



# UNITED KINGDOM

## SELECTED ISSUES

June 2016

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June 1, 2016

Approved By  
European Department

Prepared by an IMF staff team

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## EXECUTIVE SUMMARY

The UK's forthcoming referendum on European Union (EU) membership presents voters with a momentous decision. Given the importance of the referendum, this paper aims to provide information on some of the macroeconomic implications of the UK exiting the EU, while recognizing that the choice of whether to remain in the EU is for UK voters to make and that their decisions will reflect both economic and noneconomic factors.

In the event of a vote to leave the EU, the process for withdrawing and establishing a new economic relationship with the EU could be expected to begin immediately. Alternatives—from maintaining membership of the European Economic Area (EEA), to negotiated bespoke arrangements, to defaulting to World Trade Organization (WTO) trade rules—imply tradeoffs between freer access to the EU market and independence from the obligations that come with membership of the single market.

Leaving the EU has potential implications for trade and investment, productivity and incomes, the labor market, and the public finances. Most formal long-run assessments indicate that leaving the EU would adversely affect the UK economy, but the range of estimates is large, and a few studies even suggest the possibility of positive net economic benefits. Studies that find net gains, or only very small losses, tend to assume the potential for rapid expansion of trade from new trade agreements with other economies or a substantial boost to productivity from reducing EU-sourced regulation. While theoretically possible, in practice the effects on output are unlikely to be sufficiently large to make the net economic impact of exiting the EU positive.

In staff's view, increased uncertainty and risk aversion in the short and medium run would result in a material hit to incomes. The net long-run economic effects of leaving would also likely be negative and substantial, though there is significant uncertainty about the precise magnitude. Reduced trade access would likely lead to lower output and investment. Permanently lower incomes would be associated with reduced consumption. Pass-through from a weaker pound would result in higher prices for imported goods; depreciation would mitigate economic losses to the UK somewhat by stimulating net exports, but not enough to offset declines in other expenditure categories. Fiscal savings from reduced contributions to the EU budget would likely be outweighed by lower revenues from expected lower output, resulting in a net fiscal loss.

The economic consequences for other countries would mainly be negative, albeit smaller than for the UK, and concentrated in the EU. Within the EU, losses would vary widely, reflecting variation in trade and financial exposures to the UK. Ireland, Malta, Cyprus, Luxembourg, the Netherlands, and Belgium would likely be most affected.

# MACROECONOMIC IMPLICATIONS OF THE UNITED KINGDOM LEAVING THE EUROPEAN UNION

## A. Introduction

On June 23, 2016, voters in the United Kingdom will consider the question, “Should the United Kingdom remain a member of the European Union or leave the European Union?”

The question of EU membership is both a political and an economic issue, and the referendum has sparked a wide-ranging debate on the UK’s role in the EU. This paper focuses only on the macroeconomic aspects of EU membership and a potential exit from it. The paper begins in Section B with what membership of the EU means for the UK in terms of rights and obligations, the procedure for leaving the EU, and potential alternative arrangements for trade and migration that the UK could pursue. Section C then outlines the key macroeconomic channels—trade and investment, productivity and incomes, the labor market, and the public finances—through which a departure from the EU could affect the UK and provides some facts on each of those channels. Section D presents evidence on the likely net economic effects for the UK, and Section E presents evidence on the likely net economic effects for other countries. A summary and conclusions follow. Appendices provide a glossary and additional information on potential alternative relationships with the EU, formal assessments of EU exit, trade and financial exposures to the UK, and details on the macroeconomic modeling of transition scenarios shown in this paper.

Given the range of plausible alternative arrangements with the EU, the number of channels by which countries could be affected, and the uncertainty that a vote for exit could generate, the range of possible effects on the UK and other economies is broad. Nonetheless, the balance of evidence points to notable downward economic risks to the UK economy. The direct effects would be felt in loss of income from reduced trade access, but extend to potential productivity losses, and would be magnified if exit from the EU were also accompanied by restrictions on migration. The potential for a wave of deregulation to generate productivity gains sufficient to offset losses from reduced trade access to the European single market seems low, given the already relatively low degree of regulation in the UK economy. Nor does it seem likely that the UK could quickly establish trade agreements with other countries to substitute for those it has currently via EU membership. The likelihood is therefore that output and employment would be lower should the UK leave the EU than should it remain. In the short run, the uncertainty generated by navigating a complicated and untested exit process could be damaging for investment, consumption, and employment; the exchange rate could act as a buffer, but not by enough to offset the negative effects on demand and output. Spillovers to other economies would likely be less severe, but still negative, with other EU economies being some of the most affected.

## B. The UK In and Out of the EU

### *What does the EU provide to the UK?*

**1. EU membership provides access to the European single market.** UK membership of the EU ensures zero tariffs on exports to and imports from the rest of the EU. The EU is also a customs union, which implies lower administrative costs of trade, such as from applying rules of origin, value-added taxes, and physical checks. (The EU imposes a common external tariff on all goods entering the union—see ¶18.) More significantly, EU membership provides access to the European single market. The single market is more than a free trade agreement (FTA) or customs union—the intent is a zone in which there are no barriers to the movement of goods, services, capital, and people. For the UK in particular, the emphasis on services is crucial, as services account for four-fifths of UK GDP and two-fifths of UK exports.

**2. EU membership also provides FTAs with many other countries.** The EU has trade agreements in force with 60 other economies, whose combined GDP is 2½ times that of the UK. The EU also has prospective agreements under negotiation with a further 67 economies, including Brazil, Canada, India, Japan, and the US, with the aim of not only removing tariffs, but—more importantly—opening up markets in services, investment, and public procurement.<sup>1</sup> These markets are 10½ times the size of UK GDP.

**3. Membership provides UK-based firms with a “passport”, which is particularly important for the financial sector.** Firms operating in the UK have the right—known as the passport—to provide business services in the rest of the EEA.<sup>2</sup> The passport is relevant for many firms, but particularly for the financial sector.<sup>3</sup> For financial firms, the essence of the passport is the mutual recognition of prudential standards. The passport means that financial firms based in the UK can simply set up branches or offer services across borders directly—for example, an internationally-owned financial firm can set up a headquarters in the UK to serve as a base from which to offer services across Europe. Without a passport, such a firm would have to meet the varying requirements of regulators in each country in which it wanted to offer services. The firm would likely have to set up other subsidiaries, which is costly, as subsidiaries require separate capital structures and management.

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<sup>1</sup> See the DG trade website: [http://ec.europa.eu/trade/policy/countries-and-regions/agreements/index\\_en.htm](http://ec.europa.eu/trade/policy/countries-and-regions/agreements/index_en.htm).

<sup>2</sup> For a definition of these and other terms, see Appendix 1.

<sup>3</sup> For example, pharmaceutical companies based in the UK can more easily access the EU market via a single marketing authorization granted by the European Medicines Agency (EMA).

### *What does the EU require from the UK?*

**4. Domestic laws of member states like the UK are subject to the principles of the single market.** The European single market is founded on the “four freedoms” of movement of goods, services, capital, and people. Single market rules are intended to make selling goods and services to the 500 million residents of the EU easier and less costly for the UK and other EU members—the UK and other EU members therefore have to follow harmonized standards. Consequently, domestic laws and regulations that would impede the free movement of those inputs and outputs are, in general, incompatible with the objective of a well-functioning single market. Hence, some domestic laws have to be aligned with the principles of the single market. This also provides protection: the UK can seek to have laws and rules in other countries that would discriminate against UK firms overturned—in particular, EU state aid rules provide a framework for preventing firms from using government support to gain advantage over competitors.<sup>4</sup> Over time, a number of directives and regulations have been added to better harmonize social, employment, health and safety, and environmental policies across national borders.

**5. The UK has negotiated a range of exemptions from EU directives.**

- The UK is carved out of the commitment of other member states to work toward “ever closer union”. There is no obligation to join the euro, there will be no discrimination against the UK because it is outside the euro area, and UK taxpayers will not be asked to pay for bail-outs of euro area economies.<sup>5</sup>
- The UK is outside the Schengen border-free area. As of February 2016, agreement was reached providing, inter alia, concessions on benefits (e.g., a limit on access to in-work benefits by newly-arrived EU workers, and lower rates for child support) (see HM Government, 2016b).

### *What procedures would be followed in the event of a vote to leave the EU?*

**6. The process for withdrawing from the EU and establishing a new arrangement would be complicated.** The government has stated that withdrawal from the EU would begin immediately and would have to follow the rules of Article 50 of the Treaty on European Union (HM Government, 2016a).<sup>6</sup>

- Invoking Article 50 would set off a two-year countdown for a withdrawal agreement. In the event a new agreement had not been reached at the end of two years, the UK would lose access to the single market and rights of its citizens to live in and travel freely in the EU, unless some

<sup>4</sup> Note that these rules do not restrict fiscal policy, as each member government can set its own tax rates.

<sup>5</sup> The UK was granted an opt-out from introducing the euro when the Maastricht Treaty was concluded in 1992.

<sup>6</sup> It has sometimes been argued that the UK could simply repeal the 1972 European Communities Act. The UK government considers that this would violate international law.

sort of an extension were granted, which would require unanimous consent of all other 27 EU member governments.

- The process for negotiating withdrawal and a new agreement under Article 50 would set off a complicated process that would run through the European Council, European Commission, European Parliament, and Council of the European Union. No single state could veto a withdrawal agreement, but a substantial majority would be required.<sup>7</sup> It is not clear whether a new agreement would require unanimous support—that would depend on the nature of the agreement.<sup>8</sup>

**7. The withdrawal would be associated with considerable uncertainty.** The process is untested—Article 50 has never been used. It would be exercised in a tight timeframe, unless that were extended by all remaining EU governments, creating the risk that a new agreement could become hostage to domestic political considerations in other European states. Such problems would be more likely to arise if the UK were to seek both to retain access to the single market and to increase its freedoms over regulations and migration (see ¶19 below).

### *What relationship could the UK have with the EU after an exit vote?*

**8. The UK would face a wide range of possible relationships with the EU, and it is not possible to prejudge the outcome of any negotiations.** No particular formal agreement is guaranteed by the negotiations after an exit vote, although there is a default arrangement should negotiations fail. Arrangements held by other countries illustrate the range of possibilities:

- *EEA membership:* The UK could retain membership of the EEA, as in the case of Norway. In this case, the UK would retain access to the single market, but also comply with the full regulatory framework of the single market. It would lose voting rights on the determination of these regulations and other EU decisions, pay contributions to EU members, and have to allow freedom of movement of people. Norway is outside of the customs union with the EU and does not benefit from the trade agreements negotiated by the EU (¶12).
- *A bilateral agreement:* A notable precedent is Switzerland, which has established access to the single market for specific sectors through treaties. This has secured tariff- and quota-free trade with the EU on most goods, although, like Norway, it is outside the customs union. Although Switzerland and the EU have an agreement on general insurance, there is no broader access for financial services. In return, Switzerland has accepted free movement of people under the

<sup>7</sup> Specifically, an enhanced qualified majority among the remaining EU states—implying 20 out of 27 states representing 65 percent of the population—would be required, and a simple majority of MEPs in the European Parliament.

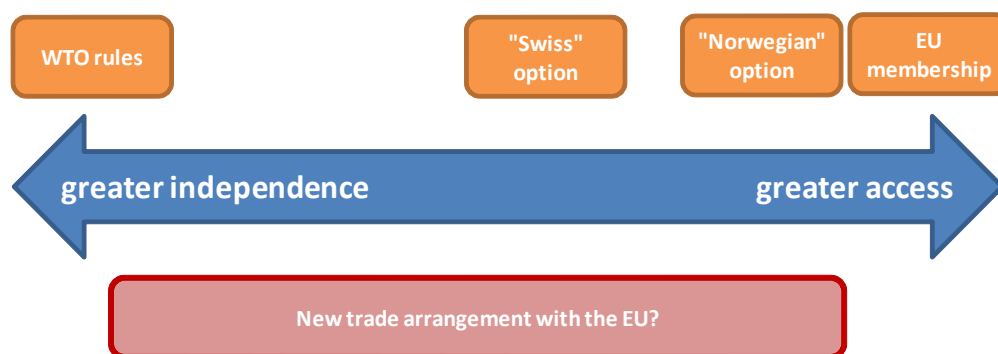
<sup>8</sup> An agreement focused solely on trade would need to be approved by the European Parliament and a qualified majority of the European Council. A broader agreement that provided for wider cooperation would need to be agreed by the European Parliament and unanimously by the European Council.



Schengen agreement, has adopted EU regulations, and makes financial contributions to the EU. Like Norway, it has no voting influence over EU laws.

- *WTO rules*: The WTO has established rules such as maximum tariff rates, which both the UK and the EU would be bound to follow, preventing punitive tariffs being imposed. In this scenario the UK would lose access to the single market and have the same status as any country that has not signed a preferential trade agreement with the EU. On the other hand, the UK would be completely free to set its own regulations and to restrict migration, and would not contribute to the EU budget. The relationship between the UK and the EU would default to this status in the absence of an alternative agreement.

**9. In general, a new free trade arrangement would likely trade off access for independence.** EEA membership, as in the case of Norway, could be seen as incompatible with a mandate to leave the EU, as the UK would continue to be obliged to follow EU directives, pay contributions to the EU budget, and retain the free movement of labor. Defaulting to WTO rules would free the UK from these requirements. The UK would be able to set whatever level of import tariffs it wished, but would also face higher export tariffs on some goods and would not have access to the single market. As a compromise between these options, the UK could seek a bespoke arrangement with the EU. Notwithstanding claims from both sides of the debate over how exit would affect the incentives for the UK and remaining EU members to enter into such an agreement, it is likely that such an agreement would need to balance the objectives of access and independence, with greater access to EU markets requiring higher compliance with EU regulations and thus less independence. As an agreement would be the result of a political process, the results are largely unknowable (although some facts bear on the question about the UK's negotiating power; see also ¶12–13).



The trade-offs across the scenarios of current EU membership, EEA membership as in the case of Norway, the Swiss precedent, and WTO rules are compared in more detail in Appendix 2.

### *What relationship would the UK have with the rest of the world after an exit vote?*

**10. The UK would also likely have to renegotiate a number of trade agreements outside of the EU, or also see trade relationships with those countries default to WTO rules.**

- The UK is party to a number of FTAs with other economies that have been negotiated by the EU. If it were to leave the EU, the UK would likely find also itself without free trade access to those economies. (The UK government views that it is not possible to apply the principle of “presumption of continuity”, under which the successor state may inherit the treaty obligations of the predecessor state, as was applied in cases such as the dissolution of Czechoslovakia. Hence, the UK would not be able to ensure continuity by right, and agreements in which it participates via EU membership would be subject to renegotiation.<sup>9</sup>)
- To avoid such abrupt disruptions to trade, the UK would have to negotiate new trading arrangements with trading partners outside the EU at the same time that it is negotiating both the terms of its exit and its new arrangement with EU. The challenge of this task would add to risks of heightened uncertainty and substantial trade disruptions during an extended transition period that would likely run beyond the two-year window under Article 50.

### C. The Economics of EU Membership

#### *What are the channels through which the UK economy could be affected by leaving the EU?*

**11. Leaving the EU has potential implications for trade and investment, productivity and incomes, the labor market, and the public finances.** Economic arguments for and against EU membership revolve around five key dimensions:

- External trade with the EU and other economies;
- Inward investment to the UK;
- The labor force and immigration;
- Productivity effects from trade, migration, and regulation of the economy; and
- Fiscal costs from membership of the EU and other arrangements.

For each of these, claims and counterclaims are made, the most common of which are summarized below:

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<sup>9</sup>No principle of state secession applies to treaties concluded by a multinational organization like the EU. EU agreements all contain a territorial application clause, saying explicitly that they apply only to the territories to which the EU Treaties apply; hence, once the UK has left the EU, the agreements no longer apply to the UK.

	Claims made by those supporting remain	Claims made by those supporting exit
<b>Trade</b>	<p>UK incomes would fall because the UK would lose trade access to the EU, especially in financial services.</p> <p>EU trade negotiations with other major trading partners are likely to be more beneficial for the UK than those conducted by the UK itself.</p>	<p>The UK could unilaterally cut import duties.</p> <p>The EU would quickly renegotiate a trade agreement with the UK, on better terms for the UK.</p> <p>The UK could quickly establish trade agreements with more prosperous regions, unbound by EU terms.</p>
<b>Investment</b>	<p>The UK is heavily dependent on inward FDI, much of which is directed to the UK for business that serves the EU market.</p> <p>Firms would relocate to other EU countries to maintain full access to the single market; the City of London would lose its status as a global financial center.</p>	<p>Business investment would increase because the UK could get rid of burdensome EU regulations.</p>
<b>Immigration and the labor force</b>	<p>Restrictions on immigration would reduce the labor force and therefore potential GDP growth and fiscal revenue. Immigration restrictions would also reduce economic efficiency by limiting the potential for firms to match employees to jobs.</p>	<p>The UK could restrict the inward flow of EU migrants; inward migration is a burden on public finances and makes access to public services more difficult.</p>
<b>Productivity</b>	<p>Firms that trade externally are likely to have more advanced practices and be more productive. Hence, arrangements that support trade, such as EU membership, also boost productivity.</p> <p>The scope for deregulation is limited. If anything, regulations might become more restrictive and anti-growth following an exit, as it may become easier for regulation-making to become captured by domestic special interests.</p> <p>Important EU regulations (such as financial and environmental safeguards) would likely be retained even if the UK left the EU, especially if the UK wants to maintain significant access to the single market.</p>	<p>The UK would save the direct costs arising from EU regulations.</p> <p>Freedom from EU regulations would increase productivity.</p> <p>The financial sector would prosper once free of EU constraints.</p>

	Claims made by those supporting remain	Claims made by those supporting exit
<b>Fiscal</b>	<p>Significant savings on contributions to the EU budget have already been granted to the UK.</p> <p>Staying in the EU maintains a say on the EU budget. The UK would have no say but would likely have to contribute anyway if it wanted to retain access to the single market.</p> <p>Concessions on migrant benefits have been granted.</p>	<p>The UK would save from not having to pay into the EU budget and from not paying benefits to foreigners.</p>

The following subsections present some facts about these five dimensions.

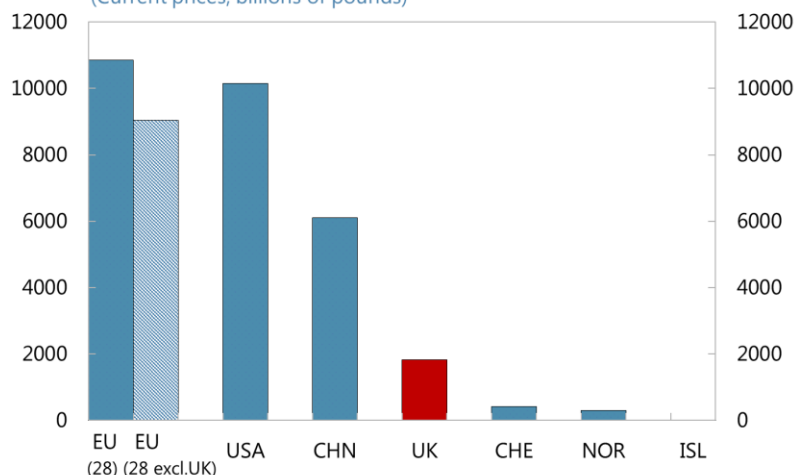
*How important is trade with the EU to the UK?*

**12. The EU is one of the largest economies in the world and is the UK’s largest trading partner.**

- In terms of nominal GDP, the rest of the EU is nearly the same size as the US economy, nearly five times the size of the UK, and is still larger than other fast-growing economies such as China. Other non-EU economies in the EEA and Switzerland are small in comparison.
- In terms of the nominal value of trade, the EU is even more significant to the UK: nearly half of UK goods and services exports go to the EU (worth 13 percent of UK GDP in 2014), although this share has decreased somewhat since its peak in 2006.

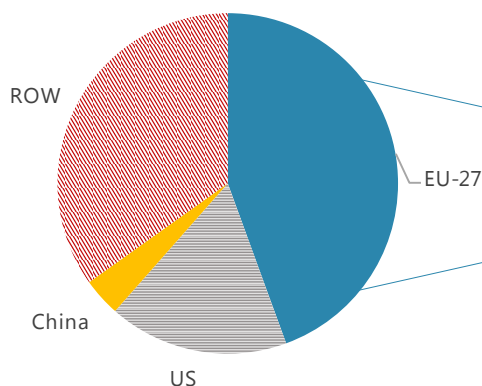
**Gross Domestic Product at Market Prices, 2014**

(Current prices, billions of pounds)

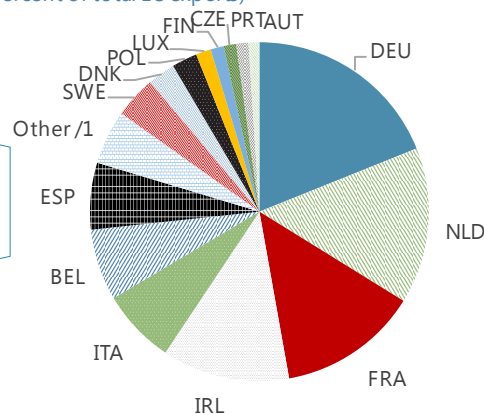


Sources: IMF, *World Economic Outlook*; and IMF staff calculations.

**UK: Exports, 2014**  
(Percent of total exports)



**UK: Exports to Rest of EU, 2014**  
(Percent of total EU exports)



Source: Office for National Statistics; and IMF staff calculations.

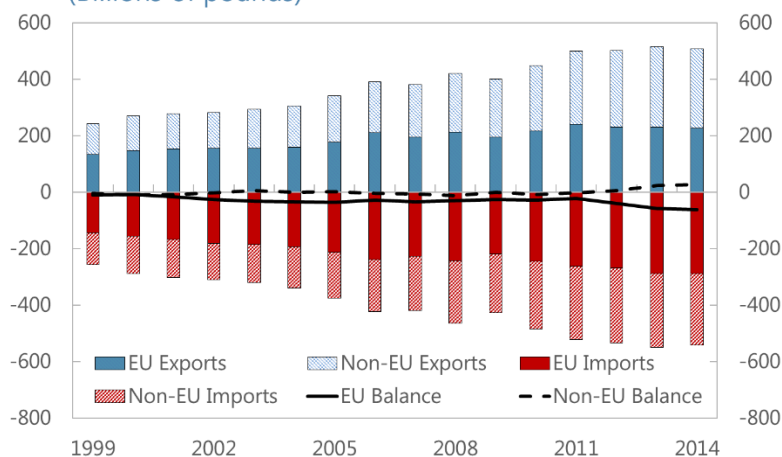
1/ "Other" includes countries with less than 1 percent of exports (BGR, CYP, EST, GRC, HRV, HUN, LTU, LVA, MLT, ROM, SVK, SVN).

**How important is trade with the UK to the EU?**

**13. The UK is very important for certain EU economies, but in overall terms the EU is much more significant for the UK than is the UK for the EU.** The UK runs a trade deficit with the EU, whereas it maintains a small surplus with the US and Japan. This deficit is mostly in goods; the UK runs a surplus in services. However, whereas the value of the UK's exports to the EU is 13 percent of UK GDP, the value of exports from the rest of the EU to the UK is 3 percent of rest-of-EU GDP.

- Expressed in nominal terms, a quarter of UK imports come from Germany; Germany, France, and the Netherlands account for nearly one-half of imports originating from the EU. Spain, Belgium, Italy and Ireland are also significant trading partners.

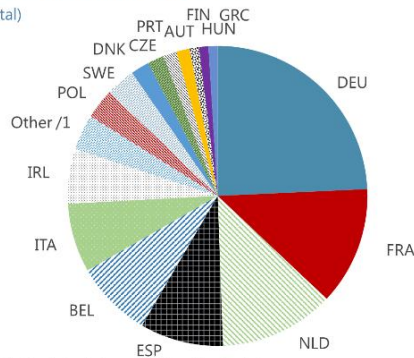
**UK Exports and Imports to EU and Non-EU Countries**  
(Billions of pounds)



Source: Office for National Statistics.

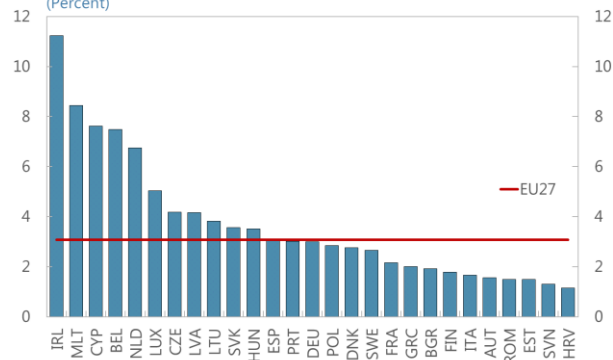
- However, when exports to the UK are expressed as a share of the GDP of the source country, the UK market is most important for Ireland, Malta, Cyprus, Belgium, and the Netherlands.

**UK Imports from Rest of EU, 2014**  
(Percent of total)



Sources: Office for National Statistics; and IMF staff calculations.  
1/ "Other" includes countries that account for less than 1 percent of UK imports (BGR, CYP, EST, HRV, LTU, LUX, LVA, MLT, ROM, SVK, SVN).

**UK Imports in Terms of Source Country GDP**  
(Percent)

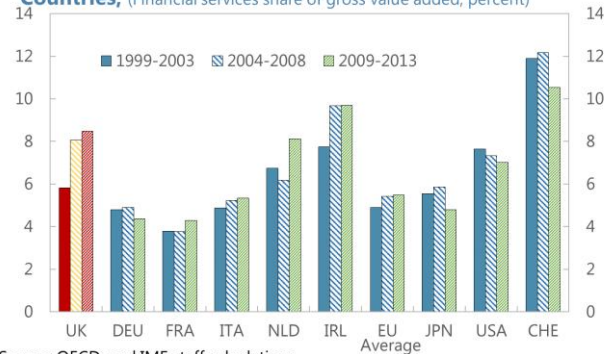


Sources: Office for National Statistics; Eurostat; and IMF staff calculations.

**How important is the EU for the UK financial sector?**

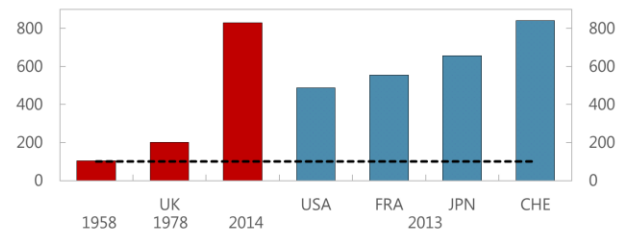
**14. The UK financial sector is a key component of the UK economy.** The financial sector has grown considerably in recent decades: UK financial sector assets were 830 percent of GDP in 2014, four-times their size in the late 1970s. Financial services generate about 8 percent of national income, about 50 percent above the EU average. The UK is the world leader in fixed-income and derivatives transactions, and far ahead of EU peers in private equity, hedge funds, and cross-border bank lending (Bank of England, 2015). The UK's insurance industry is the largest in Europe and the third largest in the world. Financial services (including pensions and insurance) account for over a quarter of services exports and record the largest trade surplus of any sector in the economy.

**Financial Services as a Share of Gross Value Added, Selected Countries,** (Financial services share of gross value added, percent)



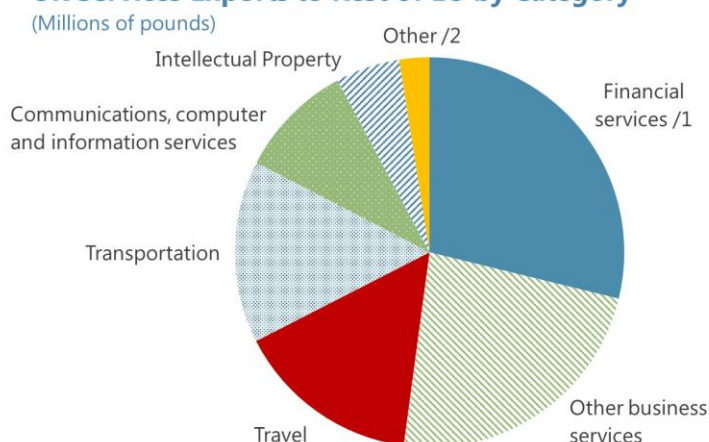
Source: OECD; and IMF staff calculations.  
Note: Figures show financial and insurance activity as a share of total gross value added based on OECD sector accounts.

**The Size of the Financial System Excluding Derivatives**  
(Percent of GDP)



Sources: Radcliffe Report (1959); Wilson Report (1980); ECB; OECD; Swiss National Bank; BoE calculations; IMF staff calculations.  
Notes: The 'Financial system' is defined as total assets of the financial corporations sector (excluding derivatives), measured on an unconsolidated basis. For 1958 and 1978, the total assets of the individual subsectors covered in the Radcliffe and Wilson Reports are summed to give an illustrative total for the financial system. Due to availability, data for Switzerland are from 2012.

### UK Services Exports to Rest of EU by Category



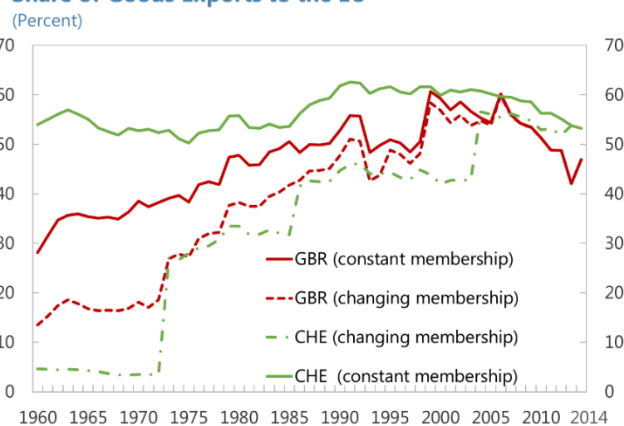
Sources: Office for National Statistics; Eurostat; and IMF staff calculations.  
 1/ "Financial services" includes "Pensions and insurance".  
 2/ "Other" includes "Construction", "Personal, cultural and recreational", and "Government".

**15. The growth of the UK financial sector owes much to the single market.** UK financial sector firms appear to have taken advantage of the passport: since the inception of the single market in the early 1990s, UK trade in financial services as a percentage of GDP has risen much faster than the OECD average (Bank of England, 2015). About a third of the UK's financial and insurance services exports are to the EU, and most of UK banks' investments are in the EU. Inward FDI to the financial sector also accelerated from the early 1990s. Consequently, the financial sector is highly exposed to a loss of access to the single market (figure 1).

#### How has trade with the EU affected the UK over time?

**16. UK trade with the EU has increased steadily since joining.** The share of exports to the EU appears to have increased noticeably after entering the European Economic Community (EEC), the precursor to the EU, in the early 1970s. Just how much can be attributed to membership per se is difficult to say with certainty. One illustrative comparison is with Switzerland: the share of Swiss trade with the countries currently in the EU has remained relatively constant over the last half century, suggesting that its bilateral trade treaties have acted more to preserve than to boost trade access. By contrast, UK trade on the same basis increased noticeably, reaching a peak in 2006. Global trade has decreased considerably after the financial crisis, and the UK's share of trade with the EU has decreased noticeably, but even so the EU remains the UK's most important trading partner.

#### Share of Goods Exports to the EU

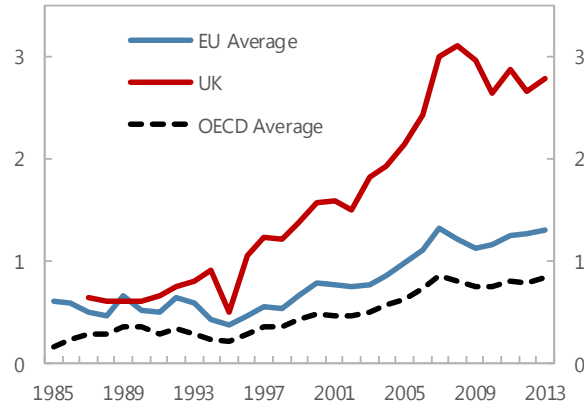


Sources: IMF DOT database; and IMF staff calculations.

**Figure 1. United Kingdom: Financial Sector**

The UK financial sector grew rapidly after access to the single market...

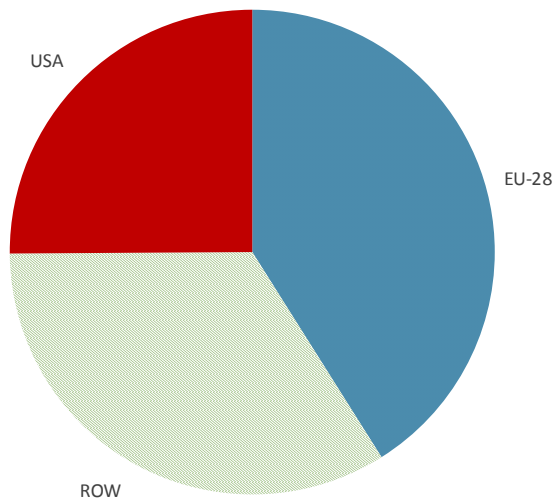
**Overall Trade in Financial Services Relative to GDP (Percent)**



Sources: UNCTAD; IMF, *World Economic Outlook*; BoE calculations, and IMF staff calculations.  
 Notes: Due to data availability, OECD and EU exclude smaller countries prior to 1996. For example, Korea and Mexico are excluded from the OECD and Latvia and Romania are excluded from the EU before this date. Data are on a BMP5 basis.

The EU now accounts for a large share of financial services exports...

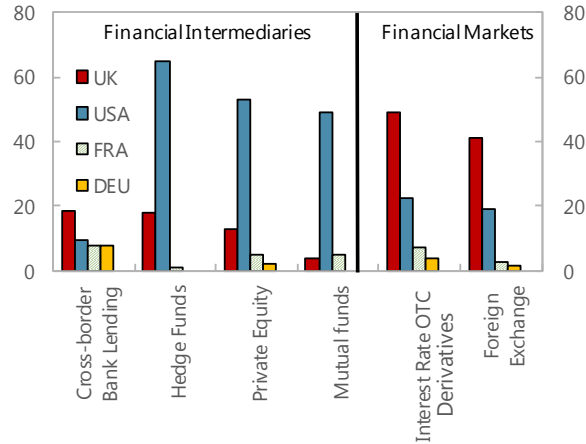
**UK: Share of Financial Services Exports (Percent)**



Sources: Office for National Statistics; Eurostat; and IMF staff calculations.

...gaining substantial shares in global financial activity, including leadership in forex, derivatives, and cross-border lending.

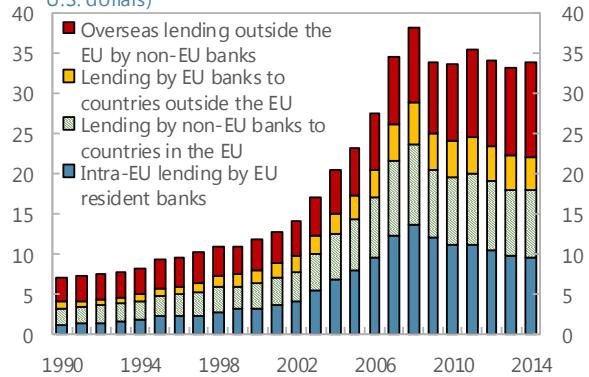
**Shares of Global Financial Activity (Percent)**



Sources: BIS; City UK; IMF, *Global Financial Stability Report*; BoE calculations; IMF staff calculations.  
 Notes: Bars show share of global activity for cross-border lending, interest rate OTC derivatives and foreign exchange and share of global assets for all other categories. Cross-border bank lending and mutual fund asset data are from 2014; all other data are from 2013.

...and over half of cross-border lending is directed to the EU.

**UK Global Cross-Border Bank Lending (Overseas lending by internationally active banks, billions of U.S. dollars)**



Sources: Bank for International Settlements; and BoE calculations.  
 Notes: Figures show lending by all internationally active banks that report to the BIS. Data gaps mean the total figure shown in the chart will not correspond to all cross-border banking flows globally and means sample coverage will vary over time. Figures are reported on a residency basis. This means UK figures include all cross-border lending by the UK entities of UK headquartered banks (e.g. HSBC, Standard Chartered, Barclays) as well as cross-border lending by the UK-based entities of foreign banks (e.g. Goldman Sachs and Deutsche Bank's London offices).



**17. Trade with the EU appears to have brought considerable benefits to the UK overall.**

Quantifying the effects of trade on output and employment is not straightforward—one has to know what would have happened in the absence of EU membership. Empirical exercises generally find that reduced trade barriers due to EU membership have substantially increased UK incomes (see, for example, Crafts, 2016, and Campos et al., 2014.) The evidence seems to support the notion that trade has improved the allocation of resources by allowing the UK economy to specialize in areas of comparative advantage and increase economies of scale. In addition, Bloom et al. (2011) argue that trade has generated benefits through greater competition, bringing productivity gains by adoption of leading-edge practices. Evidence suggests that the free trade agreement with the EU has resulted in lower-priced products (Brienlich et al. 2016).

***What would happen to tariffs if the UK left the EU?*****18. The UK would be able to reduce import tariffs, while export tariffs and non-tariff barriers for exports would likely increase in the absence of a negotiated agreement.**

- If the UK were to revert to WTO rules, it would be able to reduce import tariffs currently imposed under the terms of the EU customs union. These tariffs can be high—for example, the average for animal products is around 20 percent. On average, the tariff rate is calculated to be 5.3 percent in 2014, higher than for many advanced economies, including the US at 3.5 percent.<sup>10</sup>
- To remain compliant with WTO rules, the UK would have to impose higher Most Favored Nation (MFN) tariffs on imports from the 60 economies with which the UK currently has an agreement via the EU, or remove all barriers for all WTO members (as in the case of Singapore).
- Correspondingly, absent a new agreement with the EU, tariffs on UK exports to the EU would be based on the EU's standard MFN tariffs, compared with the zero tariff rates at present. In addition, UK firms exporting to the EU would face higher administrative costs from not being part of the EU customs union and higher non-tariff barriers to the extent that EU product and services standards and regulations differed from those in the UK over time.

***How important is the EU for investment in the UK?***

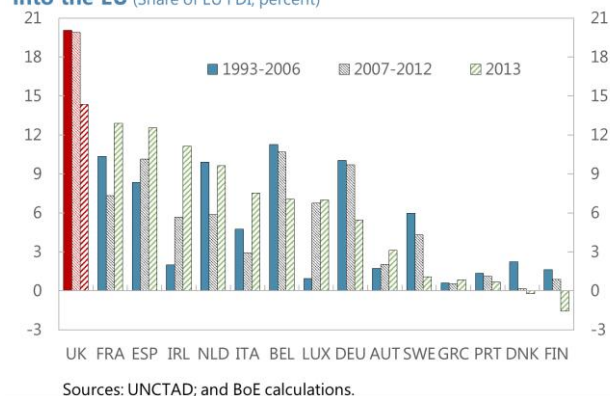
**19. The UK has been a magnet for foreign investment, most of it from the EU.** The stock of FDI in the UK is just over £1 trillion, or 57 percent of GDP. The UK typically receives by far the largest share of intra-EU FDI, and almost half of the FDI received by the UK comes from the EU. The largest contributions are from the Netherlands, France, Luxemburg, and Germany; after the EU, the US has provided the most FDI.

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<sup>10</sup> See HM Government (2016c), charts 2B and 2C.

**20. FDI appears closely linked to single market access.** The UK is an attractive destination for foreign investment because of its relatively liberalized domestic markets and strong legal frameworks and institutions. It also seems plausible, however, that FDI is drawn to the UK because the UK provides a gateway to the single market. A number of recent studies have concluded that there is a significant link between EU membership and inward FDI (Fournier et al. 2015, Bruno et al. 2015, Dhingra et al. 2016b; see also Box 2).

**EU-15 Countries' Share of Average Annual FDI Inflows into the EU** (Share of EU FDI, percent)



**21. Inward FDI has been important for the UK economy.** Before the crisis, FDI inflows to the UK reached a peak of £142 billion in 2008 and have since fallen in subsequent years, to £28 billion in 2014. To put this in context, the annual value of inward FDI has been between 0.4 to 11 percent of GDP over the past ten years. This has likely allowed higher consumption in the UK than if UK households themselves were to have provided the savings to finance such investment. To the degree that FDI has instead resulted in higher total investment, this has boosted UK output and wages. For example, Haskel et al. (2007) show a significant and positive relationship between inward FDI and productivity in the UK, with a 10 percentage point increase in foreign presence raising productivity by about 0.5 percent.

**22. FDI and other forms of foreign investment have been particularly important for the UK financial sector.** The UK's international liabilities were over 500 percent of GDP as of the end of 2015; of that, around half was from investments in monetary and financial institutions. Half of inward FDI is for financial intermediation and insurance; this proportion is much higher for the UK than the median across advanced countries, including the US (Standard and Poor's, 2015). Much of the UK's dominant position in international financial markets is due to FDI.

### *How large is migration from the EU?*

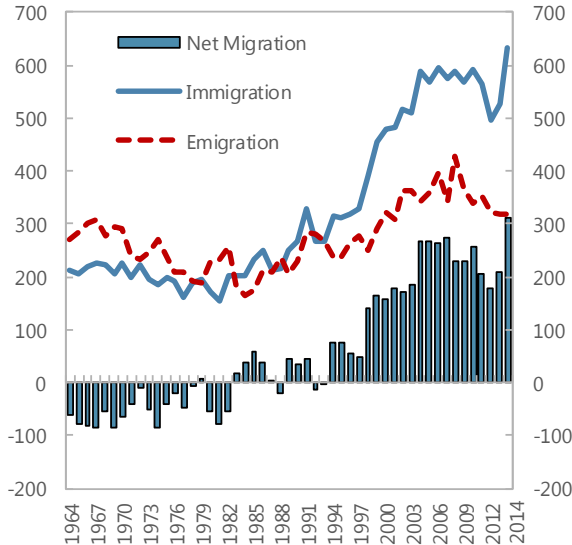
**23. Migration—under the internationally-agreed definition as people coming to work in the UK for more than a year—has risen since the early 1990s.<sup>11</sup>** The number of migrants from the EU has increased over the past decade, and by 2014 the EU accounted for half of net migration flows into the UK. Annual immigration of workers with jobs already secured or looking for work

<sup>11</sup> Recently there has been debate about the accuracy of inward migration figures: many more new National Insurance numbers have been registered to EU workers than have been recorded as inward migrants in the International Passenger Survey (IPS), the main measure of long-term migration. The Office for National Statistics has investigated this issue and found no evidence of systemic mismeasurement—the IPS measures people coming to work in the UK for more than a year; removing short-term workers from the data for National Insurance registrations accounts for most of the apparent discrepancy with the IPS numbers.

**Figure 2. United Kingdom: Migration and the Labor Market**

*Net migration to the UK has increased since the 90s...*

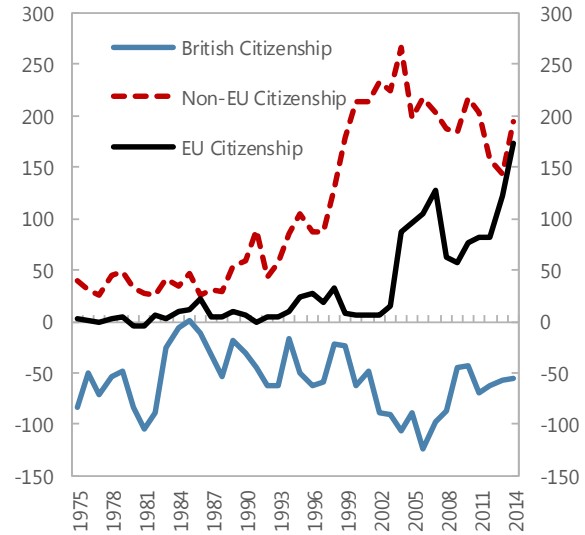
**Long-Term International Migration UK**  
(Thousands)



Source: Office for National Statistics.

*...including from EU countries...*

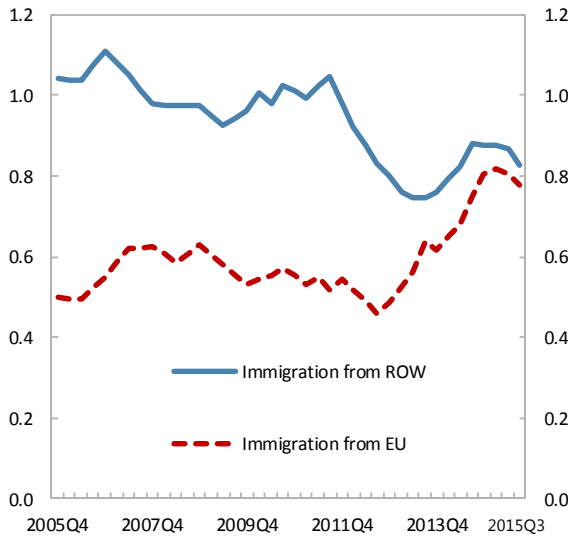
**Long-Term International Net Migration by Citizenship**  
(Thousands)



Source: Office for National Statistics.

*...making a substantial contribution to the labor force...*

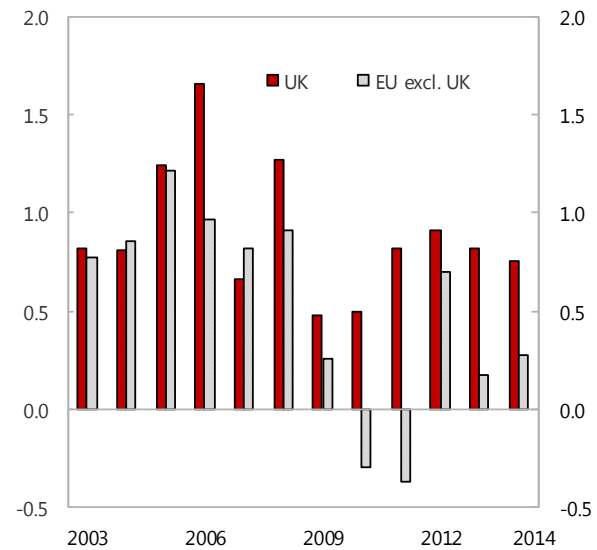
**Gross Immigration Flows**  
(Percent of UK economically-active population)



Sources: Office for National Statistics; and IMF staff calculations.

*...which has been growing faster than in the rest of the EU.*

**Labor Force Growth**  
(Percent)



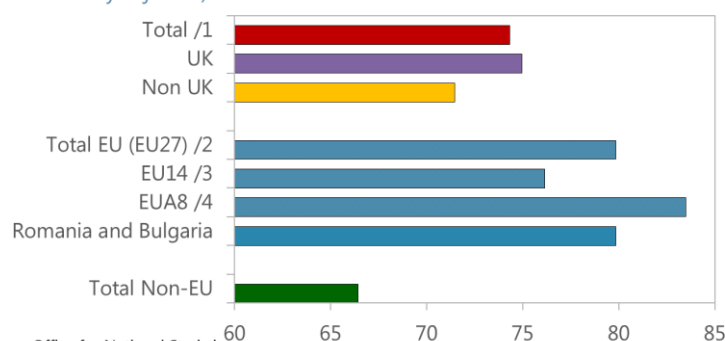
Sources: Eurostat; and IMF staff calculations.

from the EU is now 0.8 percent of the active labor force; this immigration has helped keep the growth rate of the labor force higher in the UK than in the rest of the EU for the past two decades. Employed EU migrants now number just over 2 million, or 6 percent of the labor force (figure 2).

### *What are the macroeconomic effects of migration from the EU?*

**24. EU migrants have high employment rates.** EU migrants appear drawn to the UK mainly because of employment prospects—they typically come from countries with relatively high unemployment rates.<sup>12</sup> Some 40 percent of EU migrants had a definite job on arrival in the UK, and an additional quarter of them were looking for work. EU migrants have higher employment rates than UK natives.

**Employment Rates by Country of Birth: People aged 16 to 64**  
(Not seasonally adjusted)



Source: Office for National Statistics.

1/ The total series includes people who do not state their country of birth or nationality. The total levels series MGTM does not therefore equal the sum of the "UK" and "Non-UK" series;  
2/ This series consists of all 27 EU member states excluding the UK. It does not equal the sum of the EU14, EUA8, and "Romania & Bulgaria" series as it also includes Cyprus, Malta and Croatia;  
3/ Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and Sweden;  
4/ Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia.

**25. But there is little evidence that EU immigrants have caused job losses and lower wages for UK citizens.** The evidence from empirical studies of the UK labor market does not support the notion that there is a fixed "lump of labor" available for workers in the economy and that EU migrants have displaced UK natives from jobs. Instead, the evidence seems consistent with the notion that EU migrant labor has allowed UK firms to better match workers to jobs, allowing them to work more efficiently and boosting demand for labor overall.

- There is little evidence that migrants have affected the employment of UK natives (Portes, 2016). Indeed, employment rates of UK natives have continued to increase, to record levels, as EU migrant inflows have increased. Gilpin et al. (2006) find no evidence that A8 migration has contributed to UK unemployment.<sup>13</sup> Manacorda et al. (2014) argue that migrants and UK natives are mainly not competing for the same jobs—as migrants have entered predominantly low-paid services jobs (despite having higher skills; see also Dustmann et al., 2013), UK natives have increased employment in higher-paid occupations. And even for the least skilled, the evidence of a link to higher unemployment is weak (Lemos and Portes, 2008). Wadsworth (2015) observes no association between changes in the less skilled (defined as those who left school at age 16)

<sup>12</sup> For discussion of drivers of east-west migration within the EU, see also Atoyán et al. (2016) and Kahanec et al. (2014).

<sup>13</sup> For robustness, Lucchino et al. (2012) have tested the link between aggregate unemployment and National Insurance registration and find no link.

native youth NEET ('not in education, employment, or training') rate and changes in the share of immigrants, nor evidence from comparing changes in unemployment across regions with high and low migrant inflows.

- Several studies on the UK labor market find that immigrants have not had much impact on *average* wages (see Manacorda et al., 2006, and Dustman et al., 2005). The evidence on the wages of the *less skilled* is mixed. Some have found evidence that migration might have had a negative effect in some industries (Blanchflower and Shadforth, 2009, and Nickell and Saleheen, 2008; Dustmann et al., 2013 find small negative effects on lower incomes and positive effects on higher incomes). But others find no conclusive results; Wadsworth and Vaitilingam (2015) conclude that what effects there have been have been small.

**26. Evidence suggests migration has boosted productivity and not just output.** Migration has directly added to the pool of available labor, directly boosting output. Immigrants from the EU are also more skilled than UK natives on average, and the educational attainment gap between migrants and natives has been rising over time (Wadsworth, 2015). They are over-represented in high- as well as low-paid jobs. Empirical analysis suggests migrants have a positive impact on GDP per capita (Boubtane et al. 2015), with the implication that a 50 percent decrease in the net migration rate would be associated with a 0.3 percentage point decrease in productivity (Portes, 2015).

**27. On balance, the empirical evidence finds EU immigrants make a net fiscal contribution to the UK.** As noted, EU migrants tend to have higher employment rates than UK citizens; they are also on average younger and better educated (Migration Observatory, 2016). Consequently, they receive less in terms of unemployment benefits on average and draw less on health services. EEA migrants receive 10 percent of in-work benefits, even though they make up around 6 per cent of the UK work force, reflecting the higher proportions of workers on low pay. Overall, immigrants from the EU, and especially those from countries that joined the EU in 2004, are estimated to make a net positive fiscal contribution to the UK (Dustmann and Frattini, 2014).<sup>14</sup> Indirect fiscal contributions are also likely to have been positive, to the extent that migrant workers have allowed firms to operate more cheaply and efficiently and because training costs of migrants have mostly been absorbed elsewhere.

### *What is the potential for further deregulation on leaving the EU?*

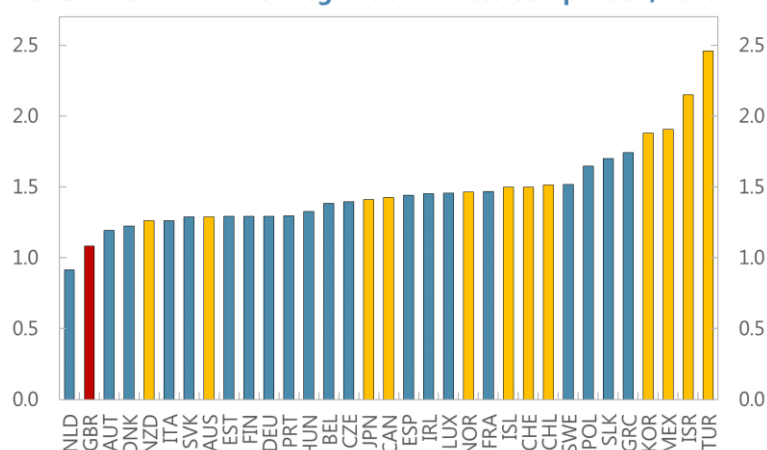
**28. Overall, the UK is already relatively lightly regulated.** The UK already has relatively liberal regulations on product and labor markets.

<sup>14</sup> According to Dustman and Frattini (2014), net fiscal contributions between 2001 and 2011 of European immigrants amounted to almost £20 billion. Jonathan Portes estimates that EEA nationals have paid more than £3 billion in taxes on income while claiming about £0.5 billion in benefits (Financial Times, May 12, 2016).

- The UK ranks second among European economies for product market liberalization, at a level on par with the US.<sup>15</sup>
- Nor are there clear signs that EU membership constrains deregulation. EU economies are generally more liberalized than the OECD average, and the least regulated market, the Netherlands, is an EU member. Moreover, between 1998 and 2013 (the latest date for which there are scores), EU countries improved their product market liberalization ratings by considerably more than non-EU economies, including, notably, the European economies with FTAs (Iceland, Norway, and Switzerland) and other “Anglo” economies (Australia, Canada, New Zealand, and the US).
- The UK is 4<sup>th</sup> best in OECD rankings of labor market flexibility and has lower employment protection legislation than other EU states, such as France, Germany, and the Netherlands.

**29. Where the UK scores relatively poorly is in domestically-controlled regulations,** such as the complexity of regulatory procedures and licensing and permits systems that are not required by the EU. For example, analysts often point to the UK’s planning regulations and

OECD Product Market Regulation Indices Comparison, 2013



Source: OECD.

Notes: Blue color denotes EU countries; yellow color denotes non-EU countries.

Product Market Regulation Indices Compared

	1998	2013	Difference	Percentage difference
France	2.38	1.47	-0.91	-38
Germany	2.23	1.29	-0.93	-42
Italy	2.36	1.26	-1.10	-46
Spain	2.39	1.44	-0.95	-40
Netherlands	1.82	0.92	-0.90	-50
Czech Republic	2.64	1.39	-1.24	-47
Hungary	2.66	1.33	-1.34	-50
Poland	3.19	1.65	-1.54	-48
Iceland	2.03	1.50	-0.54	-26
Norway	1.87	1.46	-0.41	-22
Switzerland	2.49	1.50	-0.99	-40
Australia	1.72	1.29	-0.43	-25
Canada	1.91	1.42	-0.48	-25
New Zealand	1.45	1.26	-0.19	-13
United States	1.50	1.11	-0.39	-26

Sources: OECD; and IMF staff calculations.

<sup>15</sup> This ranking is based on the OECD Product Market Regulation index, using data for 2013. The latest available data for the US are from 2008.

other restrictions on housing construction as being some of the UK's most economically harmful restrictions—regulations that are wholly under domestic control.

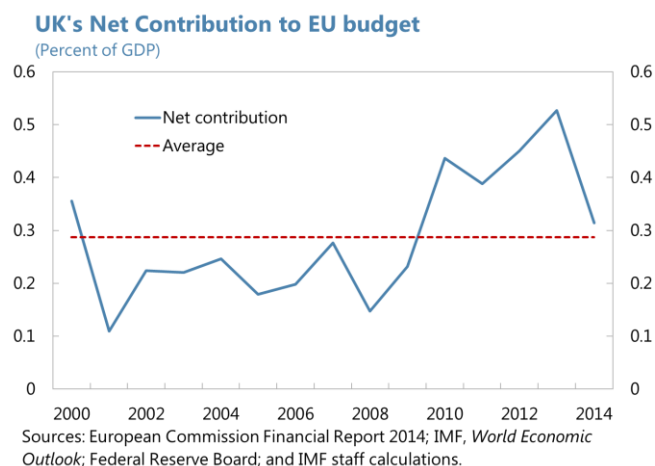
**30. In addition, it seems likely that many regulations now imposed at the EU level would be replaced with domestic equivalents in the event of an exit from the EU.**

- For example, European-imposed environmental regulations present a cost to UK businesses, but deliberately so, to deter pollution and other negative externalities, and it is questionable whether the UK would choose to forego environmental protection in the absence of EU rules.
- Likewise, the Bank of England has indicated that it would be unlikely that financial regulations currently directed at the EU level would be abandoned if the UK were to leave, including because many of these financial regulations reflect globally-agreed standards that the UK itself has promoted.
- Many EU regulations would also likely have to be maintained if the UK were to be granted substantial access to the single market via arrangements such as those negotiated by Switzerland.

**How much does the UK government pay to the EU?**

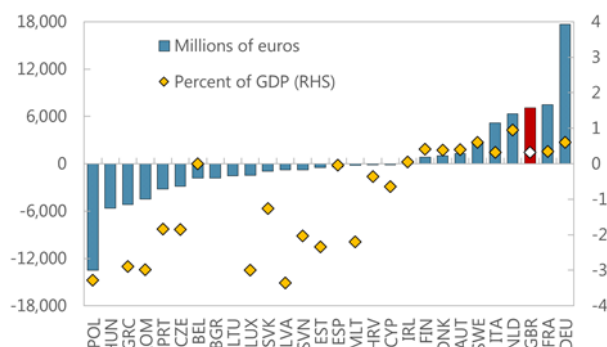
**31. The UK makes a large contribution to the EU budget in nominal terms, but a relatively small one in terms of the size of its economy.** The net contribution varies from year to year, but has averaged about 0.3 of a percent of GDP. In 2014, the UK made a net contribution of €7 billion, the third highest in the EU, but its net contribution in terms of GDP was 0.3 percent, below those of Austria, Denmark, Finland, France, Germany, Italy, the Netherlands, and Sweden.

- EU spending programs cost approximately 1 percent of EU gross national income. Because it is one of the largest economies in the EU, the UK makes one of the largest *notional gross* contributions to the EU budget in nominal terms.
- However, the UK receives a rebate. Because of this, and various other corrections, the UK's *actual gross* contributions to the EU are the smallest in terms of national income, at  $\frac{2}{3}$  of a percent, compared with  $1\frac{1}{3}$  percent for Belgium.



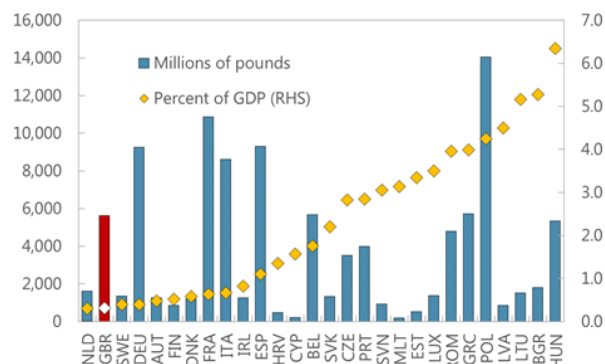
- These contributions are substantially offset by money that flows from the EU to the UK under various spending programs. The inflows are also large in nominal terms, but not the largest, because the UK has a relatively small agricultural sector—less than 1 percent of gross value added—and few regions are eligible for EU regional development support. Hence, the UK is a net contributor to the EU budget.

Net Contribution to EU Budget by Country, 2014



Sources: European Commission Financial Report 2014; IMF, *World Economic Outlook*; Federal Reserve Board; and IMF staff calculations.

Gross Receipts from EU by Country, 2014



Sources: European Commission Financial Report 2014; IMF, *World Economic Outlook*; Federal Reserve Board; and IMF staff calculations.

## D. The Economic Effects on the UK of Leaving the EU

**32. The economic effects on the UK economy of leaving the EU are difficult to estimate with precision.** As described above, there is a wide range of potential scenarios of the UK’s status after an exit vote (¶18), combined with numerous channels—trade, investment, the labor market, productivity, and the public finances (¶11). For each permutation, there are important political choices that are essentially unpredictable. And, in the event of exit, important policy decisions would have to be made for the paths of monetary, fiscal, and prudential policies.

### What does the literature say?

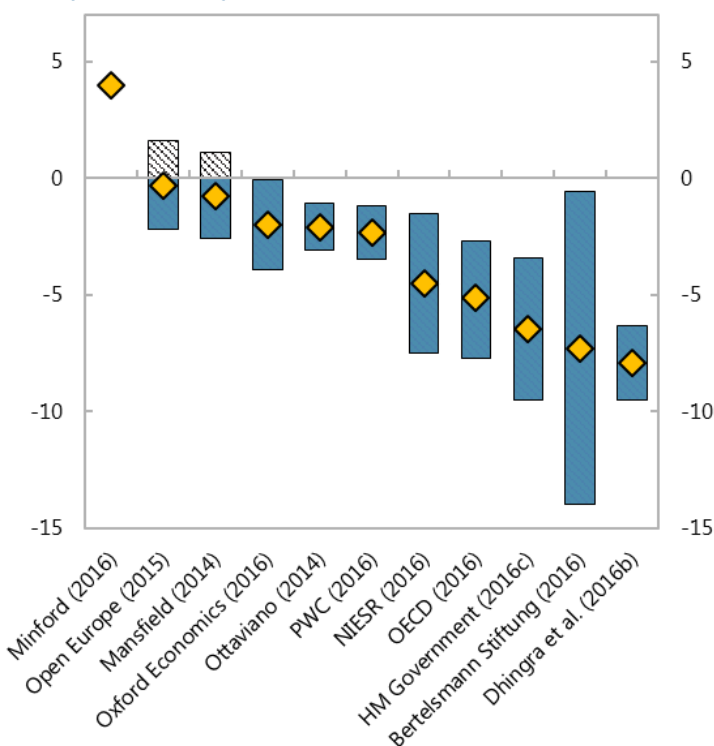
**33. Theory does not provide conclusive answers on long-run effects from exit on potential growth rates.** In simple “AK” growth models, the impact will depend on the effect of exit on investment. More recent models of endogenous growth can also justify changes in growth rates, such as through assumptions about increased or decreased economies of scale. As an empirical matter, evidence from studies of the effects of EU membership on the UK economy indicate that there have been permanent increases in the *level* of output, but do not indicate that there have been permanent changes in potential growth rates from EU membership itself (Crafts, 2016). Put another way, these studies suggest that joining the EU led to a jump in incomes in the UK, but did not affect the long-run growth rate of the economy.



**34. Most formal assessments indicate that the UK economy would be worse off economically in the long run if it were to leave the EU, but the range of estimates is large and some studies suggest the potential for positive net benefits.** Most formal estimates conclude that the UK would face a permanent net loss in the levels of output and incomes, but some studies argue that there would be net gains.

- Studies that find net losses to the UK economy typically emphasize the impact of reduced trade, based on the assumption that the UK would not be able to entirely make up for the loss of access to the single market by switching to other markets; estimates are more negative in scenarios in which the UK has to “go it alone” and rely on WTO MFN rules, as these would involve the largest disruptions in trade. Examples include Bertelsmann Stiftung (2015), Oxford Economics (2016), Ottaviano et al. (2014), PwC (2016), and NIESR (2016).

**Comparison of Long-Run Effects on GDP**  
(Percent of GDP)



Sources: Papers cited.

Notes: bars denote ranges. Diamonds denote midpoints or point estimates.

- In addition, some studies, drawing on econometric evidence on the positive relationship between EU membership and trade, assume substantial reductions in labor productivity following exit, in addition to the immediate and direct effects of reduced trade. Examples include Dhingra et al. (2016), HMT (2016), the “WTO+” scenario in NIESR (2016), and OECD (2016).
- Studies that find net gains to the UK either focus exclusively on the elimination of fiscal and regulatory costs of EU membership (Mansfield, 2014, Minford, 2016); assume unilateral elimination of tariffs that facilitates a shift in and expansion of UK production (Minford, 2016); or assume that the UK embarks on substantial deregulation that can compensate for reduced trade income, together with renegotiated access to the EU single market or new FTAs with other countries (the liberalization scenarios in OpenEurope, 2015).

Appendix 3 provides more details of individual studies.

### *Is there a consensus on the effects on UK trade from leaving the EU?*

**35. Economists agree that increased barriers to the EU would be damaging to trade with the EU—assessments vary about whether and how the UK could compensate.** There is no dispute among economists that increased trade barriers with the EU would lead to lower UK exports to the EU. Studies differ in their assessment of the *degree* of deterioration and what the UK could do to offset the damage.

- Some have questioned whether the net effect on UK exports would be significant (see, for example, Burrage, 2014). In contrast, some argue that loss of single market access would result in substantial losses in productivity, in addition to significant direct losses from trade income (see, for example, Dhingra et al., 2016). The robustness of empirical estimates of the effects of EU membership on trade is discussed in Box 1. Debate also arises because an increase in tariffs to WTO rates (¶118) is not the whole picture—assessments have to be made of the costs of being outside the customs union and non-tariff barriers that would emerge as standards and regulations diverged (see, for example, Ottaviano et al., 2014).
- Some argue that the EU would rapidly come to agreement with the UK on a bespoke agreement that maintained single market access while making concessions on regulations. This is clearly a political question; some argue the UK’s size and trade deficit would work in its favor, while others point to the disparities of UK-EU trade to argue the opposite (¶113).
- Some proponents for leaving make the case that the UK could refocus trade on faster growing regions (see, for example, Mansfield, 2014). In large part, one’s assessment of this argument will depend on whether the UK has the legal right to demand continuity of existing trade agreements (¶110) and/or the ability to quickly come to new arrangements (¶136, below).

### *How easily could the UK increase trade with other economies if it left the EU?*

**36. The EU is a natural trading partner, and substituting to other export markets would likely take time.**

- As shown in Box 1, results from a standard empirical trade model—the so-called “gravity” model—indicate that the geographic distance of a country from the UK is a good predictor of the level of trade, both in goods and services. This finding suggests that European economies are natural trading partners for the UK (see also Fournier et al., 2015, Head and Meyer, 2014). The results also indicate that membership in the EU primarily creates additional trading opportunities for the UK and does not simply divert British exports away from other markets to Europe.
- Substantial substitution of exports from Europe to other markets would require that the UK negotiate new bilateral agreements to replace those now covered by arrangements with the EU and, most likely, new trade agreements with other economies as well. Other countries’ experiences indicate that trade agreements usually take years to agree and implement, even

when mutual gains are clear: for example, New Zealand took five years to implement its FTA with China. The China-Switzerland agreement was reached relatively quickly—three years—but only over a narrow range of goods and services. By contrast, the negotiations over the EU-Canada Trade Agreement have taken seven years so far, and the agreement has yet to be ratified.

### *Could leaving the EU to unilaterally set tariffs to zero improve living standards?*

**37. Benefits from cutting import tariffs would likely be limited.** If the UK were to leave the EU, it would be free to reduce tariffs to zero (¶18). Reducing such tariffs would make UK consumers better off, all else equal. This is a standard result in trade theory and the essence of the argument presented in Minford (2016). One's assessment of this argument will depend on judgment about the likelihood of the scenario and other effects, notably exchange rate depreciation.

- The scenario proposes unilateral reduction in tariffs to zero, with the assumption that perfect competition ensures that all benefits accrue to UK consumers.<sup>16</sup> On some particular goods, the reduction in tariffs would be substantial. The effective rate would fall from 5½ percent; the question is whether it would be feasible to reduce it to zero or it would more likely fall to some level only somewhat smaller (such as the 3½ percent effective rate of the US). To illustrate the political considerations involved, the scenario in Minford (2016) implies UK production shifting entirely to services, at the expense of agriculture and manufacturing (1 and 12 percent of gross value added, respectively). Producers in these sectors might raise political objections to such developments, however. Indeed, it is possible that domestic political pressures may cause import tariffs to rise following an exit, with adverse effects on UK consumers.
- The obvious consequence of defaulting to WTO rules would be an increase in tariff rates on exports to the EU from zero currently. The effective rate would be more than the notional tariff rate (taking into account non-tariff costs, Ottaviano et al., 2014, use an effective rate of 7 percent in their simulations). Whether this would overwhelm the benefits of unilateral reduction in import tariffs depends on how susceptible UK exports to the EU are to these rates and how easily the UK could divert its production to other markets (¶36). The exchange rate would likely depreciate permanently, given the need to sell UK tradeable goods and services to other economies (¶44, below). This would aid redirection of exports, but would also potentially completely offset the reduction in import tariffs. A post-exit reduction in UK import duties would expose some sectors (such as the auto industry) to a simultaneous increase in tariffs on their exports to the EU and a reduction in tariffs on competing imports from outside the EU.

<sup>16</sup> The scenario also assumes that the UK would save 0.8 percent of GDP from contributions to the EU budget (see ¶41) and would be able to reduce national insurance contributions by 2 percentage points.

### *How much could cutting EU regulations benefit the UK?*

**38. Arguments are made that leaving the EU would allow the UK to get rid of burdensome EU regulations, lowering business costs and facilitating higher output, investment, and employment.** For example, in OpenEurope (2015), scenarios in which the UK leaves the EU to strike an FTA with the EU and pursue intensive deregulation yield net benefits ranging from ½ to 1½ percent of GDP. The crucial issue is whether intensive deregulation would be likely and whether that would lead to large gains in output.

**39. The potential for cuts in costs of regulation sufficient to outweigh losses from reduced access to the single market appear slim.** Estimating costs and benefits of regulation is extremely difficult. Nonetheless, based on UK government impact studies, OpenEurope (2015) assesses that EU regulations impose annual gross costs of £33 billion, with annual gross benefits of £59 billion, and estimates that regulations costing net £8 billion could be eliminated in the event of an exit from the EU. That assumes scrapping a range of employment (e.g., the Working Time and Agency Directives), climate change (e.g., Renewables Directive), and financial regulations (e.g., Solvency II for insurance firms), the first two of which might encounter considerable domestic opposition, and the last would need to be replaced with an equivalent UK regime.<sup>17</sup> But even if such cuts were possible, the direct savings would be outweighed if losses in trade and related income arising from reduced access to the single market access were larger than ½ percent of GDP.

**40. Instead, a substantial productivity increase would likely be required to offset likely losses from reduced access to the single market.** Staff analysis and empirical evidence suggests that reduced trade access would cause a permanent reduction in the level of output, worsened by associated disinvestment, productivity reductions arising from lessened trade, and, if accompanied by restrictive inward migration policies, labor shortages and mismatching. It is theoretically possible that these effects could be offset by higher productivity as a result of increased policy flexibility and deregulation following an EU exit. Many countries have experienced spurts in productivity, often for reasons that are not well understood (Easterly et al., 1987). However, the UK is comparatively deregulated already, and productivity problems in the UK are more to do with skills, infrastructure, and planning problems than regulatory burdens associated with EU membership (LSE, 2013). This raises the question of whether the required gains in productivity could be achieved quickly and be sustained. Moreover, regulatory policies might actually become less supportive, not more supportive, of growth following an exit.

### *What would be the fiscal impact of leaving the EU?*

**41. The UK would likely not save all of its contribution by leaving the EU.** As noted (f131), the UK contributes roughly ⅔ of a percent of GDP to the EU budget on a gross basis. However, in

<sup>17</sup> Note also that the UK, along with other countries, has already secured an individual opt-out for the Working Time Directive.

the event of leaving the EU, the UK's saving might instead be closer to its net contribution of  $\frac{1}{3}$  percent of GDP. First, over 95 percent of funds that the UK receives are for R&D and university research, regional development, and agriculture. Less could be spent on those items, but obviously at the expense of those who already receive them. Second, if the UK were to seek access to the single market after exiting the EU, it would most likely have to continue to make contributions to EU member states, as do Norway and Switzerland.<sup>18</sup>

**42. Relatively small GDP losses from trade would more than offset savings from reduced EU contributions, resulting in net fiscal losses.** Staff analysis below and other assessments using formal macroeconomic models indicate that the direct fiscal saving from leaving the EU would be outweighed by the fall in fiscal revenues arising from loss of trade income (and, potentially, lower productivity). For example, assuming the revenue-to-GDP ratio stays constant, then each 1 percentage point decline in output would reduce fiscal revenue (and increase the fiscal deficit) by an amount equivalent to about 0.4 percent of GDP. Consequently, any output losses in excess of 1 percent of GDP would result in net fiscal losses for the UK.<sup>19</sup>

### *What would be the impact of restricting inward migration?*

**43. As migrants add to productivity overall, restricting migration would likely lower GDP per capita.**

- A problem with assessing the impact of restrictive migration is that it is not clear how restrictions would be imposed (an immediate issue would be those EU migrants already living and working in the UK). Sanchez Martinez and Lisenkova (2014) assume no change to the current population of migrants and find that if the net flow of future inward migration were cut by half, GDP and GDP per capita would fall in the long run by 11.0 and 2.7 percent, respectively.
- It is sometimes proposed that the UK could increase productivity by picking highly-skilled EU workers on the basis of a points system, as it does already under the "Tier 2" system for non-EU nationals. The effect of such a policy is not clear: EU migrants are more educated overall and are already overrepresented in higher-paid (as well as lower-paid) jobs. Cutting the numbers of EU migrants able to enter lower-paid jobs would tend to increase productivity via "batting average" effects if the effect were to slow employment growth in lower-paid jobs, but it seems more likely that the net effect would be to constrain UK firms. (Some industries would be particularly adversely affected by restrictions on immigration: hospitality, food and drink, and construction. Rolfe and Hudson-Sharpe (2016) find that employers are concerned about their ability to fill vacancies in the event of restrictions on EU migrants.)

<sup>18</sup> Norway and Switzerland do not formally contribute to the EU budget, but do make payments to EU member states.

<sup>19</sup> This could be a generous figure: the Institute for Financial Studies calculates that a reduction in national income of only 0.6 percent would outweigh the saving of the EU budget contribution. See Emmerson et al. (2016).

### *On balance—assessing the long-run economic impact of exiting the EU*

**44. The UK economy would likely be worse off economically in the long run.** Based on an assessment of the evidence and other studies, it seems most likely that the net effect on GDP from exiting the EU would be negative, with the degree depending on the alternative arrangement reached with the EU.

- Reduced trade access would lower returns to capital, causing firms to reduce investment and lower real wages.
- Lower permanent income, associated with lower real wages, would result in reduced consumption.
- A permanent reduction in export demand would be associated with a permanent depreciation in the real exchange rate, to eventually restore the current account balance to equilibrium. This would cause imported goods to become more expensive. Exports would be more competitively priced, but not by enough to fully offset reduced export demand from higher trade barriers.
- Losses would likely be accentuated to the extent that reduced trade brought reductions in productivity and foreign investment. Restrictions on inward migration would also damage not just labor supply but, potentially, skill levels and efficiency.

### *Assessing the short-run economic impact of exiting the EU—the role of uncertainty and risk aversion*

**45. Another risk is that of an immediate market disruption following the vote.** Asset prices in the UK (and, to a lesser degree, the rest of the EU) would likely fall in the aftermath of a vote for exit. Of particular concern is the possibility, *in extremis*, for liquidity to dry up, especially for the funding of UK banks, which could cause a credit squeeze on UK households and businesses (Bank of England, 2015b).<sup>20</sup>

**46. Uncertainty and increased risk aversion would likely play a significant role during the transition period.** During the protracted period in which the UK would have to negotiate new arrangements with the EU and its other trading partners, UK and foreign firms operating in the UK would need to make decisions about how to position themselves. Uncertainty about new arrangements would provide an incentive to hold off on investment and hiring; some firms might even decide to pull out of the UK and relocate to EU countries to the extent that their businesses depend on access to the single market. The same arguments apply to households, which could decide to hold off on buying durable goods and houses. The resulting shortfall in demand would

<sup>20</sup> The Bank of England will offer additional indexed long-term repo operations and will continue to offer dollar liquidity in the weeks around the referendum to try to ensure the smooth functioning of sterling money markets.

generate more unemployment; the resulting job insecurity would likely cause households to reduce consumption (Box 2).

**47. To assess these risks, staff considered scenarios for limited and more adverse uncertainty.** The aim of the scenarios is to explore the implications of the transition to a new long-run relationship with the EU—which can be expected to have implications in the short run, to the extent that households and firms are forward looking—and the additional effects of increased risk and uncertainty about the new long run.

To examine these issues, two scenarios are considered:

- *Limited* uncertainty, associated with convergence to an EEA-type regime. Households and firms are relatively confident about the new long run, and therefore uncertainty dissipates relatively quickly. The new trading arrangement brings some costs (such as from being outside the customs union), and output is lower by 1½ percent in the long run. In terms of historical experiences, the uncertainty is about one-quarter of that experienced during the global financial crisis.
- An *adverse scenario* in which negotiations with the EU do not proceed smoothly and the UK eventually defaults to WTO rules. The implications of the new long run are relatively slow to emerge, but the difficulty of the negotiations generates considerable uncertainty and larger increases in risk premia than in the limited scenario. The uncertainty is at the same level of that experienced during the global financial crisis, but is somewhat slower to peak and takes longer to dissipate. Under this scenario, output is lower by about 4½ percent in the long run.

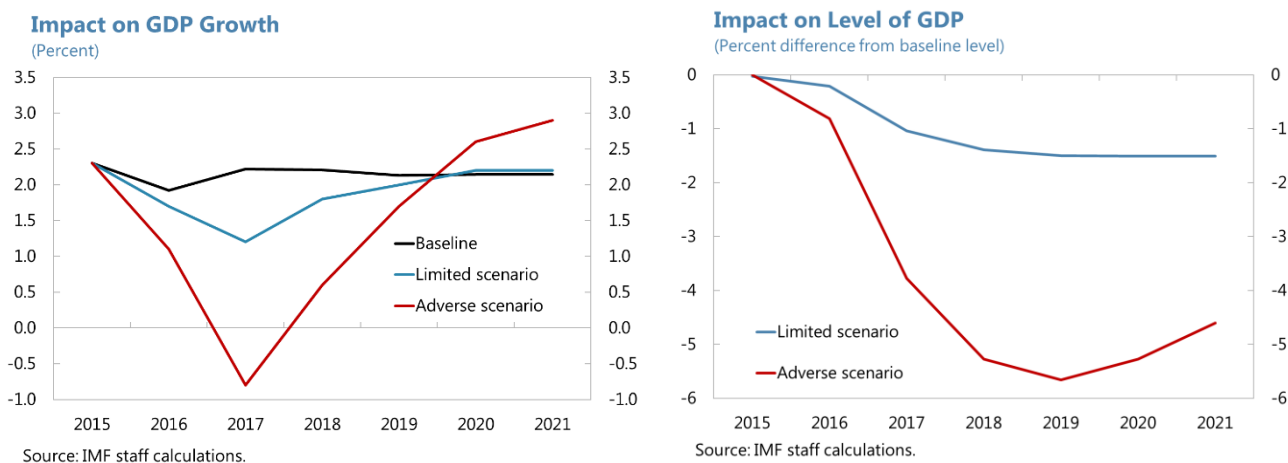
The scenarios are intended to be illustrative and are not predictions; nor are they meant to indicate upper and lower bounds to what could happen. In particular, although the scenarios considered here are based on reasonable assumptions about the impact of different types of post-EU arrangements on trade, investment, and productivity, they should not be interpreted as casting doubt on the plausibility of assumptions employed in other studies. Changes in assumptions would lead to different outcomes; as discussed (134–35), some studies have found significantly larger long-run effects of EU exit on UK GDP. Instead, the assumptions about long-run costs in the range considered here allow a greater focus on the impact of uncertainty on medium-term economic activity—that is, the short-run impacts shown below are driven substantially by the impact of uncertainty on economic activity rather than anticipation of substantial long-run costs.

In both scenarios, monetary policy is assumed to remain on hold for two years after the decision to leave the EU. This is a technical assumption imposed to simplify the interpretation of the results, and not a normative conclusion about desirable monetary policy. It is worth noting, however, that the Bank of England has emphasized that the course of monetary policy in the aftermath of a vote to leave the EU would depend on an assessment of the impact on demand, supply, and the exchange rate, with no presumption that monetary policy would become either more or less accommodative.

The scenarios are informed by a range of tools, ranging from analysis of historical episodes, econometric evidence, and simulations from structural macroeconomic models. These tools are used as inputs and cross-checked in the “financial programming” framework staff uses to prepare its macroeconomic projections. For more details on the tools and assumptions, see Appendix V.

**48. The scenarios show that uncertainty associated with the transition to new trading relationships could generate material costs** (table 1).

- In the limited scenario, GDP growth dips to 1.4 percent in 2017, and GDP is almost fully at its new long-run level of 1.5 percent below the baseline by 2019. GDP growth falls to -0.8 percent in 2017 in the adverse scenario, and the level of GDP dips to 5.6 percent below the baseline by 2019, before uncertainty and risk effects ebb away. (Growth rates in later years are higher than the baseline owing to base effects, but output is unambiguously lower in all periods.)



- For the trade balance, the immediate effect is an increase, but this is because demand for imported goods plunges due to exchange rate depreciation and reduced consumption and investment rather than an improvement in exports. This improvement gradually dissipates over the medium term, in the long run, real wages and the exchange rate would have to adjust to ensure a sustainable current account balance.
- The unemployment rate increases to 5½ percent in 2019 in the limited scenario and to 6½ percent in 2018 in the adverse scenario. The rise in unemployment might appear small. It reflects the relative flexibility of the UK labor market.<sup>21</sup> However, this flexibility also implies that

<sup>21</sup> The implied short-run Okun's relationship of 0.35 with respect to the output gap (which is narrower than the fall in GDP due to adverse effects on potential output) follows the evidence in Ball et al. (2013) and is consistent with staff analysis of the effects of uncertainty during the financial crisis that found relatively small effects on unemployment, owing in part to the UK's flexible labor market (Denis and Kannan, 2013).



**Table 1. United Kingdom: Impact of Key Macroeconomic Variables**  
(Percentage of GDP, unless otherwise indicated)

	2016	2017	2018	2019	2020	2021
<b>Real GDP growth rates (percent change)</b>						
Baseline	1.9	2.2	2.2	2.1	2.1	2.1
Limited scenario	1.7	1.4	1.8	2.0	2.1	2.1
Adverse scenario	1.1	-0.8	0.6	1.7	2.6	2.9
<b>Real GDP deviation from baseline (percent of GDP)</b>						
Baseline	0.0	0.0	0.0	0.0	0.0	0.0
Limited scenario	-0.2	-1.0	-1.3	-1.4	-1.4	-1.4
Adverse scenario	-0.8	-3.7	-5.2	-5.6	-5.2	-4.5
<b>Trade balance</b>						
Baseline	-2.1	-2.1	-2.1	-2.0	-2.1	-2.1
Limited scenario	-1.5	-0.3	-0.3	-0.3	-0.5	-0.7
Adverse scenario	-1.5	0.0	0.1	-0.2	-0.8	-1.4
<b>Unemployment rate (percent)</b>						
Baseline	5.0	5.0	5.1	5.3	5.3	5.3
Limited scenario	5.1	5.3	5.4	5.5	5.4	5.4
Adverse scenario	5.2	6.0	6.5	6.1	5.8	5.8
<b>Fiscal deficit 1/</b>						
Baseline	-2.9	-2.0	-1.1	0.5	0.5	0.6
Limited scenario	-3.2	-2.7	-1.9	0.0	0.1	0.2
Adverse scenario	-4.0	-5.0	-4.8	-2.6	-2.3	-1.7
<b>Fiscal debt 2/</b>						
Baseline	82.6	81.5	80.0	77.3	74.8	71.1
Limited scenario	83.3	82.7	82.2	80.0	78.0	74.9
Adverse scenario	85.0	87.3	89.9	89.9	89.4	87.2
<b>CPI inflation (period average, percent change)</b>						
Baseline	0.8	1.9	2.0	2.0	2.0	2.0
Limited scenario	1.1	2.6	2.8	1.8	1.5	2.0
Adverse scenario	1.6	4.0	3.2	1.9	1.2	1.9

Source: IMF staff calculations.

1/ Fiscal year public sector overall balance.

2/ Public sector net debt; end of fiscal year using centered-GDP as the denominator.

hours worked and wages would bear the burden of adjustment to reduce firms’ costs. This was clearly seen during the financial crisis (¶150); there was also a substantial increase in numbers of involuntarily part-time employed. In addition, the experience of previous cycles suggests that the young are more likely to experience larger increases in unemployment; given that the young are at a crucial stage for gaining work experience, the effects of higher youth unemployment on lifetime earnings can be quite persistent.

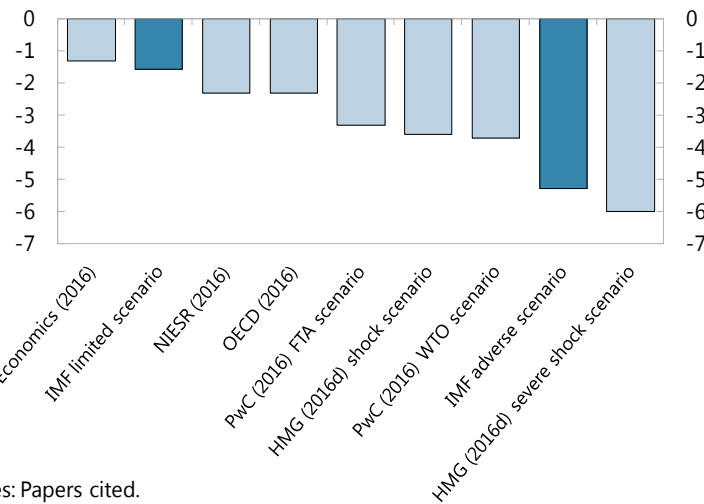
- Fiscal balances deteriorate under both scenarios. Assuming that automatic stabilizers are allowed to function, lower revenues imply higher deficits and debt, even with savings from EU budget contributions.<sup>22</sup>
- The effects of exchange rate depreciation—by 5 percent in the limited uncertainty scenario and 15 percent in the adverse scenario—and of gradual worsening of supply potential as firms diminish investment and employment are seen in higher inflation rates of 2¾ percent in 2018 in the limited scenario and 4 percent in the adverse scenario. Clearly, this situation of falling output and high inflation would present a challenge to the Bank of England (see ¶151).

**49. These scenarios are comparable with those in other studies.** As with assessments of the effects on the long run, estimates of short-run effects cover a range. The limited and adverse scenarios are within this range.

Naturally, the plausibility of these scenarios depends on how plausible are the underlying assumptions, including about the long run: the limited scenario assumes membership of the EEA, which would require paying contributions to EU members, allowing free movement of people, and accepting single market rules; the WTO scenario would imply loss of passporting access and defaulting to MFN tariffs.<sup>23</sup>

**Comparison of Short-Run Impacts**

(Deviation from baseline, percent)



Sources: Papers cited.

Notes: All values for 2018, except HMG scenarios, which are for fiscal year 2017/18.

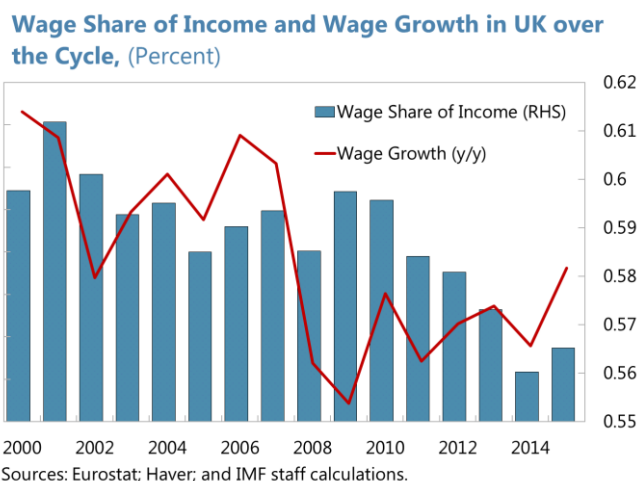
<sup>22</sup> For simplicity and ease of comparison, the net saving from EU budget contributions is assumed to be 0.4 percent of GDP (the same assumption as made by the Institute for Fiscal Studies), starting in mid 2018, in both scenarios.

<sup>23</sup> The scenarios are compared at the year for which data are most available. Note that the peak losses in the two PwC scenarios are -3.4 percent in 2019 and -5.5 percent in 2020.

### What would be the likely effect on household incomes?

#### 50. Assuming no change in the composition of households, household incomes would decrease in line with GDP, possibly more so in the short term.

- For the reasons discussed above, national income would likely fall as a result of an exit. Nominal household incomes would likely fall more or less in line with the drop in national income over the long run, as shares of income accruing to labor and capital have remained broadly stable over long periods. Real household incomes would deteriorate further as consumer prices increase because of exchange rate depreciation.
- In the short term, household incomes could be disproportionately affected, as the labor share of income tends to fall during UK recessions, possibly due to a loss of wage bargaining power. This was seen during the financial crisis.



### What would be the implication for monetary policy and interest rates?

#### 51. Risk premia could increase, and the Bank of England would face a difficult decision on policy rates. There would be two drivers of interest rates: first, the risk premium that lenders attach to lending, and second, the level of the policy rate.

- In the short term, risk premia would be likely to go up and feed into retail interest rates. As noted in the accompanying Financial System Stability Assessment (Appendix II), UK banks would face higher impairments and higher funding costs. There could even be an increase in sovereign rates, especially if the UK were to experience a ratings downgrade.
- In principle, the Bank of England could try to offset the effect of higher risk premia by reducing Bank Rate. But the Bank of England might not be able to reduce rates and still satisfy the mandate to hit target inflation if there is substantial damage to potential output from lower investment or if inflation expectations increase.<sup>24</sup>

<sup>24</sup> Simulations by the National Institute of Economic and Social Research show *tightening* of monetary conditions with unconstrained monetary policy that follows a Taylor rule with parameters published by the Bank of England.

### *Which sectors would be most affected?*

**52. The financial sector and high value-added manufacturing are likely most vulnerable to exit-related risks.** Given the wide range of potential scenarios, including about tariff rates, access to the single market, and fiscal subsidies, assessments differ on the degree by which sectors will be affected.<sup>25</sup>

- The UK has a number of advantages as a financial center that predate EU membership, and substantial networks have been built up to support the financial sector. That said, exit from the EU would disrupt client relationships with the EU. Exit from the single market would almost certainly reduce market access of UK-based financial firms—both domestic and foreign—to the EU, subject them to regulatory uncertainty for some time, and force them to re-examine business models. Even EEA membership might not ensure uninterrupted access to the single market for some financial services providers, given current delays in transposing EU legislation into the EEA agreement. Loss of passports would acutely affect UK-based banks. The likely effects would be higher costs; in addition, global financial companies with European headquarters in London could decide to relocate. UK-based asset managers and clearing houses would also be adversely affected, and UK payment and settlement systems might also face restrictions to access EU counterparts. UK insurance companies would be more insulated, as most UK insurers already operate in other EU countries via subsidiaries, with the notable exception of Lloyd's. The impact on the latter and the London insurance market could be significant absent cross-border supervisory recognition. UK insurers would also be affected by regulatory uncertainty following a decision to exit. (See the accompanying Financial System Stability Assessment, Appendix II, for more details.)
- A number of other sectors could be adversely affected, particularly those that are tightly connected to the EU via supply chains (HMG 2016c). Notable examples include the pharmaceutical, aerospace, and automotive sectors (see also Dhingra et al., 2016c); the first of these also relies on passporting rights and EU sponsoring of joint R&D projects.

## **E. Economic Effects on Other Countries**

**53. Other countries would likely lose economically from the UK leaving the EU, although the effects would be smaller.**

- Within the EU, data show that Malta, Ireland, Cyprus, the Netherlands, and Belgium are most exposed via trade linkages.<sup>26</sup> France, Germany, Italy, and Spain would likely be less affected than

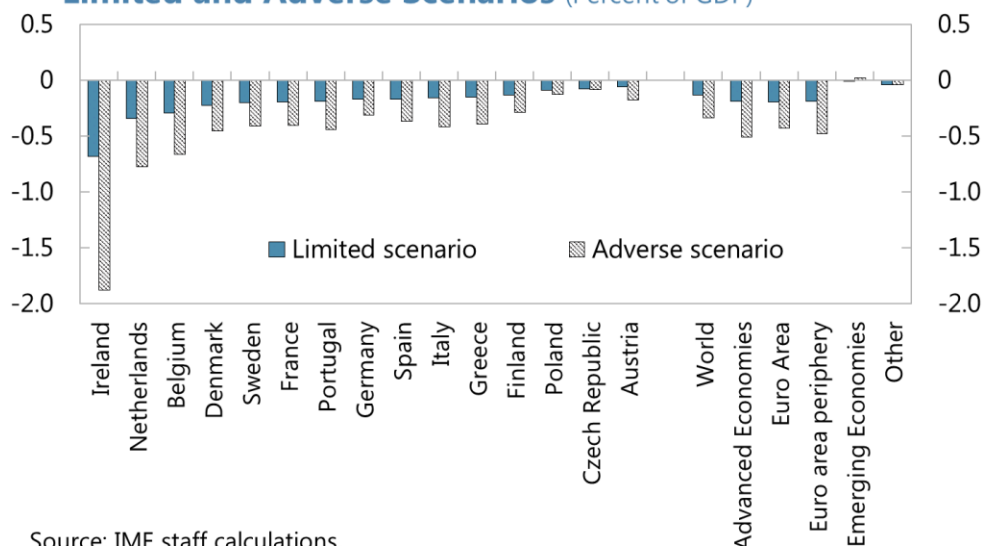
<sup>25</sup> Oxford Economics (2016) estimates that the construction, manufacturing, agriculture, utilities, and financial services sectors would be worst hit, with no sectors gaining. Bertelsmann (2015) estimates that the chemicals and financial services sectors would be hardest hit, with mining and food benefitting.

<sup>26</sup> Dhingra et al. (2015) estimate that Ireland would be worst affected, by almost as much as the UK. The effects on the rest of the EU amount to about 1/3 as much as for the UK.

the EU average. Financial links show that Luxembourg, the Netherlands, Cyprus, Malta, and Ireland are most exposed (Appendix 4).

- Staff analysis and assessments indicate that it is unlikely that any EU economies would gain from the UK’s exit.

### Spillovers to Larger EU and Other Countries from Limited and Adverse Scenarios (Percent of GDP)



Source: IMF staff calculations.

Note: the bars show deviations of output from baseline, in percent, at the troughs: 2018 for the limited scenario and 2019 for the adverse scenario.

- Negative spillovers from the UK cause spillovers to the rest of the world, concentrated in the rest of the EU. Output falls by 0.2 to 0.5 percent below baseline in the rest of the EU and by 0.0 to 0.2 percent in the rest of the world in 2018. The wide variation in output losses across individual economies reflects differences in their trade and financial exposures to the UK, as well as their policy space to respond to adverse spillovers.<sup>27</sup> Among larger EU countries, Ireland, the Netherlands, and Belgium would experience the largest losses. Ireland is notable for the combination of substantial trade and financial linkages, and also labor force linkages.<sup>28</sup>

<sup>27</sup> The ordinal rankings of the countries’ GDP losses differ across the scenarios: the adverse scenario features a more persistent tightening of financial conditions, as well as relatively larger and more persistent heightened uncertainty. The simulated peak output losses are therefore driven more by more persistent financial spillovers (via cross-border banking and capital market linkages with contagion) under the adverse scenario, versus trade spillovers under the limited scenario. The ranking of exposures to the trade and financial shocks differs across countries.

<sup>28</sup> Barrett et al. (2015) highlight risks to Ireland, not just from trade linkages overall, but to specific sectors and associated FDI from the UK, energy, and migration.

- Oxford Economics (2016) finds small losses to the rest of the EU, although losses to Ireland are nearly half that of the UK. The OECD (2016) finds that losses to the EU overall are 1 percent of GDP by 2020, about one-third of the loss experienced by the UK in their scenario.
- A potential mitigating factor is that some countries might benefit from the relocation of business (such as financial services) from the UK. This is not modeled and represents an upside risk to EU economies.
- A downside risk is that the UK's exit from the UK causes a repricing of risk more generally, including in euro area periphery economies. This is not modeled.
- Around three-quarters of EU spending goes toward cohesion policy (directed to economic, social, and regional development) and to agriculture and rural development. Net recipients of EU funds would be exposed to the UK's withdrawal—Hungary, Estonia, Bulgaria, Denmark, Lithuania, Latvia, Poland, and Romania benefit by over 3 percent of domestic GDP. Based on the UK's contribution (net of its rebate) to the EU budget, the UK's exit would mechanically imply a 10 percent reduction funds available for EU payments, absent any other changes.
- Trade and financial exposures of non-EU G-20 countries are small (Appendix IV). However, there could be material effects for a number of other countries. Hong Kong SAR, Iceland, Norway and Singapore have notably high goods and services exports to the UK (as a percentage of own GDP), and goods exports of Equatorial Guinea, Seychelles, Cambodia, Belize, Norway, Costa Rica, Iceland, Guyana, Tuvalu, Mauritius, Algeria, Solomon Islands, Fiji, South Africa, and Vietnam were higher in 2014 than the EU average.

## F. Conclusions

### 54. A vote to leave the EU would result in a protracted period of heightened uncertainty, leading to a hit to output.

- Following a decision to exit, the UK would need to negotiate the terms of its withdrawal and a new relationship with the EU (unless it abandoned single market access and relied on WTO rules, which would significantly raise trade barriers). The UK would also need to simultaneously renegotiate the arrangements it has with a large number of other countries, or else see them revert to WTO rules.
- These processes and their eventual outcomes could well remain unresolved for years, weighing heavily on investment and economic sentiment during the interim and depressing output. In addition, volatility in key financial markets would likely rise as markets adjust to new circumstances. Estimates of the effects on output and incomes are naturally highly uncertain. Nonetheless, even a comparatively limited amount of uncertainty, associated with a relatively smooth transition to an EEA-type trading arrangement, could have a material impact on short-term growth, while an adverse scenario could push the economy into a recession in 2017.

**55. The long-run effects on UK output and incomes would also likely be negative and substantial.**

- Most assessments, including those of staff, point to sizable long-run losses in incomes, as increased barriers would reduce trade, investment, and productivity. The wide range of estimated losses largely reflects differing assumptions about the UK's future economic relationships with the EU and the rest of the world.
- Any output losses in excess of 1 percent of GDP would result in net fiscal losses for the UK, as reduced revenue due to lower output would more than offset any gains from eliminating the UK's net EU budget contribution of  $\frac{1}{3}$  percent of GDP.
- The prospect to substantially improve productivity by eliminating regulation seems remote, as many regulations would likely be replaced by equivalents and because those regulations that are most associated with damage to business relate to domestic issues such as planning.

**56. Spillovers to other countries would be felt mostly by EU countries.** Those most exposed include Ireland, Cyprus, Malta, the Netherlands, and Belgium. But net recipients of EU spending— notably recent accession states—could also be affected, unless EU budget contributions were increased to compensate for the UK's withdrawal.

### Box 1. Testing the Robustness of Estimated Effects of EU Membership on Trade and FDI

A standard model of trade is the gravity equation, which relates the value of bilateral trade flows to aggregate demand in the domestic and foreign economies and the distance between them. Such specifications can be derived from microeconomic foundations (Anderson and van Wincoop, 2003) and form a natural basis for testing the importance of EU membership by estimating the statistical significance and value of the coefficient on that variable. Estimated gravity models usually show large and significant benefits to UK trade with EU countries from EU membership (Fournier, 2015; HMT, 2016; LSE, 2016c).

These gravity models are usually estimated on the basis of every pair-wise trading flow between EU countries (Belgium with France, for example, as well as UK with Belgium and UK with France). This is useful for statistical inference—the more information, the narrower the uncertainty around the estimated coefficients. However, the estimated effects of EU membership are therefore, in a broad sense, averages across all EU economies. This raises the question of whether they can be assumed to apply to the UK. The issue is potentially particularly important for services trade, which is very high for the UK but much less so for other bilateral flows (e.g., Portugal and Croatia).

To test the robustness of the estimates of the effects of EU membership, a standard gravity model is run for UK trade flows only:

$$\begin{aligned} \text{UK bilateral trade} = & \alpha_1 \cdot (\text{UK GDP} \times \text{partner GDP}) + \alpha_2 \cdot (\text{partner population}) \\ & + \alpha_3 \cdot (\text{distance to partner}) \\ & + \beta_1 \cdot (\text{EU membership}) + \beta_2 \cdot (\text{EFTA membership}) \\ & + \gamma_1 \cdot (\text{common official language}) + \gamma_2 \cdot (\text{colonial linkage}) + \gamma_3 \cdot (\text{contiguous border}) \end{aligned}$$

The data are from the ONS Pink Book, running from 2004 to 2014. As the only time variation in EU membership during this period is the accession of Bulgaria, Croatia, and Romania, which we would want to discount for inferences about UK membership, a pooled OLS estimator is used (instead of fixed or random effects estimators), such that all country variation goes into dummies for EU and EEA membership.

The results in the table below are very close to those from other studies that evaluate EU membership on the basis of all EU trade:

<b>Gravity trade model estimates</b>			
	Goods	Services	Goods and Services
EU membership	0.90***	0.68***	0.77***
EFTA membership	1.30***	0.91***	1.07***
ln(GDP)	1.30***	0.98***	0.99***
ln(population)	-0.11***	-0.20***	-0.16***
ln(distance)	-0.25***	-0.39***	-0.32***
Language	0.24***	0.19*	0.17**
Linkages	0.74***	1.36***	0.98***
Borders	0.58***	-0.09***	0.28***
R <sup>2</sup>	0.86	0.85	0.88

Robust standard errors in parentheses, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



### Box 1. Testing the Robustness of Estimated Effects of EU Membership on Trade and FDI (concluded)

EU membership has a substantial effect on UK trade with EU countries: a coefficient of 0.77 implies that EU membership increases UK trade by 116 percent over and above EFTA membership and the natural tendency to trade with close neighbors. As can be seen in the table, the effect is consistent across both goods and services.

However, there remains the question as to whether these and other inferences about the effects of EU membership on trade are driven mostly by imports; for the purposes of considering the impact of EU exit, the effects on exports are arguably more important, given that the UK would likely face higher barriers to exports to the EU following an exit, whereas the UK could in principle do whatever it desired to import barriers.

To test robustness, the same specification is run on export values only. The coefficients are slightly smaller, but still highly significant:

<b>Comparison of EU membership effects</b>			
	goods	Services	goods and services
Exports only	0.71***	0.61***	0.56***
Trade (imports and exports)	0.90***	0.68***	0.77***

Robust standard errors in parentheses, \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

On this basis, the estimates of substantial benefits from EU membership for the UK appear robust.

What about the link between EU membership and FDI? The gravity model has also been applied to FDI (Bruno et al. 2016, HMT 2016c), although here the theoretical foundations are less settled. Looking at inferences from gravity models for both trade and FDI leaves open the question of whether there is an additional effect from trade on FDI. To test this, vector error correction models are estimated for aggregate UK inward FDI and aggregate trade over the period 1962–2015.<sup>1</sup> As expected, an increase in FDI facilitates a permanent increase in trade. Moreover, an increase in trade by 1 percentage point of GDP is associated with a small but significant marginal increase in the FDI stock by 2 percentage points of GDP for the period in which the UK has been a member of the single market, but not before, consistent with the notion that loss of access to the EU would result in disinvestment over and above the effects associated with reduced export production.

On this basis, the links between EU membership and trade and further to FDI appear robust.

<sup>1</sup> A VECM specification is used instead of a VAR because the null of a unit root cannot be rejected statistically for the FDI as a share of GDP.

## Box 2. How Does Political Uncertainty Affect Economies?

Economists have long suspected that increased uncertainty causes people to become more cautious and have proposed a number of channels by which heightened uncertainty could affect the economy.

- *Firms* will postpone investment and hiring and wait before entering new markets—as uncertainty increases, the “option value” of not committing increases. Similarly, firms can minimize the risk of holding unsold goods by reducing inventories.
- The same argument applies to *households’* decisions about purchases of durable goods, especially large financial commitments, such as cars and houses. Even for nondurable goods, households might increase precautionary savings.
- *Asset prices* would be expected to fall, not just because falling demand would be associated with reduced yields (such as from dividends, in the case of equities), but also because risk premia would be expected to rise in response to higher uncertainty.<sup>1</sup>

Estimating the effects of changes in uncertainty is difficult. Nonetheless, a range of studies of the effects of changes in uncertainty support the notion that an increase in uncertainty is likely to result in reduced private demand and falling asset prices.

- *Output*: Denis and Kannan (2013) found that uncertainty played a significant role in depressing output in the UK in the aftermath of the global financial crisis, accounting for about a quarter of the decline.
- *Investment*: Bloom et al. (2013) find that increases in uncertainty about economic policy foreshadow declines in investment and employment. Using the same approach, Gulen and Ion (2016) find that a doubling of policy uncertainty is associated with an average decrease in quarterly investment rates of approximately 9 percent relative to the average investment rate in the sample. The authors estimate that one third of the downturn of US capital investment during the financial crisis can be attributed to policy uncertainty, a result corroborated independently by Stein and Stone (2012). Of particular relevance to thinking about the effects of the EU referendum is the literature on the effects of electoral uncertainty. Julio and Yook (2012) find that investment declines during election years, and particularly so when the election result is uncertain and the impact of the election in terms of policies could be large—average investment rates drop by 12 percent in such cases. Similarly, Handley and Limao (2012) find that uncertainty around Portugal’s accession to the European Community in 1986 caused firms to put off entering markets.
- *Consumption*: Giavazzi and McMahon (2012) estimate that the 1998 German election induced households to increase savings rates by 3 percentage points of household disposable income. Leduc and Liu (2015) find that uncertainty tends to increase unemployment, fears of which could further depress consumption—Benito (2006) finds that increased job insecurity in the UK has been associated with lower consumption, especially of young and less skilled workers.
- *Asset prices*: Pastor and Veronesi (2013) find that political uncertainty increases the equity risk premium, the more so when the economy is weak. Kelly et al. (2015) look at options prices around elections and political summits in 20 countries and find that the cost of financial insurance against uncertainty soars as political uncertainty increases.

On this basis, the effects of uncertainty seem to be universally negative, and potentially quite strong and persistent, even if ultimately temporary.

<sup>1</sup> An increase in uncertainty does not per se make assets risky; rather, investors will demand higher compensation—lower prices—to hold those assets that could deliver low returns at the time when the ability to increase consumption is most valuable (i.e., during a downturn).

### Box 3. What do we Learn from Disruptions to Other Longstanding Trade Relationships?

The cumulative gains from attaining EU membership can be estimated with econometric models, such as gravity models (e.g., HMT 2016, OECD 2016). These models tend to imply larger effects than would be expected from simply reducing tariffs and non-tariff barriers, which is consistent with the argument that membership is associated with permanent increases in productivity and capital.

However, it is unclear that we can simply “reverse the sign” from such models to estimate the costs of leaving. For example, changing an existing relationship is likely to entail adjustment costs not captured by such models, which may leave permanent scars (hysteresis). On the other hand, gains from harmonization of product standards already achieved do not disappear immediately, nor do productivity improvements that have been gained from competing in international markets. More generally, econometric models may miss important channels and the full interaction between the various effects on trade, capital and labor flows, and productivity. Such considerations provide a motivation to search for historical episodes that are analogous in key aspects to a Brexit shock.

Finding such episodes is not easy, as there are no fully comparable instances. There have been many instances of “sudden stops” leading to financial crises and recessions, but such episodes do not appear very applicable here, typically being cases in which investor confidence evaporates as a sovereign tries to maintain an overvalued exchange rate, most often with limited foreign exchange reserves.

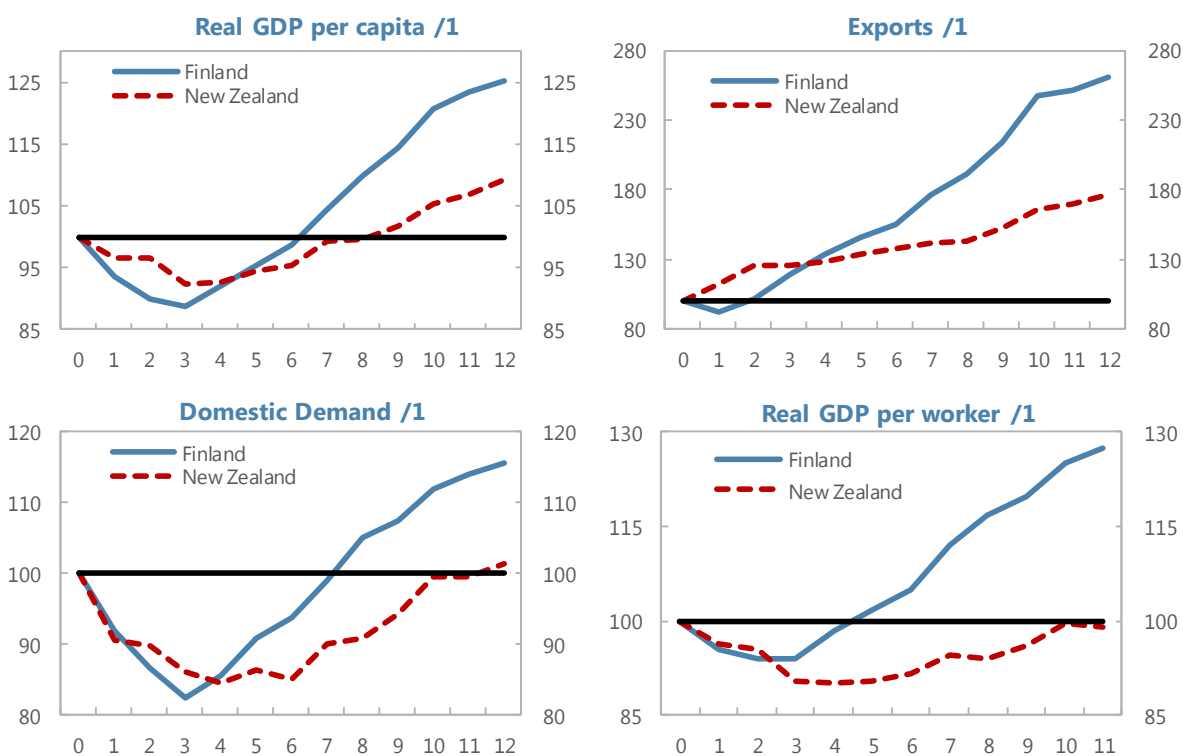
Dissolutions of political unions might appear good analogies, but those episodes have most often been associated with all of the entities experiencing dramatic economic collapse (e.g., the collapse of the Soviet Union in the 1990s) and even civil war (e.g., Yugoslavia). The break-up of Czechoslovakia does provide an example of a peaceful transition. The successor countries were able to rely on legal principles of continuity of existing agreements—however, trade intensity between the Czech and Slovak Republics fell sharply and persistently, despite the endeavors by authorities to maintain trade relations (Fidrmuc and Fidrmuc, 2003).

What would be more relevant would be cases in which a smaller economy experiences a sudden and persistent loss of trade access to a larger economy with which it is closely linked, setting off a period of adjustment to reorient the smaller economy. Two examples provide interesting parallels:

- *New Zealand, 1973*: New Zealand’s preferential access to British markets was closed after the UK entered the EEC. Productivity collapsed (Kehoe and Ruhl, 2007), down by one third after 20 years; New Zealand subsequently slid from 8th in per capita GDP to 22nd by 2000.
- *Finland, 1990*: The Finnish economy had been very oriented to trade with the Soviet Union. After the collapse of the Soviet Union, Finland experienced a severe recession, one of the largest in an advanced economy since the 1930s.

In both cases, the countries experienced substantial and extended declines in per capita incomes (see figures, below). It is striking that this was not driven by declines in exports—in both cases, the economies found ways to export their products (Finland by devaluation of the Maarka, New Zealand by substantial reduction in commodity prices). Rather, domestic demand collapsed. This was associated with substantial declines in output per worker—an increase in the unemployment rate of 12 percentage points in the case of Finland and a decrease in labor productivity of 10 percent in the case of New Zealand.

### Box 3. What Do We Learn From Disruptions to Other Longstanding Trade Relationships? (concluded)



Sources: OECD; and IMF staff calculations.

1/ The series are normalized to 100 at the time of the crisis for each country, corresponding to 1974 for New Zealand and 1990 for Finland. The x-axis indicates years since the crisis occurred.

The observations seem consistent with the “New Trade” literature (Melitz, 2003) that stresses network effects and implies that there can be substantial costs to establishing new export markets and reallocating factors of production across sectors. From this perspective, the New Zealand and Finnish experiences were more than simply terms of trade shocks—they generated severe and long-lasting damage to the economies. In turn, they suggest a strong risk that leaving the EU could cause more damage than static gains-from-trade calculations would indicate.

There are of course caveats. The downturn in Finland was also driven by the legacy of a domestic credit boom, and the aftermath was made worse by devaluation increasing the private sector’s foreign-currency-denominated debt burden. New Zealand was hit by the global oil shock at the same time as it lost preferential trade access, although its economic decline stands out when compared to other similar economies during that period; recovery was also held back by some misguided protectionist policies. The UK already has a floating exchange rate as buffer. That said, the UK’s own experiences in 2009, when sterling depreciated by 25 percent yet export growth remained stagnant, provide grounds for caution against presuming that even a substantial exchange rate depreciation would completely insulate the economy.

## Appendix I: Glossary of Terms

<b>A8</b>	A group of 8 countries, out of 10, that joined the EU in 2004. The countries are: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia. (The term excludes Cyprus and Malta due to their higher per capita income levels.)
<b>Council of the European Union</b>	A forum for government ministers from each EU country to discuss, amend, and adopt laws and coordinate policies. The council constitutes the main decision-making body of the EU, alongside the European Parliament.
<b>Directive</b>	A legislative act that sets out a specific goal that all EU countries must achieve. It is subsequently up to the individual countries to devise their own laws on how to reach these goals.
<b>EU15</b>	The member countries in the EU prior to the accession of ten candidate countries on May 1, 2004. The countries are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom.
<b>EU28</b>	The current members of the EU: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom.
<b>European Commission</b>	The Commission is the EU's executive body. It represents the interests of the EU as a whole. Its main roles are to propose legislation, enforce European law, set objectives and priorities for action, manage and implement EU policies and its budget, and represent the EU outside Europe.
<b>European Community</b>	A precursor to the EU, originally named the European Economic Community and created by the Treaty of Rome in 1957, that aimed to bring about economic integration, including a common market and customs union, among its six founding members (Belgium, France, Italy, Luxembourg, the Netherlands and West Germany).
<b>European Council</b>	The Council defines the EU's overall political direction and priorities. Its members are the heads of state or government of the 28 EU member states, the European Council President, and the President of the European Commission. The council sets the EU's policy agenda, traditionally by adopting 'conclusions' during European Council meetings that identify issues of concern and actions to take.
<b>European Economic Area</b>	The EEA consists of the 28 Member States of the EU and three countries of the European Free Trade Association (EFTA): Iceland, Liechtenstein, and Norway.
<b>European Free Trade Agreement</b>	The European Free Trade Association (EFTA) is an intergovernmental organization set up for the promotion of free trade and economic integration to the benefit of its four Member States: Iceland, Liechtenstein, Norway, and Switzerland.

<b>European Monetary Union</b>	The coordination of economic and fiscal policies, a common monetary policy, single rules and supervision of financial institutions, and a common currency amongst select member states of the EU.
<b>European Parliament</b>	The European Parliament is the directly elected EU body. It consists of 751 members that represent citizens from the member states. Members are elected once every five years and share power over the EU budget and legislation with the Council of the EU.
<b>European Union</b>	An economic and political partnership currently consisting of 28 European member states, with, inter alia, the European Council, the Council of the European Union, the European Parliament, and the European Commission as formal bodies. The customs union was established by the Treaty of Rome in 1957. The EU in its modern form was established in 1992 by the Maastricht Treaty in 1992.
<b>Financial Stability Board</b>	An international body that monitors and makes recommendations about the global financial system, with the goal of promoting international financial stability.
<b>Lisbon Treaty</b>	An international agreement which amends the two treaties that form the constitutional basis of the EU. The Treaty entered into force on December 1, 2009, with the goal of making the EU more democratic, more efficient, and better able to address global problems.
<b>Maastricht Treaty</b>	Signed in 1992 and entering into force in 1993, the purpose of the Maastricht Treaty was to prepare for European Monetary Union and introduce elements of a political union. The main changes brought about by the Treaty were the establishment of the EU, the co-decision procedure, and new forms of cooperation between EU governments, including on defense, justice, and home affairs.
<b>Most Favored Nation (trade status)</b>	Most-favored-nation (MFN) refers to the principle of equal treatment of trade partners. Under the WTO agreements, countries cannot normally discriminate between their trading partners, giving them equally “most-favored-nation” status. With some exceptions, MFN status means that every time a country lowers a trade barrier or opens up a market, it has to do so for the same goods or services from all its trading partners.
<b>Passport</b>	In the EU, the passport is a document issued by a national authority to help service providers going cross-border show that they comply with the requirements applicable to them in the member state to which they want to provide the service.
<b>Single market</b>	The single market refers to the EU as one territory without any internal borders or other regulatory obstacles to the free movement of goods and services.
<b>World Trade Organization</b>	The World Trade Organization (WTO) is a global international organization that deals with the rules of trade between nations. WTO agreements are contracts, guaranteeing member countries important trade rights while also binding governments to keep their trade policies within agreed limits.

## Appendix II: Comparison of Current and Potential Alternative Relationships with the EU

	Current membership	EEA membership ("Norway" option)	Bespoke arrangement ("Switzerland" option)	New UK-EU Free Trade Agreement	WTO rules
<b>Ability to ignore EU rules</b>	Very limited (some opt-outs granted to the UK)	Limited	Partial	Unknown	Full
<b>Say over EU rules</b>	Full voting rights	Limited (some formal engagement)	None	None	None
<b>Access to single market</b>	Full access	High <sup>1</sup>	Medium	Unknown	Low
<b>Passporting rights</b>	Full	High <sup>2</sup>	None <sup>3</sup>	Unknown	None
<b>Fiscal contribution to EU</b>	Full	Likely slightly less than current	Likely less than current	Unknown	None
<b>Independent immigration policy</b>	No	No (all "four freedoms" retained)	No	Yes	Yes
<b>Independence to negotiate trade deals</b>	Represented by EU	Yes	Yes	Yes	Yes

<sup>1</sup> The EEA agreement does not cover agriculture or fisheries, and EEA countries are outside the customs union.

<sup>2</sup> EEA membership would confer passporting rights to banks and insurers. But European regulations applying to UCITS asset managers and counterparty clearing are not yet part of the EEA agreement.

<sup>3</sup> Switzerland is not an EEA state, and therefore has no passporting rights. However, EEA general insurers do have the right to establish in Switzerland (and vice versa) under the provisions of special bilateral treaties between the EU and Switzerland.

## Appendix III: Summary of Formal Assessments of EU Exit

Source	Effect of exit on UK	Notes
<b>Bertelsmann Stiftung (2015)</b>	-0.6 to -3.0% of per capita GDP (static estimates); -2 to -14% ("dynamic" estimates).	Assesses impact of "soft exit" and "isolation" scenarios: (i) the UK obtains similar access to the EU single market as Norway; (ii) the UK defaults to WTO rules. Authors emphasize potential additional losses from uncertainty (not modeled).
<b>Dhingra et al. (2016a, 2016b)</b>	-1.3 to -2.6% on incomes ("static" long-run trade effects); -6.3 to -9.5% of GDP ("dynamic" long-run trade effects").	Assesses impact of optimistic and pessimistic scenarios: (i) the UK obtains similar access to the EU single market as Norway; (ii) the UK defaults to WTO rules. Assumes increases in trade barriers, reduced fiscal contribution to the EU, and reduced productivity in the long run from reduced trade, all depending on the scenario. Effects on other EU countries are smaller than for the UK, but everywhere negative.
<b>HM Government (2016c)</b>	-3.4 to -9.5 percent of GDP in long run (15 years).	Assesses impact of three scenarios: (i) the UK leaves the EU but retains EEA membership; (ii) the UK negotiates a bilateral agreement with the EU; and (iii) the UK defaults to WTO rules. Assumes decreases in trade access, FDI, and productivity to varying degrees.
<b>HM Government (2016d)</b>	-3.6 to -6.0 percent in short run.	Assesses short-run effects on the economy in a "shock" scenario (associated with uncertainty at the same level as during the early 1990s recession) and a "severe shock" scenario (associated with uncertainty at about half of that experienced during the global financial crisis, and defaulting to WTO membership).
<b>Mansfield (2014)</b>	+1.1 to -2.6% of GDP, with +0.1% as the most probable case.	Assesses three scenarios: (i) the UK achieves unlimited trade access, new trade agreements with major non-EU economies, and reductions in regulations and taxes; (ii) the UK secures EFTA access, regulatory reforms, and FTAs with medium-sized trading partners; (iii) the UK defaults to WTO rules and deregulates significantly.
<b>Minford (2016)</b>	+4 percent of GDP.	Assesses implication of unilateral reduction of import tariffs to zero, with UK consumers and producers taking world prices.
<b>NIESR (Baker et al., 2016, Ebell and Warren, 2016)</b>	-2.3 percent in short run; -1.8 to -7.8 percent of GDP in long run.	Assesses four scenarios: (i) the UK maintains EEA membership (and hence access to the single market); (ii) the UK establishes a bespoke FTA with the EU; (iii) the UK defaults to WTO rules; (iv) the UK defaults to WTO rules and experiences severe productivity loss.



<b>OECD (2016)</b>	-3.3% of GDP in medium term (2020); -2.7 to -7.7% of GDP in long run (2030).	Assesses optimistic and pessimistic scenarios for trade access to EU, inward investment, managerial quality, and inward migration.
<b>Open Europe (2015)</b>	+1.6 to -2.2% of GDP. "Politically realistic" range is 0.6 to -0.8% of GDP.	Assesses impact of optimistic and pessimistic scenarios: (i) the UK negotiates an FTA with the EU, free trade with all other trading partners, and widespread deregulation; (ii) the UK defaults to WTO rules. Assumes changes in trade barriers and reduced regulation, both depending on scenario.
<b>Ottaviano et al. (2014)</b>	-1.1 to -3.1% of GDP.	Assesses impact of optimistic and pessimistic scenarios: (i) tariffs with the EU remain at zero and some increase in non-tariff barriers; (ii) the UK defaults to WTO MFN tariffs, with higher increases in non-tariff barriers. Authors emphasize that "dynamic losses" could be more than double.
<b>Oxford Economics (2016)</b>	-0.1 to -3.9% of GDP in long term.	Assesses impact of nine scenarios, ranging from best case, in which the UK forms a customs union with the EU and undertakes an ambitious deregulation program, with only modest restrictions on immigration; to worst case, in which the UK defaults to WTO rules, restricts immigration, expands public spending, and does not deregulate. Analysis focuses on long-term impact on UK economy.
<b>PwC (2016)</b>	-3 to -5.5% of GDP in medium term; -1.2 to -3.5% in long term. Employment falls by 1.7 to 2.9% in medium term.	Assesses impact of optimistic and pessimistic scenarios: (i) the UK negotiates an FTA and uncertainty is resolved within 5 years of referendum; (ii) the UK defaults to WTO rules. Assumes increases in trade barriers, lower immigration, and reduced regulation, with increased uncertainty over medium term, all depending on the scenario.

## Appendix IV: Trade and Financial Exposures to the UK<sup>1</sup>

	Trade Indicators: EU Countries											
	Imports from UK						Exports to UK					
	Percent of own GDP			Percentage share of total EU27 imports from UK			Percent of own GDP			Percentage share of total EU27 exports to UK		
	Goods and Services	Goods	Services	Goods and Services	Goods	Services	Goods and Services	Goods	Services	Goods and Services	Goods	Services
Austria	0.9	0.6	0.3	1.0	0.7	0.3	1.6	1.2	0.4	1.4	1.1	0.4
Belgium	4.8	3.9	0.9	6.8	5.5	1.3	7.5	6.4	1.1	8.3	7.1	1.2
Bulgaria	2.4	1.3	1.1	0.4	0.2	0.2	1.9	1.0	0.9	0.2	0.1	0.1
Croatia	1.2	0.4	0.8	0.2	0.1	0.1	1.2	0.2	1.0	0.1	0.0	0.1
Cyprus	7.6	3.1	4.5	0.5	0.2	0.3	7.6	0.9	6.7	0.4	0.0	0.3
Czech Republic	2.2	1.6	0.6	1.2	0.9	0.3	4.2	3.8	0.4	1.8	1.6	0.2
Denmark	2.9	1.3	1.6	2.6	1.2	1.4	2.8	2.1	0.6	2.0	1.5	0.5
Estonia	1.9	1.7	0.2	0.1	0.1	0.0	1.5	1.1	0.4	0.1	0.1	0.0
Finland	1.7	1.0	0.8	1.3	0.7	0.6	1.8	1.4	0.4	1.0	0.8	0.2
France	1.8	1.1	0.7	13.4	8.0	5.4	2.2	1.4	0.8	12.7	8.3	4.4
Germany	1.8	1.3	0.6	18.9	13.2	5.7	3.0	2.5	0.5	24.3	20.4	3.9
Greece	1.6	0.7	0.9	1.0	0.4	0.6	2.0	0.5	1.5	1.0	0.2	0.7
Hungary	2.2	1.4	0.8	0.8	0.5	0.3	3.5	2.9	0.6	1.0	0.8	0.2
Ireland	18.3	11.7	6.6	12.2	7.8	4.4	11.2	7.7	3.5	5.9	4.0	1.9
Italy	1.3	0.7	0.6	7.1	3.8	3.3	1.7	1.3	0.4	7.4	5.7	1.8
Latvia	2.4	1.8	0.7	0.2	0.1	0.1	4.2	2.1	2.1	0.3	0.1	0.1
Lithuania	1.7	1.0	0.7	0.2	0.1	0.1	3.8	3.3	0.6	0.4	0.3	0.1
Luxembourg	8.3	0.5	7.8	1.4	0.1	1.3	5.0	1.1	3.9	0.7	0.2	0.5
Malta	27.3	6.2	21.1	0.8	0.2	0.6	8.4	2.0	6.5	0.2	0.0	0.1
Netherlands	6.4	4.2	2.2	14.9	9.8	5.2	6.7	6.0	0.7	12.4	11.1	1.3
Poland	1.7	1.2	0.5	2.4	1.7	0.7	2.9	2.3	0.5	3.2	2.6	0.6
Portugal	1.9	0.9	1.0	1.2	0.6	0.6	3.0	1.6	1.4	1.4	0.8	0.7
Romania	1.2	0.8	0.4	0.6	0.4	0.2	1.5	1.2	0.3	0.6	0.5	0.1
Slovak Republic	1.1	0.8	0.3	0.3	0.2	0.1	3.6	3.1	0.4	0.7	0.7	0.1
Slovenia	1.1	0.8	0.3	0.2	0.1	0.0	1.3	1.0	0.3	0.1	0.1	0.0
Spain	1.7	1.0	0.7	6.4	3.8	2.5	3.1	1.6	1.5	9.0	4.5	4.5
Sweden	2.7	1.6	1.1	4.0	2.4	1.6	2.7	2.2	0.5	3.2	2.6	0.6
Total EU27	2.4	1.5	0.9	100.0	62.8	37.2	3.1	2.3	0.8	100.0	75.4	24.6

Sources: IMF, *Direction of Trade Statistics*; IMF, *WEO*; ONS; and IMF staff calculations.

	indicates greater than 3 and less than 5 percent
	indicates greater than 5 and less than 10 percent
	indicates greater than 10 and less than 20 percent
	indicates greater than 20 percent

<sup>1</sup> All data in this appendix are from 2014.

	Trade Indicators: Selected Other Countries											
	Imports from UK						Exports to UK					
	Percent of own GDP			Percentage share of total world imports from UK			Percent of own GDP			Percentage share of total world exports to UK		
	Goods and Services	Goods	Services	Goods and Services	Goods	Services	Goods and Services	Goods	Services	Goods and Services	Goods	Services
Iceland	3.0	1.5	1.5	0.1	0.0	0.0	5.2	4.0	1.1	0.1	0.1	0.0
Norway	2.2	1.2	1.1	1.3	0.7	0.6	6.9	5.6	1.4	3.8	3.1	0.8
Switzerland	5.4	4.8	0.6	4.4	4.0	0.5	2.6	1.7	0.9	2.0	1.3	0.7
Argentina	0.1	0.1	0.0	0.1	0.1	0.0	0.2	0.2	0.1	0.1	0.1	0.0
Australia	0.9	0.4	0.5	1.6	0.7	0.9	0.5	0.2	0.2	0.7	0.4	0.4
Brazil	0.2	0.2	0.1	0.6	0.4	0.2	0.2	0.2	0.0	0.6	0.5	0.1
Canada	0.6	0.4	0.2	1.2	0.7	0.5	0.8	0.8	0.0	1.6	1.6	0.0
China	0.3	0.2	0.0	3.6	3.1	0.6	0.6	0.6	0.0	7.0	6.7	0.3
India	0.7	0.3	0.4	1.7	0.7	1.0	0.8	0.5	0.3	1.9	1.1	0.8
Indonesia	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.0	0.2	0.2	0.0
Japan	0.4	0.2	0.2	2.0	0.8	1.1	0.4	0.2	0.1	1.8	1.1	0.7
Mexico	0.2	0.1	0.1	0.3	0.2	0.1	0.2	0.2	0.0	0.2	0.2	0.0
Russia	0.5	0.3	0.2	1.2	0.7	0.6	0.6	0.5	0.1	1.3	1.1	0.2
Saudi Arabia	1.2	0.8	0.4	1.1	0.7	0.3	0.5	0.4	0.1	0.4	0.3	0.1
South Africa	2.0	1.1	0.9	0.8	0.4	0.4	1.7	2.1	-0.4	0.7	0.8	-0.2
Korea	0.9	0.5	0.4	1.4	0.8	0.6	0.4	0.4	0.0	0.6	0.7	0.0
Turkey	1.0	0.7	0.3	0.9	0.7	0.2	1.6	1.3	0.4	1.4	1.1	0.3
USA	0.8	0.3	0.5	17.1	7.1	10.0	0.5	0.3	0.2	9.4	5.9	3.5

Sources: IMF, *Direction of Trade Statistics*; IMF, *WEO*; ONS; and IMF staff calculations.

	indicates greater than 3 and less than 5 percent
	indicates greater than 5 and less than 10 percent
	indicates greater than 10 and less than 20 percent
	indicates greater than 20 percent





	Financial Indicators: EU Countries					
	BOP				Banks	
	FDI		Portfolio Investment		Claims on an immediate counterparty basis	
	Percent of own GDP	Percent of total inward FDI	Percent of own GDP	Percent of total inward FDI	Percent of own GDP	Percent of foreign banks' total claims
Austria	1.6	0.4	4.0	0.5	3.0	0.4
Belgium	3.3	1.0	5.7	0.8	4.3	0.7
Bulgaria	0.0	0.0	0.3	0.0	N/A	N/A
Croatia	0.0	0.0	0.9	0.0	N/A	N/A
Cyprus	31.5	0.4	2.9	0.0	N/A	N/A
Czech Republic	0.0	0.0	1.6	0.1	N/A	N/A
Denmark	4.7	0.9	6.5	0.6	N/A	N/A
Estonia	0.0	0.0	0.1	0.0	N/A	N/A
Finland	2.2	0.3	9.2	0.6	0.9	0.1
France	4.5	7.3	10.7	7.7	10.7	9.4
Germany	2.5	5.6	8.1	8.0	12.3	14.9
Greece	0.4	0.0	6.1	0.4	5.1	0.4
Hungary	0.0	0.0	4.6	0.2	N/A	N/A
Ireland	15.0	2.2	94.5	6.1	31.5	2.7
Italy	1.0	1.2	6.4	3.5	2.6	1.7
Latvia	0.0	0.0	1.3	0.0	N/A	N/A
Lithuania	0.0	0.0	1.1	0.0	N/A	N/A
Luxembourg	201.2	7.5	175.5	2.9	N/A	N/A
Malta	16.5	0.1	0.5	0.0	N/A	N/A
Netherlands	32.5	16.4	24.1	5.4	15.1	4.0
Poland	0.0	0.0	2.1	0.3	N/A	N/A
Portugal	0.7	0.1	3.1	0.2	N/A	N/A
Romania	0.0	0.0	0.9	0.0	N/A	N/A
Slovak Republic	0.0	0.0	0.2	0.0	N/A	N/A
Slovenia	0.0	0.0	2.4	0.0	N/A	N/A
Spain	5.5	4.3	6.1	2.2	34.5	15.0
Sweden	3.4	1.1	9.4	1.4	12.5	2.2
Total EU27		49.0		40.8		

Sources: IMF, *Coordinated Direct Investment Survey*; IMF, *WEO*; BIS; and IMF staff calculations.

	indicates greater than 3 and less than 5 percent
	indicates greater than 5 and less than 10 percent
	indicates greater than 10 and less than 20 percent
	indicates greater than 20 percent

	Financial Indicators: Selected Other Countries					
	BOP				Banks	
	FDI		Portfolio Investment		Claims on an immediate counterparty basis	
	Percent of own GDP	Percent of total inward FDI	Percent of own GDP	Percent of total inward FDI	Percent of own GDP	Percent of foreign banks' total claims
Iceland	6.6	0.1	3.4	0.0	N/A	N/A
Norway	2.5	0.7	5.5	0.7	N/A	N/A
Switzerland	11.1	4.5	12.5	2.2	36.4	8.7
Argentina	0.0	0.0	0.2	0.0	N/A	N/A
Australia	1.4	1.2	6.3	2.3	11.3	5.0
Brazil	0.0	0.0	2.3	1.4	0.9	0.6
Canada	2.0	2.0	1.6	0.7	6.4	3.6
China	0.0	0.1	0.5	1.2	0.1	0.5
India	0.3	0.3	1.3	0.7	N/A	N/A
Indonesia	0.0	0.0	1.0	0.2	N/A	N/A
Japan	1.5	4.1	4.6	5.4	4.5	6.7
Mexico	0.0	0.0	1.9	0.6	0.0	0.0
Russia	0.1	0.2	1.1	0.6	N/A	N/A
Saudi Arabia	0.0	0.0	0.6	0.1	N/A	N/A
South Africa	1.0	0.2	4.6	0.4	N/A	N/A
Korea	0.3	0.2	2.7	1.0	0.3	0.1
Turkey	0.0	0.0	2.2	0.5	1.0	0.3
USA	2.3	23.2	5.6	24.8	2.6	17.1
Total		36.8		43.0		

Sources: IMF, *Coordinated Direct Investment Survey*; IMF, *WEO*; BIS; and IMF staff calculations.

	indicates greater than 3 and less than 5 percent
	indicates greater than 5 and less than 10 percent
	indicates greater than 10 and less than 20 percent
	indicates greater than 20 percent

## Appendix V: Constructing the Conditional Transition Scenarios of Exit from the EU

A number of possible effects are relevant for the scenarios considered in this paper: loss of access to the single market; potential repercussions for investment and productivity; potential restrictions on migration, affecting labor supply and productivity; increased risk and risk aversion; and direct effects from uncertainty about the UK's eventual economic relations with the EU and the rest of the world. These effects can all differ in degree and timing, depending on the scenario considered.

Conceptually, these effects can be allocated into two “layers” that can be used to build up the profile of the projections:

- First, the transition to the new steady state of the economy under the assumption that agents are risk neutral and fully understand the path to the long run (i.e., the “certainty equivalent” response); and
- Second, the additional effects of risk and uncertainty.

Note that this distinction does not correspond to “short run” vs. “long run”—the certainty equivalent path will involve dynamics arising from agent’s expectations of the new steady state. Indeed, a key judgment (below) is the degree to which households and firms would front-load adjustment because of what they anticipate about the future.

The modeling of risk and uncertainty is distinct. To illustrate, take the investment equation estimated by Julio and Yook (2012):

$$\text{investment} = f(\text{uncertainty, Tobin's Q, cash flow, aggregate demand})$$

The equation is specified with both a measure of uncertainty—the focus of their exercise—and Tobin’s Q. As the latter is the ratio of the *market* value of assets to the book value of assets, it will reflect current market pricing of risk. Hence the treatment of uncertainty and risk is separate, and judgments on risk premia are needed in addition to the certainty equivalent responses, which will be based on expectations of the path of future riskless interest rates.

Because the scenarios are complex and unusual, multiple methods were used independently to provide evidence on the adjustment of the economy: empirical and narrative analysis of historical episodes; reduced-form, atheoretical empirical analysis of responses to uncertainty; model-based simulations, both of the new steady state and the transition to the long run; and the IMF’s traditional “financial programming” approach to conditional projections. Each of these methods has advantages and weaknesses; each was run independently and the results compared to converge on the scenarios shown in ¶47–48.

The analysis begins with the new steady state. For this, bilateral trade changes from the LSE’s trade model analysis of limited and more severe scenarios were assumed (Dhingra et al. 2016), with additional small losses to investment and productivity based on the microeconomic studies

quoted in the text (¶17, 20; see also Box 1). In the projections shown in the text, the economy loses 1½ and 4½ percent of GDP in the long run.

These assumptions are not meant to indicate predictions of likely full effects from leaving the EU. Instead, as the focus of interest is the medium-term transition to new steady states, in which the effects of uncertainty and risk are important, they are deliberately conservative—if instead very severe losses in bilateral trade were assumed, these effects would dominate over the transition period. However, as noted in the text and Appendix 3, HMT, the OECD, and NIESR present scenarios with larger losses to output.

To apply the next layer, assumptions need to be made about the scale and effects of risk and uncertainty. The scale, duration, and effects of uncertainty are estimated and cross-checked by two methods: episode analysis, applied to the financial programming approach, and a structural VAR. As seen in the text, with these additional effects, output is 1½ and 5½ percent below the baseline after two years.

## A. Estimating the effects of uncertainty

### *Episode Analysis*

The UK has experienced two notable episodes of macroeconomic adjustment and uncertainty over the past quarter century: the ERM crisis of 1992, and the global financial crisis that began in 2007.

The ERM crisis at first appears similar: the UK experienced a sudden regime shift as it was forced off its fixed exchange rate with the Deutschemark in September 1992. However, the ERM crisis is arguably better viewed as the culmination of pressures and vulnerabilities that had accumulated up to that point, notably from maintaining an overvalued exchange rate and an inability to respond to a credit boom—year-over-year GDP growth reached its trough in the middle of 1991, well before Black Wednesday itself.

The UK's experience of the global financial crisis is more instructive. Denis and Kannan (2013) find that a quarter of the decline in output during the recession that followed the global financial crisis can be attributed to uncertainty. The full effects of uncertainty peaked a year after the shock. They also find that the role of uncertainty in the UK and the US over this period was nearly identical, which gives some confidence that empirical analysis of the experience of the US could also be applied to the UK. In particular, Gulen and Ion (2016) and Stein and Stone (2012) independently find, with very different methods, that around a third of the decline in business investment in the US in the aftermath of the global financial crisis can be attributed to uncertainty effects.

In the UK, GDP declined by around 6 percent from peak to trough from the start of 2008 to the middle of 2009. Business investment declined by around 18 percent from peak to trough, with a 6 percent decline in private consumption. This episode analysis suggests that, taking the global financial crisis as a benchmark, uncertainty of around half of that experienced during the global

financial crisis could lead to a decline of 3 percent and 1 percent, respectively, in the levels of business investment and private consumption.

### VAR Analysis

As a complement to the episode analysis, it is useful to look at reduced-form evidence, with minimal imposed theory. The approach here is to estimate the impact of uncertainty shocks on the economy, using a shock to uncertainty in a vector autoregression estimated on UK data.

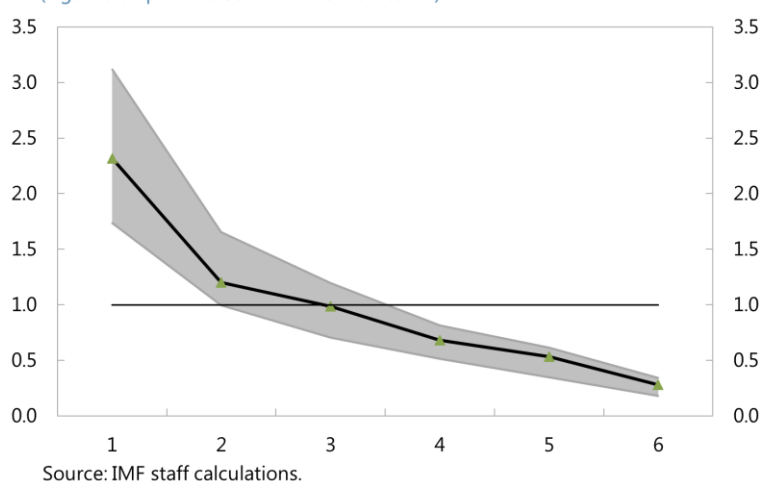
The starting point is to construct a quarterly index of UK economic uncertainty to assess the impact of Brexit-induced uncertainty on economic activity. The index of economic uncertainty is calculated as the first principal component of the following variables:

Source	Component of the Index	Remark
Consensus Forecasts	Average standard deviation of the current and future year GDP forecasts	Cubic spline interpolation to get quarterly data
www.policyuncertainty.com	Economic Policy Uncertainty Index	Quarterly average
Confederation of British Industry	Uncertainty Effect on Demand	Quarterly average
GfK	Unemployment expectations	Over next 12 months
Haver Analytics	Trade weighted USD-GBP volatility	90-day rolling volatility
Haver Analytics	FTSE All Volatility	65-day rolling volatility

The index is similar to those estimated by Denis and Kannan (2013) and discussed by the Bank of England in Haddow and Hare (2013).

The first principal component is an adequate reduction of the information in the sample. Principal component analysis of the components of the uncertainty index shows that the first principal component (PC) explains about 40 percent of the total variance in the data. Statistically, the first PC is the only component that is significant at the 95 percent level, as is shown in the scree plot on the right. For this reason, the first PC component is used as the index of economic uncertainty.

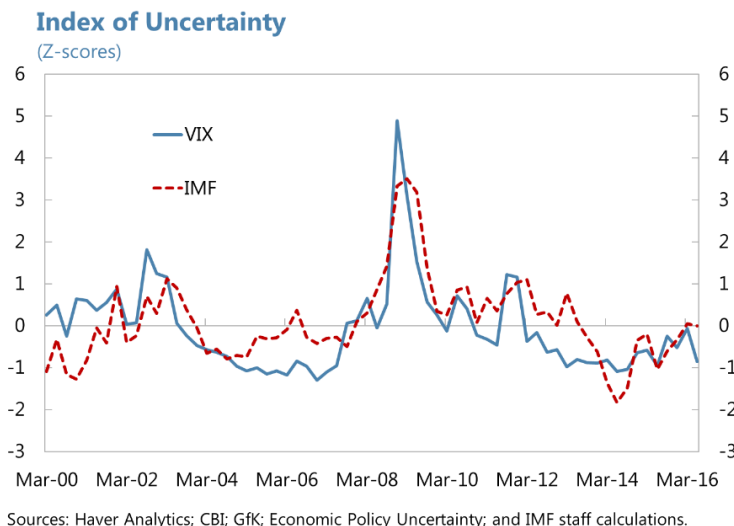
**Principal Component Analysis of the Uncertainty Index**  
(Eigenvalue plot and 95% confidence interval)





The index of economic uncertainty conforms well to the intuitive perception of economic uncertainty. The index reaches its absolute peak in late 2008 and early 2009, when the great recession reached its zenith. The index also shows elevated levels during the early stages of the Iraq war in 2003 and during the euro crisis in 2010.

The index also reveals recent decoupling from the global uncertainty, as measured by the VIX index, and UK-related uncertainty. The timing of this decoupling indicates that recent uncertainty is most likely related to the EU referendum, rather than caused by global factors.



To isolate the effect of uncertainty on economic activity, we estimate a quarterly structural VAR model of the UK economy. This is an open economy model: the variables are separated into a UK block and a global block. The global block (or rest of the world, ROW) consists of the trade-weighted average of the US and the euro zone. Each block contains the following variables: the uncertainty index, real GDP growth, the Bank of England policy rate, and the rate of inflation. The real effective exchange rate is included in the domestic block. The index of uncertainty is the first variable in the causal ordering. The model is estimated with two lags of endogenous variables under the assumption that the UK variables do not affect the ROW block.<sup>1</sup>

To analyze the impact of uncertainty on growth, we calculate responses of real GDP growth to a one-time shock to UK uncertainty. The size of the shock is calibrated to be one half of the maximum value of the UK uncertainty index—that is one half of the uncertainty during the great recession. The shock reduces real GDP growth by approximately 0.4 percent in one quarter and then gradually tapers toward zero. To relate to the episode analysis: the evidence suggests that a quarter of the decline in output, which lasted 5 quarters, can be attributed to uncertainty; this would be 1½ percentage points of GDP. From the VAR estimates, the cumulative effect would be 2 percentage points, slightly higher but remarkably close.

To examine the effects on components of aggregate demand, the VAR was re-estimated using business investment and private consumption separately. As expected from theory, investment reacts more strongly to uncertainty shocks than private consumption. The ratio of peak responses of private consumption and investment to uncertainty shocks is approximately 3:1, consistent with the

<sup>1</sup> The lag length was selected by the Schwartz information criterion.

relative declines in consumption and investment seen during the financial crisis, and suggesting that such a ratio can be used to inform projections.<sup>2</sup>

## B. Model-based projections

The limited and adverse scenarios, driven by tighter financial conditions, heightened uncertainty, restricted trade, and suppressed foreign direct investment, are simulated using a structural macroeconomic model of the world economy (Vitek, 2015). This panel dynamic stochastic general equilibrium model is estimated for 40 economies and features a range of nominal and real rigidities, extensive macrofinancial linkages with both bank and capital market based financial intermediation, and diverse spillover transmission channels.

The assumptions for the limited and adverse scenarios are laid out below:

<b>Limited and Adverse Scenario Assumptions</b>	
<i>Layer 1: Tighter financial conditions in United Kingdom, 2016Q3 – 2017Q2 / 2017Q3</i>	
Real equity price; Equity risk premium shocks with contagion	–10.0 / 30.0 percent
Money market interest rate spread; Credit risk premium shocks with contagion	+50 / 150 basis points
Corporate loan interest rate spread; Lending rate markup shocks	+100 / 300 basis points
Long term government bond yield; Duration risk premium shocks	+25 / 75 basis points
Real bilateral exchange rate; Currency risk premium shocks	+5.0 / 15.0 percent
<i>Layer 2: Heightened uncertainty in United Kingdom, 2016Q3 – 2018Q2 / 2018Q4</i>	
Private investment; Investment demand shocks	–2.0 / 8.0 percent
Private consumption; Consumption demand shocks	–0.5 / 2.0 percent
<i>Layer 3: Restricted trade for United Kingdom, 2016Q3 – 2021Q4</i>	
Exports; Export demand shocks	–4.0 / 12.0 percent
<i>Layer 4: Suppressed foreign direct investment in United Kingdom, 2016Q3 – 2021Q4</i>	
Private investment; Investment demand shocks	–2.0 / 6.0 percent
Productivity; Productivity shocks	–0.1 / 0.3 percent

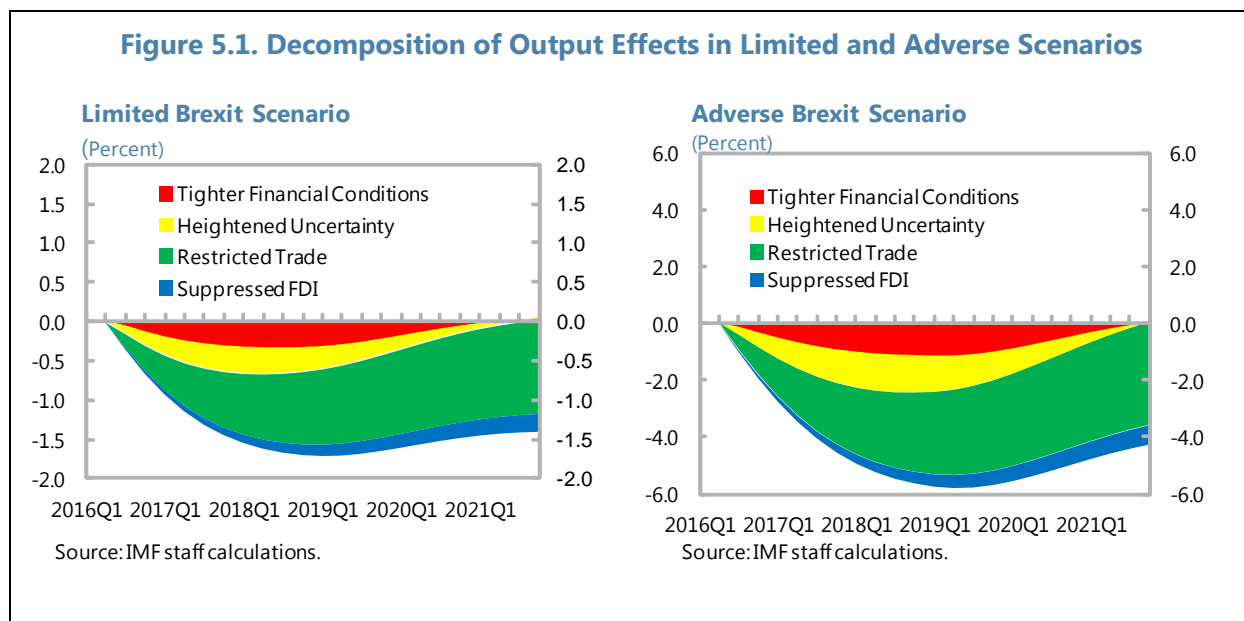
*Note:* All scenario assumptions are expressed as deviations from the April 2016 World Economic Outlook baseline. Endogenous variable adjustments peak in 2017Q2 / 2017Q3 or 2018Q2 / 2018Q4 where indicated and dissipate by 2021Q4. Policy interest rates remain at their effective lower bounds in the Euro Area, Japan, Sweden, Switzerland, and the United Kingdom through 2018Q4.

Under these two scenarios, output falls by 1.6 to 5.3 percent below baseline in 2018, largely reflecting declines in private consumption and investment. These output losses are largely permanent, stabilizing at 1.4 to 4.5 percent by 2021.

Over the transition, effects of risk and uncertainty contribute nearly half of the decline in output

<sup>2</sup> The ratio of peak responses depends strongly on the openness of the economy. Under the counterfactual assumption of a closed economy, the reaction of investment is much stronger—the ratio of declines in investment and consumption is approximately 8:1.

(Figure 5.1). In the long run, the effects are almost entirely driven by lost trade, with relatively small effects from reduced FDI and productivity. (As noted, these are conservative assumptions, so as not to dominate the transition path.)



The loss in output is greatest in the limited uncertainty scenario in 2018 and in 2019 for the adverse scenario, reflecting the larger and more persistent uncertainty associated with this scenario. The ratio of the movement in business investment to private consumption is closer to 2:1—the assumption for the uncertainty layer is higher, but, in the certainty equivalent, the consumption response to the effect of the reduction in households’ permanent income is relatively strong.

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