27: The TCA only reduces a small share of the barriers relative to MFN barriers**

AVE change between EU and MFN and EU and FTA



SOURCE: Analysis of L Fontagné, C Mitaritonna & J Signoret, [Estimated Tariff Equivalents of Services NTMs](#), USITC Economics Working Paper 2016-07A, 2016; Developing Trade Consultants, [Non-tariff Measures and the United Kingdom Internal Market](#), Department for Business, Energy and Industrial Strategy, 2019, and Department for International Trade, [CPTPP scoping assessment technical annex](#), June 2021.

## Annex 2

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### The trade model and model inputs

#### Model specification

There are  $n$  regions and  $j$  sectors in the economy. Within each region-sector combination there is a market. Each market has a continuum of perfectly competitive firms producing intermediate goods. There is a final good producer that uses only intermediate goods and produces non-tradable final goods. These intermediate goods are freely tradable and only used to produce final goods. Final goods are consumed locally or used as intermediate inputs for intermediate goods producers.

#### Consumer problem

In each region  $n$ , there are a fixed number  $L_n$  consumers maximizing the following Cobb–Douglas utility by choosing each consumption goods:

$$C_t^{nj} = \prod_{k=1}^J (c_t^{nj,k})^{\alpha^k}$$

where  $c_t^{nj,k}$  is the consumption of sector  $k$  goods in market  $(n,j)$ .  $\alpha^k$  is the share of expenditure spent on  $c_t^{nj,k}$ . The share of expenditure  $\alpha^k$  sums up to 1. Each consumer supplies a unit of labour inelastically. The only consumer income comes from wage and there are no other expenditures. Solving for this maximizing problem yields the demand for each final good in each region.

The ideal price index is given by

$$P_t^n = \prod_{k=1}^J (P_t^{nk} / \alpha^k)^{\alpha^k}$$

where where  $P_t^{nk}$  is the price index of goods purchased from sector  $k$  in region  $n$

**The complete *Annex 2: The trade model and model inputs* is available at [resolutionfoundation.org/app/uploads/2022/06/Annex-2-The-Big-Brexit.pdf](https://resolutionfoundation.org/app/uploads/2022/06/Annex-2-The-Big-Brexit.pdf)**

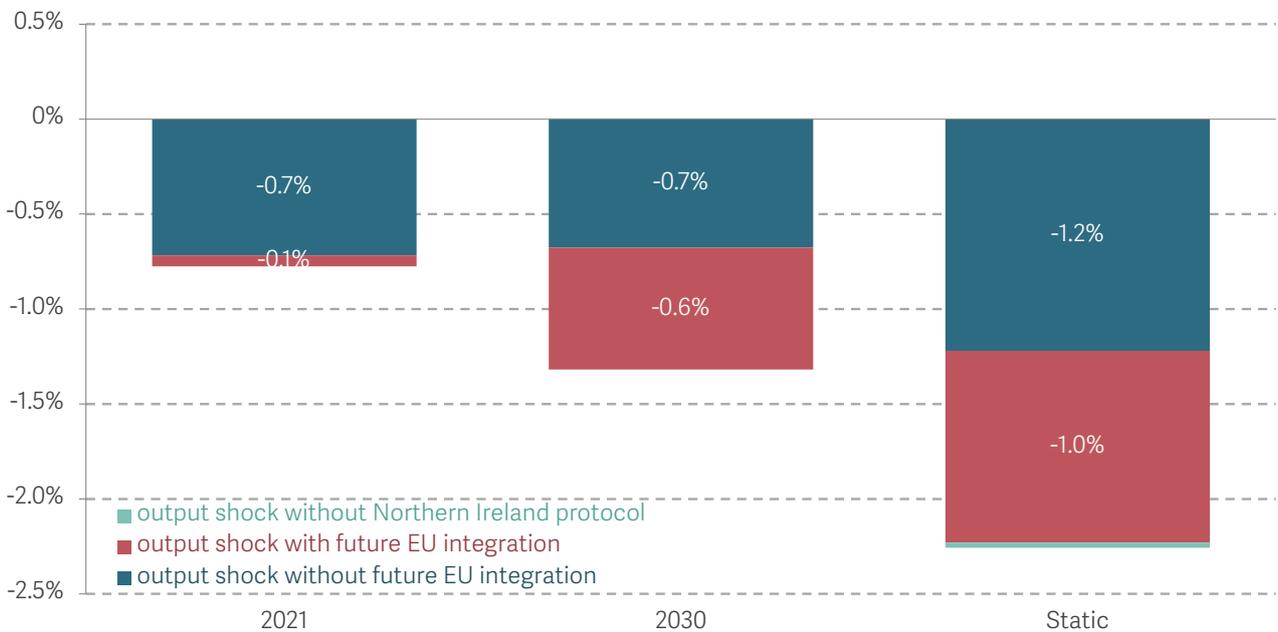
## Annex 3: Sensitivity Analysis

### Future EU integration and the Northern Ireland protocol

The core scenario includes both future EU integration and the Northern Ireland Protocol creating a total output shock in the dynamic model of 1.3 per cent and in the static model of 2.2 per cent. To identify the magnitude of each of these effects, we model the dynamic model over time and the static model without future EU integration and the Northern Ireland protocol. Over time, the contribution of future EU integration to the total shock increases. In 2021, future EU integration contributes just 0.06 percentage points which rises to 0.64 percentage points by 2030, explaining 49 per cent of the total output shock (Figure 28). EU integration contributes 1 percentage point to the static scenario which explains 46 per cent of the total shock. The NIP contributes less than 0.005 percentage points in output reduction in 2030 to the dynamic model, rising from 0.001 in 2021. The NIP marginally improves the static reduction by 0.03 percentage points.

**FIGURE 28: Future EU integration contributes to approximately half the total output shock after scaling in by 2030**

Contribution of the Northern Ireland protocol and future EU integration to output shock over time



SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey.

The effects of EU integration and the Northern Ireland protocol on real wages has a similar effect to output. The total real wage shock in 2021 is just a 0.9 per cent fall relative

to the baseline, rising to 1.8 per cent in 2030. EU integration contributes 44 per cent of the real wage shock by 2030. The Northern Ireland protocol reduces the wage shock by just 0.01 percentage point in 2021, increasing to just 0.02 percentage points by 2030.

## Assumptions and base data

The core scenario uses 2014 data inputs to ensure that we model a pre-Brexit UK, without contamination either from anticipating the referendum or the outcomes of the referendum. We assume that firms in each region are able to trade independently with Europe and the rest of the world as well as with other UK regions. To stress test regional and sectoral outcomes in the core scenario, we use two different approaches:

2014 data inputs with an assumption that the UK trades centrally. The core scenario assumes that each region-sector in the UK is able to independently trade with international markets. While this assumption will hold for many organisations, the extreme alternative assumption would be that the firm buys from the national warehouse. Then the relevant shares for the region are the sector-country shares and not the region-sector-country shares. At a high level, using a central trading assumption leads to an output shock of 1.3 per cent in 2030, the same as the core scenario used in this paper.

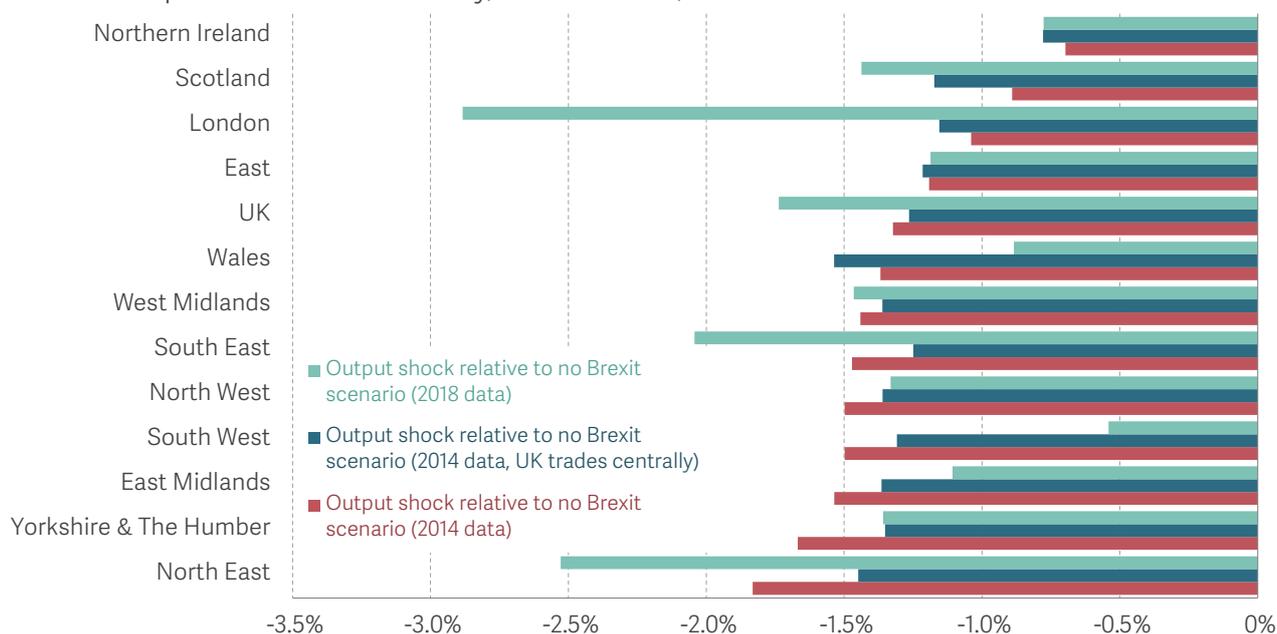
2018 data inputs. To compare changes over time, we used 2018 data as an input in the dynamic model, regionalising using ONS regional trade data, combined with OECD IO tables. While 2018 data is more recent than 2014 data, there had already been effects from the Brexit referendum by this date. For example, the 12 per cent depreciation caused imports to become more expensive, causing inflation. When using this data, the modelled output and real wages shocks are higher than to the scenario using 2014 data. For example, the combined output shock was 1.7 per cent in 2030 compared with 1.3 per cent in the core scenario. The NIP reduces the total output shock by 0.02 percentage points, and including future EU integration contributes 0.8 percentage points to the output shock in 2030 (47 per cent of the total shock) in line with the 2014 scenario. However, the 2018 data provides a different assessment of the effects on regions and sectors.

## Regional sensitivities

Across scenarios using 2014 base data, the ordering of worst to least hit regions remain relatively constant. The North East sees the largest falls in output of 1.8 per cent and London sees a relatively low fall of 1 per cent. However, varying the assumption of the UK trading centrally vs regionally, and changing the base data to 2018 does affect the regional ordering as shown in Figure 29.

**FIGURE 29: Regional output shocks vary due to base data and assumptions**

Output shock by region relative to no Brexit scenario, 2014 data, 2014 data with assumption UK trades centrally, 2018 data: UK, 2030



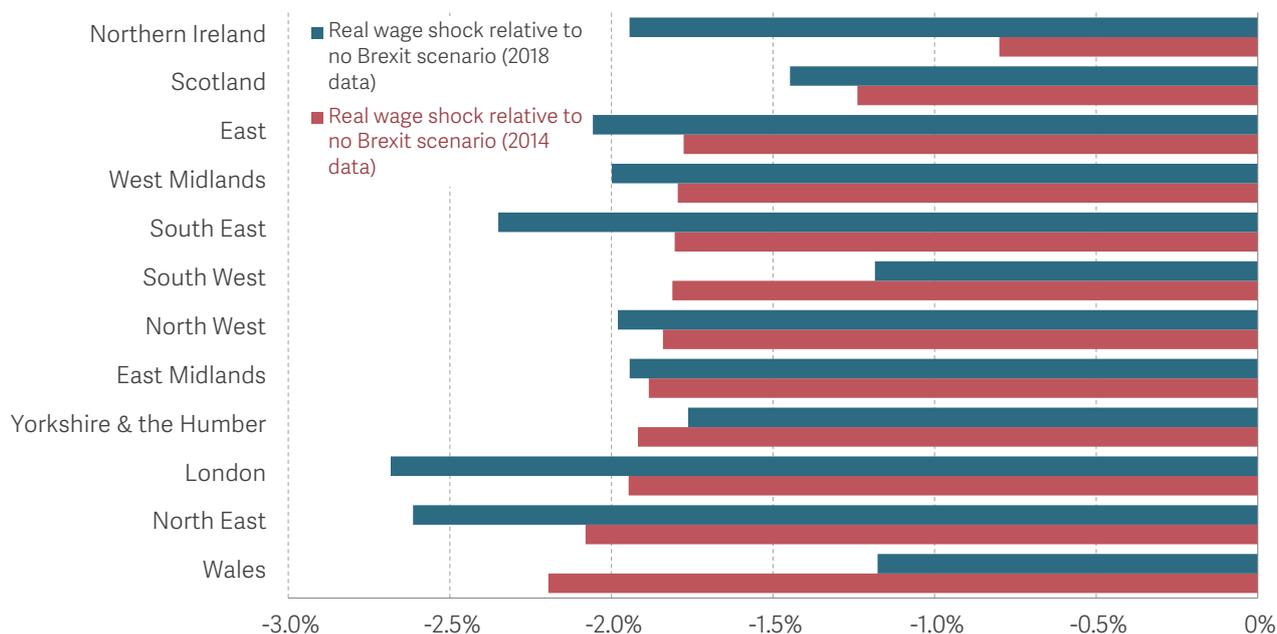
SOURCE: Analysis uses CEP trade model from S Dhingra et al., *The costs and benefits of leaving the EU: trade effects*, Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey. 2018 baseline data uses OECD Input Output tables and ONS, regional trade statistics.

Comparing 2014 core scenario with the assumption that the UK trades centrally. There is limited divergence between the output shocks for these two assumptions. The total output shock for the UK remains at 1.3 per cent in both scenarios. The North East, and East Midlands continue to have the worst output shocks in both scenarios. In addition, London, Scotland and Northern Ireland continue to perform the best in both scenarios. Wales is the largest mover, falling from a 1.4 per cent output shock relative to the baseline to a 1.5 per cent output shock which makes the region fall from mid-table to the worst affected. Otherwise all other moves are relatively small, and regions are not sensitive to this scenario. In reality, it is likely that the reality is somewhere between these two assumptions.

Comparing the use of 2014 base data with 2018 base data sees shifts in the regions most and least affected. The North East continues to see a high output shock relative to the UK average. Northern Ireland continue to see a relatively low output shock compared to the UK average. However, London moves from having one of the lowest output shocks of 1 per cent, to the highest output shock of 2.9 per cent, affecting the UK average given the size of the London economy, and moving the UK output shock from 1.3 per cent to 1.7 per cent. A comparison of real wage shocks is shown in Figure 30, with Wales and the South West experiencing lower real wage shocks using 2018 data than when using 2014 base data.

FIGURE 30: Regional real wage shocks also vary by base data

Real wage shock by region relative to no Brexit scenario, 2014 data, 2018 data: UK, 2030



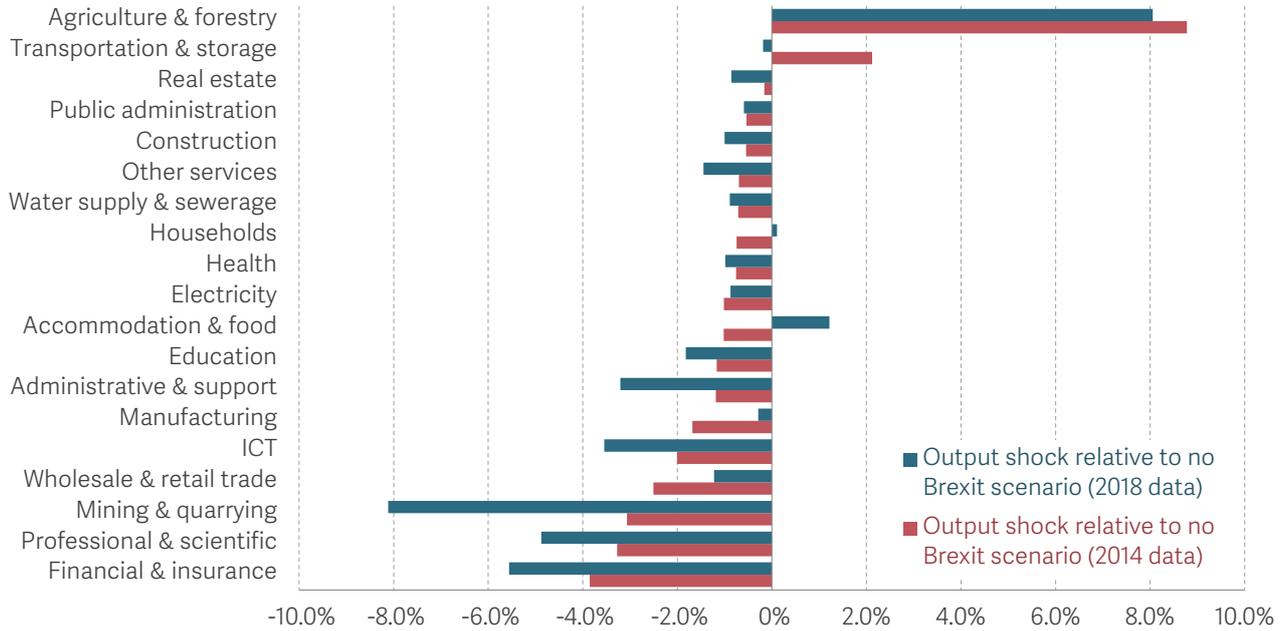
SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey. 2018 baseline data uses OECD Input Output tables and ONS, regional trade statistics.

## Sectoral sensitivities

Sectors are less affected by the changes in base data for both output and real wages. However, the size of the shocks in 2018 base data is significantly higher than 2014 base data for certain regions output shocks, and, for almost all regions, real wage shocks. For both real wages and for output, agriculture and forestry benefit in both 2018 and 2014 base data. Sectors seeing the largest output and real wage shocks include regulated services such as finance and insurance, professional and scientific, and information and communications, as well as mining and quarrying. For both output and real wage changes, accommodation and food and manufacturing are the biggest movers between 2014 and 2018 base data. For example, manufacturing sees a 0.3 per cent output fall relative to a no Brexit scenario with 2018 base data compared with 1.7 per cent fall relative to a no Brexit scenario using 2014 data (Figure 31 and Figure 32).

**FIGURE 31: Sectoral output shock by base data**

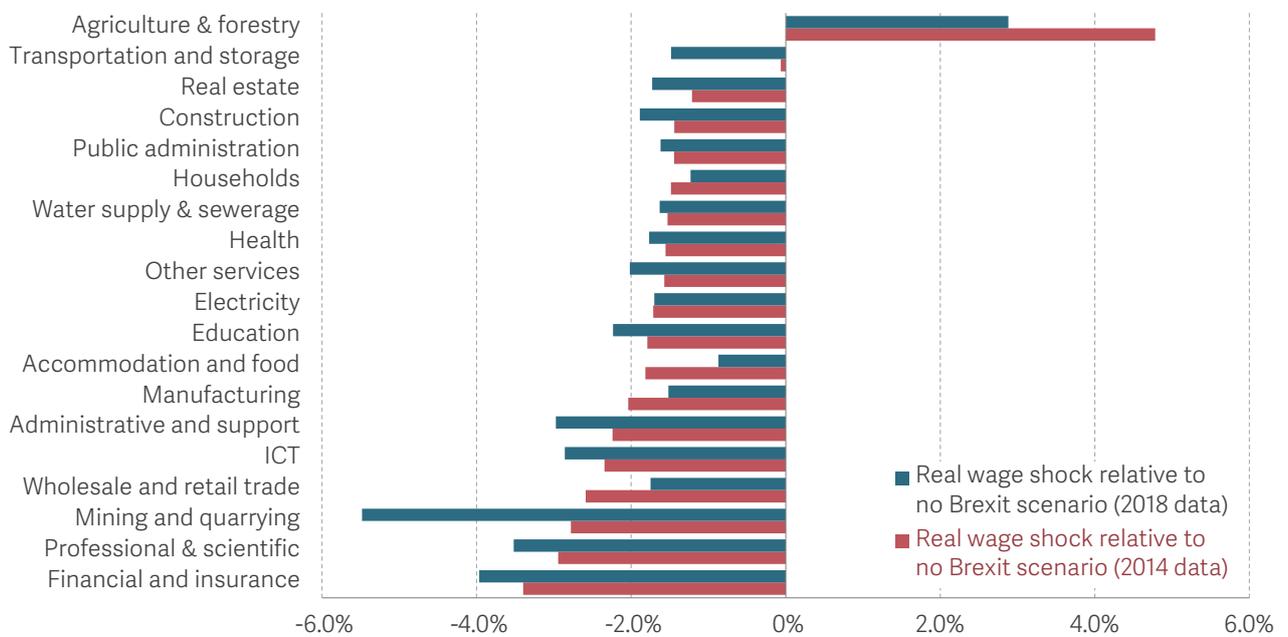
Output shock by region relative to no Brexit scenario, 2014 data, 2018 data: UK, 2030



SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey. 2018 baseline data uses OECD Input Output tables and ONS, regional trade statistics.

**FIGURE 32: Sectoral real wage shock by base data**

Real wage shock by region relative to no Brexit scenario, 2014 data, 2018 data: UK, 2030



SOURCE: Analysis uses CEP trade model from S Dhingra et al., [The costs and benefits of leaving the EU: trade effects](#), Economic Policy 32(92), October 2017 with regionalised inputs from EUREGIO Regionalised Input Output Database and a dynamic adjustment using ONS, Labour Force Survey. 2018 baseline data uses OECD Input Output tables and ONS, regional trade statistics.

# THE ECONOMY 2030 INQUIRY

SHAPING A DECADE OF CHANGE

The UK is on the brink of a decade of huge economic change – from the Covid-19 recovery, to exiting the EU and transitioning towards a Net Zero future. The Economy 2030 Inquiry will examine this decisive decade for Britain, and set out a plan for how we can successfully navigate it.

The Inquiry is a collaboration between the Resolution Foundation and the Centre for Economic Performance at the London School of Economics. It is funded by the Nuffield Foundation.

**For more information on The Economy 2030 Inquiry, visit**  
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