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**Research Report**

# Brexit - the economic impact: A meta-analysis

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**IW Report 10/2016**

# Brexit – The Economic Impact
## A Meta-Analysis

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JEL-Classification:
F14: Empirical Studies of Trade
F15: Economic Integration
F21: International Investment

## Executive summary

A plethora of analyses attempts to quantify the economic impact of a Brexit for the United Kingdom (UK). The results are rather confusing – ranging from significant advantages to marked losses. This can be explained by significantly different methods, diverse assumptions, and the different aspects which are included – as this comprehensive meta-analysis shows with a comparative analysis. We cut through the fog of assertions and seek to get to the reality of the situation facing the UK after a Brexit. The more reliable amongst the many studies surveyed estimates that the net economic cost will remain moderate (between 1 to mostly less than 5 percent of economic output or income). However, we challenge this mainstream view. The risks of a Brexit are likely to be underestimated and the economic damage to the UK could be significantly higher than the mainstream view suggests.

The authors suggest that pertinent forward-looking theoretical models are unable to capture the many important advantages of economic integration between the UK and the EU. They provide a thorough overview of the various advantages that are left out and point out their relevance for welfare and growth. Currently, there is no universally accepted method of estimation available to integrate all of these specific effects in a comprehensive way. The available backward-looking empirical studies that attempt to do this can be criticised to some extent. But they indicate significantly greater risks for the UK. Overall, net economic damage around 10 percent of economic output or more cannot be ruled out in a more pessimistic scenario in the longer run.

The final effect reflects contradicting influences. On the positive side, a Brexit could allow for less of an EU-induced regulatory burden and also for lower welfare losses due to EU protectionism. However, these effects appear relatively moderate and in most reliable studies they are outweighed by the disadvantages of lower economic integration with the EU. The EU is the main trading partner for the British economy – it is the destination for around 45 percent of all British exports of goods and around 38 percent of total exported UK services. Depending on the institutional arrangement between the UK and the EU, a Brexit would imply higher EU trade barriers. Trade transaction costs would rise and customs clearance requirements would lead to delays for British firms exporting to the EU. Moreover, the UK would partially lose access to the EU Internal Market which would particularly affect the freedom to provide services and the right of establishment in the EU. Higher EU trade barriers could also induce British and foreign companies to shift jobs from the UK to the continent. The UK (and in particular the City of London) could suffer from relocations, as especially US companies use the UK as a bridgehead for the EU, which would be significantly complicated after a Brexit. Moreover, EU companies could cut UK firms out of their (just-in-time) cross border value chains due to higher trade costs and time delays. Finally, in case of a Brexit, the UK would no longer be able to benefit from future EU trade agreements and further progress within the Single Market.

**Possible strategic misconceptions**

Much will depend on what legal basis the UK would continue to do business with the EU and with the rest of the world after a Brexit. With regard to the negotiation of the institutional relationship with the EU and the many trade agreements with third countries, there is a risk of certain misconceptions:

- While the negotiating position of the UK might seem strong due to its merchandise trade balance deficit with the EU and due to the expectation that the EU would want to maintain good political relations, this optimism might be misleading: The UK would probably be in a defensive position, because it would rely much more on access to the much larger EU market than vice versa. Moreover, the EU is not likely to offer generous conditions for market access as this precedent could also invite other members to withdraw from the EU.

- There will be no free lunch for the UK in choosing from different options of future institutional integration with the EU. The more politically motivated the striving for sovereignty should prevail with regard to regulatory issues, the higher will be the price for the UK in terms of lost market access to the EU.

- Some argue that the UK can liberalise its trade policy vis à vis third countries to the benefit of UK consumers and that at the same time it can secure attractive market access conditions in these countries for UK firms. However, this might appear too optimistic, because the UK is only able to offer a significantly smaller market than the EU and would be in a defensive position. Moreover, there is also a certain dilemma for the UK: In order to reap the welfare benefits of free trade, the UK would have to unilaterally reduce its trade barriers sooner rather than later. Yet, if it does so, it loses important bargaining chips that are necessary to obtain significant market access in the ‘give and take’ of bilateral trade negotiations.

Besides all of this, a big uncertainty (with possible rating downgrades) in case of a Brexit could damage the general investment climate in the UK. This uncertainty concerns not only the possibly substantial negative economic impact but also the uncertain future for institutional arrangements with important trading partners. Overall, a Brexit would indeed resemble a potentially dangerous leap in the dark.

# 1. Introduction

On 23rd June 2016, the British people will have to decide whether to remain in the European Union (EU) or to leave the EU. British Prime Minister David Cameron has said that leaving the EU would be a "leap in the dark"[1]. Donald Tusk, the President of the European Council has recently warned that "uncertainty about the future of the UK in the European Union is a destabilizing factor"[2].

In addition, a secession of the United Kingdom (UK) could be seen as a dangerous precedent which could trigger similar discussions in other EU countries, especially countries with strong political parties which are critical to the EU, for instance, France or Finland. In EU sceptical circles, there is a strong tendency towards reclaiming sovereignty from the EU. Admittedly, the current integration paradigm not only finds consensus in Europe. The Dutch Prime Minister Mark Rutte has recently declared: The era of an 'ever closer union' has come to an end, and the Dutch government has suggested the guiding principle should be 'Europe where necessary, national where possible' (Fresh Start, 2013, 3).

Against this background, the question arises whether claims are correct that the UK (and also possibly other EU members) would be better off leaving the EU. However, leaving would mean that the country would lose free access to the Internal Market of the EU if no other agreements were concluded. The four freedoms of the Internal Market[3] would be restricted for this country. A lot would depend on the form in which the relationship to the EU would then be structured.

Public debates are often dominated by political considerations about sovereignty and regulatory autonomy. However, the economic consequences of a Brexit should be clear to the general public in order to put political considerations in a comprehensive long term perspective.

Numerous studies have investigated the possible impact of a withdrawal of the UK from the EU. However, these were based on different methods and assumptions (as well as probably different intentions), and the authors come to rather different conclusions. Therefore, the implications of leaving the EU are also an important topic for economic researchers in order to find out what the true ramifications might be.

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[1] Cameron, David, Oral Statement to Parliament, 22nd February 2016, https://www.gov.uk/government/speeches/pm-commons-statement-on-eu-reform-and-referendum-22-february-2016 [2016-3-15].
[2] Tusk, Donald, press release 898/15, 7th December 2015, http://www.consilium.europa.eu/press-releases-pdf/2015/12/40802206053_en_635851009800000000.pdf [2016-3-15].
[3] The terms "Internal Market" and "Single Market" are used as synonyms.

Against this background, this report is intended to give an understandable overview of existing studies and provide a classification and a basic evaluation for the general public.

The study is organised along the following lines:

- How close is the UK linked to the EU in terms of the four freedoms? (Chapter 2)
- What are the economic opportunities and risks of a Brexit for the UK and what possible options exist for institutional arrangements between the UK and the EU after a Brexit? (Chapter 3)
- How do existing studies on the economic effects of a Brexit differ and what general conclusions can be drawn from the assessment of their impact for the UK? (Chapter 4.1 and 4.2)
- Will the possible drawbacks of a Brexit remain contained or are there larger risks still looming ahead? (Chapter 4.3)

**Political ramifications**

Britain’s withdrawal would be a serious blow for the EU. Without the UK, the EU's position in the world would lose out in terms of political relevance. The UK, on the other hand, would also be worse off, however. This can be highlighted in the following figures: according to the IMF Database, the EU-28’s share of global gross domestic product (GDP) based on purchasing power parity (PPP) amounted to 17 percent in 2015, while the UK’s share is only 2.4 percent.

The EU would lose an important member state with a rich and relatively strong economy (Table 1-1) – and with a permanent seat in the United Nations Security Council. In terms of GDP, the UK is the second largest EU member state after Germany, when denominated in euros and also expressed in PPP. The UK accounts for nearly 18 percent of EU-GDP, its share of the total population is about 13 percent. GDP per capita in the UK is 39 percent higher than the average in the 28 member states.

**Table 1-1: The EU and the UK: A comparison of main economic indicators 2015**

| | UK | EU-28 |
|---|---|---|
| Gross Domestic Product (GDP), billion euros | 2,583 | 14,611 |
| Population million | 65.0 | 511.5 |
| GDP per Capita, euros[1)] | 39,700 | 28,600 |
| GDP per person employed, euros[1)] | 82,700 | 63,900 |
| Unemployment rate | 5.4 | 9.5 |
| Real GDP growth in percent | 2.5 | 1.9 |
| Gross fixed capital formation, percentage of GDP | 17.2 | 19.5 |
| Net capital stock at 2010 prices: total economy, billion euros | 5,009 | 39,688 |
| Net lending or borrowing, general government, percentage of GDP | –4.3 | –2.4 |
| General government consolidated gross debt, percentage of GDP | 88.3 | 87.8 |

1) Rounded.
Source: AMECO Database as of 5th November 2015, (EU Commission Economic Forecast, autumn 2015)

# 2. Empirical stocktaking of economic transactions between the UK and the EU

**On the basis of the four freedoms of the Internal Market**

“The most extensive impact of exit is likely to be the ending of the right of access to the Internal Market and the corresponding ending of the obligation of the withdrawing member state to offer unrestricted access to its own market” (Nicolaides, 2013, 214).

The Treaty on the Functioning of the European Union (TFEU) defines the Internal Market as an area without internal barriers in which the free movement of goods, services, capital, and persons is ensured. In order to get an impression how relevant these four freedoms are, this chapter provides an overview of the economic relations existing between the UK and the EU.

**Free movements of goods**

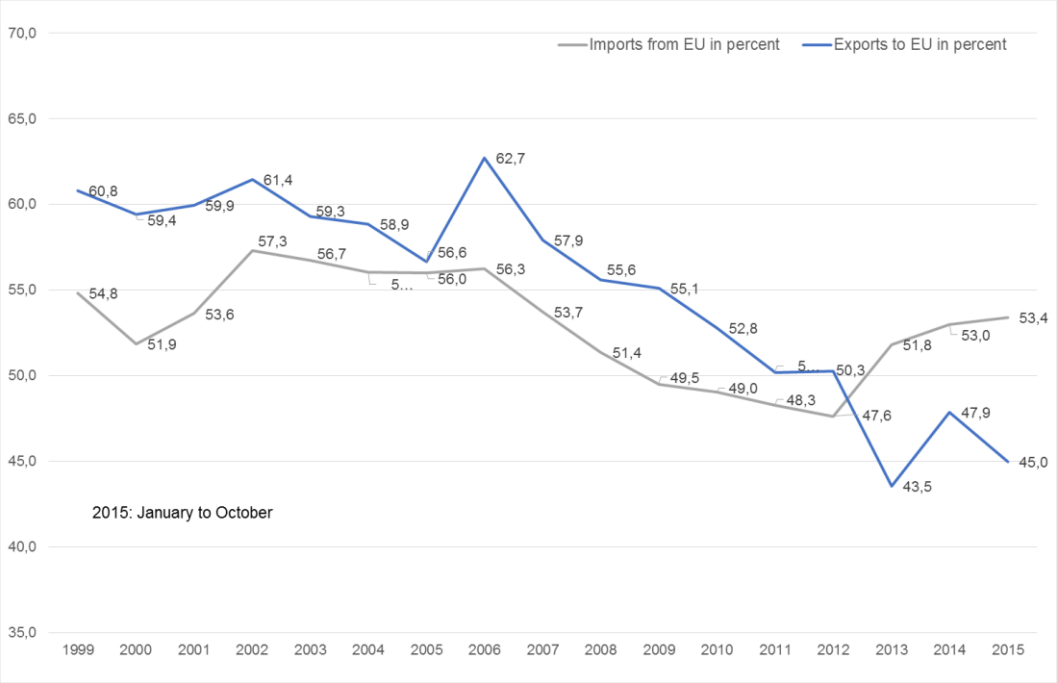
“Trade is a very important part of the transmission mechanism through which much of the benefit of the Single Market filters through” (CEBR, 2015, 9). The UK provided 45 percent of its exported merchandise to the rest of the EU in the first ten months of 2015. Thus, the EU is the dominant market for British goods. The long-term comparison, however, is marked by a significant decline (Figure 2-1). In 1999, the share of

British exports supplied to other EU member states was around 60 percent. Accordingly, the internal European market has lost its significance as a market for British goods in the longer term.

This trend is to a large extent a normal development which reflects the dynamics of world trade (see also Figure 2-2). UK trade with the US declined even more as a share of total UK trade. At the same time, trade with rapidly growing emerging markets such as China has increased. This trend is also relevant for other EU countries: In Germany, for example, trade with fast-growing emerging economies has expanded significantly faster than trade with the EU (Matthes, 2010).

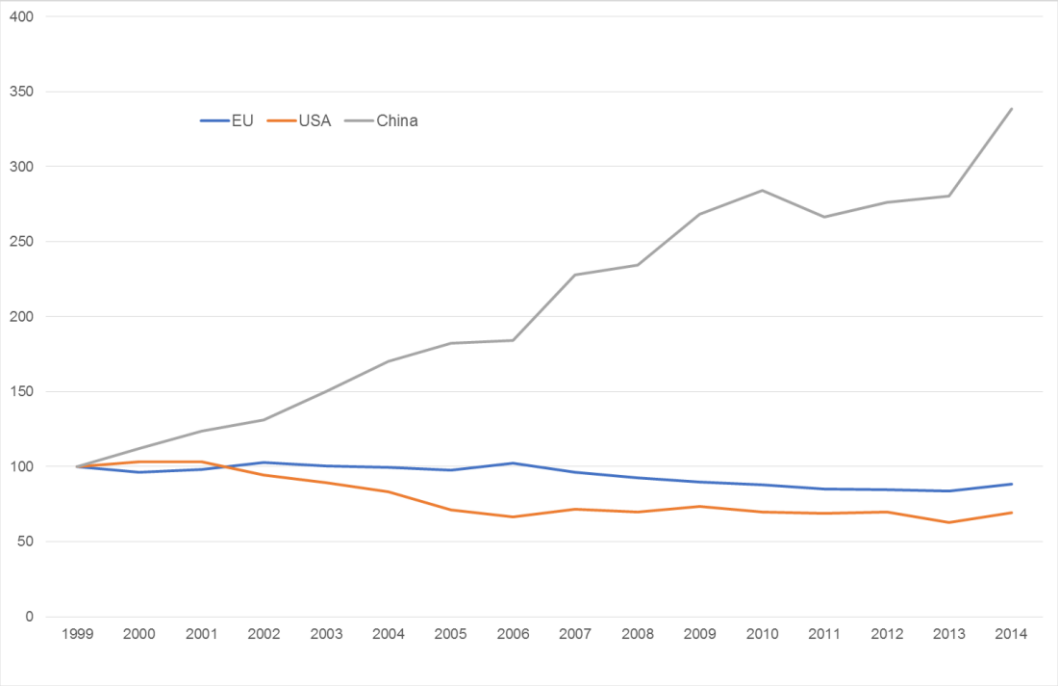
The most important trading partners of the UK outside the EU are the United States (US) with an export share of 12 percent in 2014, followed by Switzerland and China with a share of 6.7 percent and 5.1 percent, respectively.

**Figure 2-1: Trade relations between the UK and the EU**




Sources: Eurostat, database [DS-016890]; own calculations

**Figure 2-2: Trade relations between the UK and selected countries**
Exports plus imports, share of total exports and imports, 1999 = 100




Sources: Eurostat, database [DS-016890]; own calculations

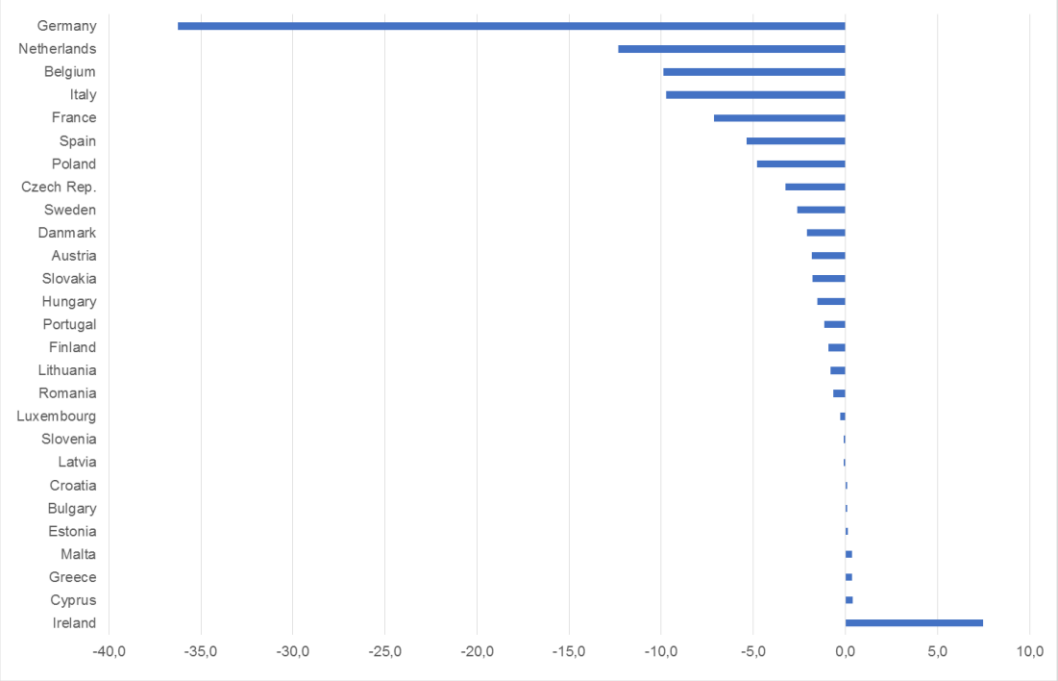
If we look at imports, the changes are less pronounced. The UK's imports from other EU member states declined up until 2012, but this was considerably less than for exports. Moreover, the proportion of British imports from the EU increased after the low from 2012 to 2015 by nearly 6 percentage points to 53.4 percent. This corresponds more or less to the same level at the turn of the millennium.

The biggest trade partner in imports from outside the EU was China with 8.8 percent in 2014, followed by the USA (7.8 percent) and Norway (4.0 percent).

In terms of the relation to GDP, while UK exports to the EU show a slightly negative trend over the period from 1999 to 2014, the opposite is true for imports.

In 2014, the UK had a deficit in merchandise trade with other EU countries amounting to 93.4 billion euros or 4.1 percent of GDP. In 1999, the trade deficit was lower and stood at 0.8 percent of GDP. It more or less increased continuously in the years up to 2014. The UK has a deficit in merchandise trade with 20 EU countries.

**Figure 2-3: The trade balances of the UK in the trade with other EU member states 2014**
Billion euros




Sources: Eurostat, database [DS-016890]; own calculations

The UK has by far the biggest import surplus in its trading relationship with Germany, amounting to 36 billion euros in 2014 followed by the Netherlands and Belgium (Figure 2-3). In 1999, the trade deficit with Germany amounted to around 10 billion euros. In contrast, the surplus with Ireland which amounted to 4 billion euros in 1999 increased to 7.5 billion euros during this period. The UK had a trade deficit of around 46 billion euros (or 2 percent of the country's GDP) with the rest of the world in 2014.

A look at the shares of exports from the UK to the EU alone underestimates the importance of membership to the EU. According to a study from TheCityUK (2014, 5), about 60 percent of the UK's external trade takes place with countries either in the EU or with an EU trade agreement. This will rise to around 85 percent, if current EU trade negotiations are successful. In the case of a Brexit, existing trade agreements are to be renegotiated as well as trade agreements still under negotiation (see also Chapter 3.2).

A more detailed look at merchandise trade by different sectors might help to identify possible vulnerabilities. A first question to answer is: To what extent does a given industry carry out trade within the EU? The greater the share of exports destined for the Internal Market, the more vulnerable a given industry in the UK would tend to be to new trade barriers erected by the EU after a possible Brexit.

Mining and quarrying is closely integrated within the EU, followed by wood and wood products and textiles (Table 2-1). Less closely integrated within the Internal Market are basic metals, other transport equipment and machinery. According to data from the OECD, exports of the British metal and electrical engineering industry to the EU are below par with 35.7 percent.

**Table 2-1: UK industries with the highest and the lowest share of exports to the EU**
Percent of all exports 2014 and the value-added share of industry including energy and construction[4]

| | | |
|---|---|---|
| Mining and quarrying | 86.5 | 8.0 |
| Wood and products of wood and cork, except furniture; articles of straw and plaiting materials | 77.6 | 0.7 |
| Textiles, wearing apparel, leather and related goods | 70.3 | 1.9 |
| Paper and paper products | 69.7 | 1.4 |
| Agriculture, hunting, forestry and fishing | 68.4 | n.a. |
| Rubber and plastics products | 65.3 | 3.1 |
| Printing and the reproduction of recorded media | 46,6 | 1.5 |
| Motor vehicles, trailers and semi-trailers | 44.0 | 3.6 |
| Furniture; other manufacturing | 43.7 | 3.0 |
| Machinery and equipment n.e.c. | 38.6 | 4.0 |
| Other transport equipment | 28.1 | 3.0 |
| Basic metals | 16.8 | 1.2 |
| Memorandum: metal and electrical engineering industry[5] | 35.7 | 22.1 |

Sources: OECD, STAN database; National Accounts; own calculations

A second conclusion can be drawn from the sectoral bilateral trade position (Table 2-2). This can be used as an indicator for possible trade arrangements after a Brexit. It is based on the hypothesis that the EU would be more willing to keep open access to the Internal Market if the EU has a surplus of trade with the UK in a given industry. In the case of a trade deficit with the UK, the EU might be less willing to retain open access to its markets (Open Europe, 2015a, 4).

[4]Mining and quarrying, manufacturing, electricity, gas, steam and air conditioning supply, construction.
[5] Comprising the following industries due to available data: basic metals; fabricated metal products except machinery and equipment; computer, electronic and optical products; electrical equipment, machinery and equipment n.e.c.; motor vehicles, trailers and semi-trailers; other transport equipment.

**Table 2-2: UK trade balances with the EU for selected industries 2014, million dollars**

| | |
|---|---|
| Motor vehicles, trailers and semi-trailers | –44,422.4 |
| Food, beverages and tobacco | –22,935.4 |
| Computer, electronic and optical products | –15,015.3 |
| Machinery and equipment n.e.c. | –10,110.5 |
| Basic pharmaceutical products and pharmaceutical preparations | –9,532.2 |
| Chemicals and chemical products | –8,795.8 |
| Electrical equipment | –6,205.5 |
| Printing and the reproduction of recorded media | 54.3 |
| Other transport equipment | 533.8 |
| Coke and refined petroleum products | 1,220.9 |
| Extraction of crude petroleum and natural gas | 24,278.4 |
| Memorandum: metal and electrical engineering industry | –84,336,6 |

Sources: OECD, STAN database; own calculations

Only four out of 20 UK industries (see Annex) had a surplus in merchandise trade with the EU. The other 16 industries recorded a deficit, i.e. a surplus for the EU. The biggest deficit was achieved by the manufacturers of motor vehicles, trailers and semitrailers in 2014 followed by the food processing industry.

In case of a Brexit, the British Pound could possibly depreciate considerably. This would enhance the overall and sectoral trade balances of the UK with the EU and could thus provoke more protectionist tendencies by the EU than the figures shown would suggest.

**Free movement of services**

The EU is also the biggest market for British services. In 2014, the UK exported services worth almost 273 billion euros of which 104.5 billion euros or 38.3 percent were with the EU. Regarding the trade in services, the EU as a destination for UK exports became only slightly less important over time: In 1999, this share amounted to 40.5 percent.

In terms of UK service imports, a decrease of 55.3 to 48.4 percent was recorded for the share with EU countries in the same period. Unlike trade in goods, however, the country had a surplus in traded services, both in relation to third countries (84.4 billion euros) as well as with the EU (25.8 billion euros). The total surplus in trade for services amounted to nearly 5 percent of GDP in 2014.

About half of all service exports to the EU is accounted for by financial and other business services (Table 2-3). In terms of financial services, the country has by far the largest surplus in the trade with services within the EU. However, this position is likely to be put to the test with a Brexit. In this respect, it is also expected that after a Brexit trade barriers will tend to be less likely and relevant for tariffs on goods rather than regulatory barriers, which apply more for the trade in services (Chapter 3.2).

**Table 2-3: Britain's service exports to the EU**
2014, million euros

| | Service Exports | Balance |
|---|---|---|
| Financial services | 23,051.8 | 18,855.1 |
| Other business services | 23,000.0 | 5,242.3 |
| Travel | 15,020.9 | –12,780.6 |
| Transport | 14,753.7 | 1,892.1 |
| Telecommunications, computer, and information services | 10,171.2 | 2,808.5 |
| Insurance and pension services | 7,188.3 | 6,738.0 |
| Charges for the use of intellectual property n.i.e. | 5,887.9 | 3,188.3 |
| Manufacturing services on physical inputs owned by others | 1,494.0 | 1,000.5 |
| Maintenance and repair services n.i.e. | 1,349.5 | 1,055.1 |
| Construction | 1,227.9 | -991.7 |
| Government goods and services n.i.e. | 697.0 | –1,474.3 |
| Personal, cultural, and recreational services | 675.3 | 281.7 |
| Services, total | 104,517.6 | 25,815.0 |

Source: Eurostat, database [bop_c6_q]

**Free movement of capital**

Apart from the free movement of goods and services, the free movement of capital is also a constituent freedom of the Internal Market. This freedom is very important for the UK's financial sector. Financial and insurance activities accounted for 7.9 percent of gross value added in the UK in 2014 according to Eurostat, the statistical office of the EU. This reflects the historically evolved division of labour in Europe. While the UK has specialised particularly in financial services, the country has experienced a process of de-industrialisation. The share of manufacturing in the UK's gross added-value declined to just 10.6 percent in 2014. In the EU-15 (the countries that already belonged to the EU before 2004), the share of manufacturing was 15.1 percent on average (including the UK) in 2014. In contrast to this, the financial sector accounted for just 5.6 percent of the share in the EU-15 on average.

Free movement of capital also guarantees free access of foreign direct investment (FDI) between the member states of the EU. This means for the UK that British companies can invest in other EU countries free of limitations. Moreover, the UK is attractive for FDI from non-member states of the EU. Companies from third countries can use the UK as a bridgehead to continental Europe because inside the UK they enjoy free access to the Internal Market. This possibility is especially attractive for US-investors because of the language and similar economic traditions.

Tables 2-4 and 2-5 show stocks from direct investments in the UK and the UK abroad for the years 2005 and 2014. Figures are subdivided according to regions and selected countries.

**Table 2-4: FDI – international investment positions in the UK by area and main country**

| | 2005 | | 2014 | |
|---|---|---|---|---|
| | GBP million | Percent | GBP million | Percent |
| **Europe** | **277,027** | 56.7 | **608,736** | 58.9 |
| EU | 244,392 | 50.1 | 495,798 | 47.9 |
| Netherlands | 95,579 | 19.6 | 175,997 | 17.0 |
| Luxembourg | 7,880 | 1.6 | 78,852 | 7.6 |
| France | 56,309 | 11.5 | 76,048 | 7.4 |
| Germany | 51,469 | 10.5 | 50,089 | 4.8 |
| Spain | 8,782 | 1.8 | 45,690 | 4.4 |
| UK Offshore Islands | 7,059 | 1.4 | 61,810 | 6.0 |
| **The Americas** | **174,037** | 35.6 | **336,772** | 32.6 |
| USA | 149,759 | 30.7 | 252,975 | 24.5 |
| **Asia** | **24,101** | 4.9 | **73,628** | 7.1 |
| **Australia & Oceania** | **12,537** | 2.6 | **12,190** | 1.2 |
| **Africa** | **510** | 0.1 | **3,008** | 0.3 |
| **World, total** | **488,212** | 100.0 | **1,034,335** | 100.0 |

Source: Office of National Statistics (ONS); own calculations

**Table 2-5: FDI – international investment positions of the UK abroad by area and main country**

| | 2005 | | 2014 | |
|---|---|---|---|---|
| | GBP million | Percent | GBP million | Percent |
| **Europe** | **387,324** | 55.6 | **474,523** | 46.7 |
| EU | 339,691 | 48.8 | 404,168 | 39.8 |
| Netherlands | 64,511 | 9.3 | 118,779 | 11.7 |
| Luxembourg | 97,260 | 14.0 | 108,090 | 10.6 |
| France | 47,348 | 6.8 | 38,236 | 3.8 |
| Ireland | 26,824 | 3.9 | 33,774 | 3.3 |
| UK Offshore Islands | 29,954 | 4.3 | 32,138 | 3.2 |
| **The Americas** | **216,343** | 31.1 | **355,968** | 35.1 |
| USA | 164,405 | 23.6 | 239,805 | 23.6 |
| **Asia** | **54,919** | 7.9 | **121,007** | 11.9 |
| Hong Kong | 20,432 | 2.9 | 52,328 | 5.2 |
| **Australia & Oceania** | **16,694** | 2.4 | **21,357** | 2.1 |
| **Africa** | **20,834** | 3.0 | **42,495** | 4.2 |
| **World, total** | **696,113** | 100.0 | **1,015,351** | 100.0 |

Sources: ONS; own calculations

FDI stocks from other EU countries in the UK increased approximately 100 percent in the period from 2005 to 2014; this was a little less than the overall amount FDI rose in the UK, but a little more than investments from the Americas. The development of the FDI stock in the UK was particularly dynamic from some countries that entered the EU in 2004. However, in two cases four-digit growth rates were achieved from a very low base. It is remarkable that among the “old” member states, investors from Luxembourg increased their engagement nearly tenfold and Belgian companies increased their investment by more than 470 percent. Overall, the share of EU-investors in the UK shrunk approximately 2 percentage points to 48 percent between 2005 and 2014. The shares of France and Germany decreased even more. On the contrary, investors from other European countries – especially from the UK offshore islands – increased their position by 4.6 percentage points. Since predominantly holding companies are located on these islands, and FDI flows are often channelled through holding companies, it is very difficult to infer where the inflows of FDI from offshore islands originated. This argument also qualifies the increase in FDI stocks from Luxembourg and Belgium to some extent. Asian countries were also able to improve their investment position in the UK. Japan is particularly worth mentioning in this respect with a share of 3.7 percent, whereas Singapore (+737 percent) and China (+934 percent) account for the most dynamic developments.

Regarding the UK's FDI stock abroad, the EU is still the dominant region (Table 2-5). Investment stock has grown by 19 percent. However, as the investment in other regions rose even more, the share of the UK's investment in other EU countries has declined by 9 percentage points to 40 percent during the period from 2005 to 2014. The Americas ranked second with 35.1 percent in 2014, an increase in comparison to 2005 of 4 percentage points. Asia followed in third place with a share of nearly 12 percent, which was also an increase by 4 percentage points. British investments in the Americas rose by 64.5 percent and in Asia by 120 percent. The highest growth rates outside the EU were recorded by Russia (655 percent), Brazil (357 percent) and Indonesia (288 percent). British FDI in Austria declined by 76 percent, in Spain by 36 percent, in Belgium and France by 19 percent, respectively. A large increase of 81 percent, however, was recorded by The Netherlands.

While the EU Internal Market has lost importance in the decade under consideration, British companies are increasingly focused on markets outside Europe. A British withdrawal from the EU could change this trend and could lead to a redirection of British direct investments in the EU, because these investments guarantee access to the EU Internal Market and can help to overcome possible trade barriers after a British exit. However, this could also lead to employment losses in the UK, if accompanied by a relocation of production.

Looking at capital transactions from a more general perspective, the UK relies on capital inflows to finance its current account deficit. Thus, it cannot be precluded that the uncertainty created by a Brexit could lead to a balance-of-payment crisis. According to the latest available IMF figures, the UK's balance of current account versus the rest of the world amounted to –5.9 percent of GDP in 2014. Since 1984, the current account balance has always been negative, although not to the same extent. This means that the UK has to import capital in order to finance its current account deficit. A Brexit could lead to a net outflow of capital and make it difficult to finance the current account deficit. In fact, experience shows that financial markets tend to overreact due to 'herd behaviour' and self-fulfilling prophecies. This could lead to large capital outflows and also put the British Pound under pressure. The governor of the Bank of England warned in January of financial instability, higher interest rates and the flight of capital if Britain voted to leave the EU (FT, 2016).

**Interim conclusion**

Especially with regard to the free movement of goods, services and capital, the EU is still the UK's main partner. The EU Internal Market is of prime importance for the British economy. While the relative position of the EU for British exports of goods and services has declined, this does not imply that a Brexit would be without any serious

economic effect to the UK. On the contrary, the position of the UK as a bridgehead to the continent for non-European and US investors in particular could suffer significantly. Less new investment and the danger of relocation of production could put a dent in employment in the UK.

**Free movement of persons**

In the UK, immigration is a major bone of contention. The immigration of people from other EU member states evokes a negative feeling in 44 percent[6] of the British population according to the last opinion poll conducted by Eurobarometer (European Commission, 2015, T142). However, this is not significantly higher than in the EU-28 with on average a 38 percent share.

**Table 2-6: Population in the UK on 1st January by citizenship**

| | 2001 | 2013 | 2014 |
|---|---|---|---|
| Total | 58,999,916 | 63,905,297 | 64,308,261 |
| UK | 56,342,184 | 58,902,990 | 59,233,536 |
| Foreign citizenship | 2,657,732 | 4,978,470 | 5,047,653 |
| EU-28 countries except the UK | n. a. | n. a. | 2,623,367 |
| EU-27 countries except the UK | 1,008,987 | 2,456,799 | n. a. |
| EU-15 countries except the UK | 905,460 | 1,144,488 | n. a. |
| EU-27 minus EU 15 | 103,527 | 1,312,311 | n. a. |
| Hungary | 4,273 | n. a. | 74,495 |
| Latvia | 1,803 | 71,792 | 90,216 |
| Lithuania | 7,936 | 144,877 | 163,204 |
| Poland | 38,340 | 724,283 | 748,207 |
| Romania | 5,324 | 110,187 | 136,947 |
| HU+LV+LT+PO+RO | 57,676 | n. a. | 1,213,069 |

Sources: Eurostat, database [migr_pop1ctz]; own calculations

A look at the facts might be helpful. Unfortunately, official statistics regarding population by citizenship contain a lot of gaps. According to Eurostat, the information in Table 2-6 is available for 2001 and for more recent years: In 2014, about 5 million people or 7.8 percent of the UK's population were citizens of a foreign country. 2.6 million or 4.1 percent were citizens of an EU member state (EU-28). In comparison to 2001 (EU-27), this represents an increase of 1.6 million. The population with third

[6] Fairly negative: 30 percent; very negative: 14 percent.

country citizenship increased in the same period by around 0.8 million. The number of immigrants from EU countries has thus seen an above average increase. In particular, citizens from Eastern European member states have contributed to this increase. The number of immigrants from the five new member states[7] increased by almost 1.2 million people, of which more than 60 percent came from Poland.

**Table 2-7: Employment by citizenship in the UK**
in 1,000 persons

| | 2006 | 2014 |
|---|---|---|
| Total | 28,417.3 | 29,530.8 |
| UK | 26,527.2 | 26,653.4 |
| Foreign citizenship | 1,886.7 | 2,877.1 |
| Outside the EU-28 | 1,094.2 | 1,171.1 |
| EU-28 countries except the UK | 792.5 | 1,706.0 |
| EU15 countries except the UK | 472.2 | 699.8 |
| New member states (EU-28 minus EU-15) | 320.3 | 1,006.2 |

Sources: Eurostat, database; own calculations

In 2014, the number of employed persons (Table 2-7) having the citizenship of another EU country amounted to 1.7 million persons or 5.8 percent of total employment. 0.7 million are from the old member states (EU-15 without the UK) and 1 million from countries that became EU members in 2004 and/or later. The picture is similar for the development of population. In comparison to 2006, the earliest year for which data is available, the number of employed persons from EU countries increased by 914,000. An increase of nearly 230,000 persons is attributable to EU members before 2004 and an increase of 686,000 persons to countries joining the EU in 2004 and/or later.

The UK, with a share of 5.8 percent of foreign workers who are nationals of another EU member state, is right at the top of the list compared to the other large EU countries. The corresponding value for Germany is 4.7 percent, for Spain 4.3 percent, for Italy 3.4 percent and for France 2.3 percent. In comparison to these four countries, the share of employed persons from EU countries joining in 2004 and later is also the highest in the UK with 3.4 percent. This share accounts for 2.1 percent in Germany, 3.1 percent in Italy, 2.5 percent in Spain and only 0.2 percent in France.

[7] Due to missing values, the other eight states which became members of the EU in 2004 and thereafter cannot be considered.

A withdrawal from the EU would enable the British Government to restrict immigration as well as cross-border labour mobility. On the one hand, this could lead to a diversion of migration flows within Europe. On the other hand, this would also impact the future allocation of human capital within Europe and could negatively affect the availability of human capital and create a shortage of skilled labour in the UK. One should, however, bear in mind that the fertility rate in the UK (children per woman) is comparatively high and amounted to 1.92 in the period from 2010 to 2015. In Germany, the corresponding value was 1.39 for the same period. In 2014, the average fertility rate in the EU was 1.58. According to official estimates by the Office of National Statistics (ONS), the UK population will rise by almost 10 million by the year 2039[8].

# 3. Potential scenarios how the UK could be related to the EU after a Brexit

## 3.1 The legal situation of Article 50 (TEU): procedures and requirements[9]

The possibility for a member state to undergo voluntary secession from the EU was introduced in the Treaty on European Union (TEU) with the Treaty of Lisbon in 2007[10]. Article 50 states that a country wanting to withdraw must inform the European Council of its intention. As a next step, the European Council would issue political guidelines. In the light of these guidelines, the Union must negotiate an agreement with the exiting country, setting out arrangements for the withdrawal, which takes account of the framework for the country's future relationship with the EU. The withdrawing country cannot take part in the discussions or the decisions of the European Council or the Council concerning the agreement. The treaties cease to apply to the exiting country from the date the withdrawing agreement comes into effect, at the latest two years after the notification. This means an agreement is not a prerequisite for a withdrawal. The negotiation period can be extended by a unanimous decision of the European Council in accordance with the exiting country. Both partners therefore have the possibility to refuse an extension of the negotiating period.

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[8] http://www.ons.gov.uk/ons/rel/npp/national-population-projections/2014-based-projections/sty-1.html [2016-3-24].

[9] For a discussion of various legal aspects see inter alia Wieduwilt (2015) and the literature cited therein.

[10] Date of signature; date of coming into effect: 1st December 2009.

The withdrawal agreement does not require unanimity within the Council. The Council decides with a qualified majority after obtaining the consent of the European Parliament. If both parties did not conclude an agreement before exiting, the respective country could try to come to terms with the EU, e.g. with the status of a non-member state. But in this case the conclusion of the agreement would probably be subject to unanimity in the Council according to Article 218.8[11] of the Treaty on the Functioning of the European Union (Piris, 2016, 5).

The result of negotiations would be a complex and extensive agreement, as it should not only settle the framework for future relations, but also needs to include various transitional provisions. It is assumed that detailed conditions of any future relationship would have to be held in a separate agreement (HM Government, 2016, 9). Open Europe examined previous free trade negotiations and concluded "that two years is not a long time to conclude a comprehensive agreement" (Booth et al., 2015, 11). Peter Mandelson, a former European Commissioner, has recently warned that the British renegotiation of its relationship with the EU would take up to ten years (Euractiv, 2015). Accordingly, it would be long, complex and disagreeable to finalise an agreement, also due to the differing interests of the remaining member states.

The main purpose of Article 50 TEU is to prevent a disordered exit. In the case of a Brexit, this incident could be called a "Braccident". The treaty provisions could be used to negotiate a modern free-trade or partnership agreement between the UK and the EU. Such an agreement would in the best case lead to low or zero tariffs and an absence of quantitative restrictions. It could also include a wide range of policies that affect other forms of cross-border commerce, such as services, direct investment and the mobility of labour (CEPR, 2013a, 37). Whether the EU would accept such a generous arrangement appears doubtful (see also Chapter 3.4).

## 3.2 General impact of a Brexit on the four freedoms and EU-related costs

The agreement which the EU and the UK have to negotiate after a pro-exit referendum will be a decisively determining factor for the future economic relations between both sides. The substance of this agreement is naturally not easily predictable. Before discussing several institutional options for the UK as a non-member state to connect to the EU, some remarks are important concerning the general (dis-)integrational effects of a Brexit. A general overview is provided by Table 3-1.

[11] "However, it (the Council) shall act unanimously when the agreement covers a field for which unanimity is required for the adoption of a Union act as well as for association agreements".

**Table 3-1: Positive and negative effects of European integration**

| Positive effects | Negative effects |
|---|---|
| Gains from trade | Trade diversion losses due to trade preferences for EU countries and for third countries with preferential trade agreements |
| Gains from more international competition | Sovereignty / democracy costs (National policies are decided in a way that may clash with the national sovereignty of a country.) |
| Gains to efficiency from economies of scale and scope | Subsidiarity costs (Regulations that might be optimal for the EU are not optimal for a single country.) |
| Gains from innovation | Process costs (EU institutions have to be funded; rules and regulations have to be complied with.) |
| Policy synergies where effects spill over borders | |

Source: Europe Economics, 2013, 20; own compilation

In terms of economic integration, a Brexit would affect all four freedoms of the Internal Market: merchandise trade, free movement of services, free movement of capital including FDI, and free movement of persons. A Brexit would also affect the scope of sovereignty for national regulation and possibly influence the general business and investment climate in the UK. These consequences vary in extent with regard to the options pointed out below in Chapter 3.3.

### 3.2.1 The four freedoms

#### Free movement of goods

**Trade relations with the EU:**

- In the event that the UK were to leave the EU, it could not be ruled out that the EU would introduce tariffs on imports of British products. It is also possible that the UK government would react in the same way. Market access would be impeded for both sides and import costs and consumer prices would rise. In a worst case scenario, this could unleash a trade war.
- Market access could also be hindered by non-tariff barriers because the mutual recognition of standards and regulations is not ensured. Over time, this would cause trade costs for both partners that are due to probably diverging regulations, standards and conformity assessment procedures. This would be relevant for technical provisions for manufacturing products and sanitary and phytosanitary for agricultural products and food. Some figures can illustrate

the potential burden for the UK as a non-member of the Internal Market: On a scale from zero (fully open) to 100 (fully closed), intra-community NTBs amount on average to roughly 18 for firms inside the EU and around 28 for those firms from outside the EU (CEPR, 2013a, 60). A breakdown by sector shows that the biggest differences for goods to the disadvantage of third countries apply in the aerospace, chemicals and motor vehicles industries.

- If the UK were to obtain a bilateral trade agreement with the EU (and not a customs union), Rules of Origin (RoO) and customs procedures would be required. RoO have the function to prevent circumvention of the tariffs of the partner country with higher external tariffs applying to third countries.[12] Customs procedures are necessary between both partner countries to ensure that the RoO are adhered to. For UK firms this would mean new administrative barriers in trading goods with EU countries. In other words: "The process of adapting to RoO-based duty-free trade under a new UK-EU Free Trade Agreement (FTA) would be tedious, costly and disruptive to trade" (Stewart-Brown/Bungay, 2012, 1). New studies conclude that RoO induce compliance costs in a range of 4 to 8 percent of the value of the goods traded (CEPR, 2013a, 57).

**Trade relations with third countries:**

- The UK would be free to reduce its tariffs on imports from third countries. This is not possible as long as the UK remains a member of the EU's custom union. Lower tariffs towards third countries would mean an increase in welfare in the UK.
- On the negative side, however, the UK would lose preferential market access to the markets of third countries outside the EU with which the EU has negotiated preferential trade agreements. The EU has concluded agreements with approximately 50 countries.[13] The UK would have to renegotiate the relevant agreements in order to maintain free access to these markets (House of Commons, 2013, 32). The UK would also have to initiate own negotiations with countries with which the EU is currently negotiating trade and/or investment agreements, for instance the US, Japan, and China.

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[12] RoO prevent that imports from third countries enter the partner country with lower external tariffs and are then brought under free internal trade to the other partner country with the higher tariff. RoO do not matter if a product is completely British made, but rather when more than a certain relevant amount of components is imported from third countries, if the product is further processed in one of the partner countries and is then exported to the other partner. In such a case, the trade preference between the partner countries does not apply to this product and the full external tariff is levied.

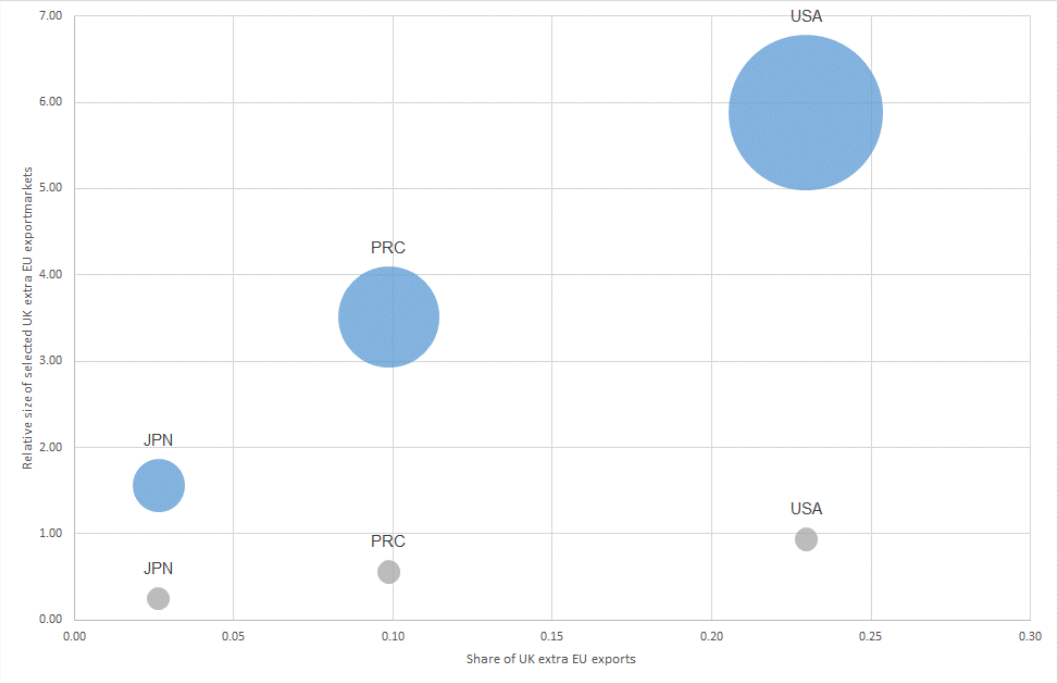
[13] http://trade.ec.europa.eu/doclib/docs/2012/june/tradoc_149622.jpg [2016-3-24]

**New bilateral trade agreements with third countries**

The question now arises: What quality would these future agreements have between the UK and third countries? Several problems can be identified in this respect (Euractiv, 2015):

- Third countries would have to be persuaded to negotiate with the UK as a priority.
- The negotiating capacity of the British government would be put under some strain if it had to deal with up to 30 bilateral and regional trade agreements (with more than 50 countries) simultaneously (Global Counsel, 2015, 22). Moreover, negotiation of recent comprehensive trade agreements requires very deep knowledge and experience. The EU has acquired this experience over time, but it is not certain that the UK administration has progressed to the same extent because it only has accompanied recent trade negotiations of the EU.
- It appears questionable whether the UK would obtain agreements of the same quality as the EU, as its bargaining power would be weaker. Firstly, the size of the UK market is much smaller than the size of important trade partners such as the US, China and Japan (Figure 3-1). Secondly, the UK could be in a defensive position because it would initiate trade negotiations.
- The negotiating power could be somewhat enhanced, because the UK (as a liberal-minded country) would probably offer third countries lower trade barriers than the EU, particularly in agriculture. However, the first two of the above-mentioned effects imply that it could take a relatively long time until new agreements could come into force. This would create a dilemma for the UK: In order to reap the welfare benefits of free trade, the UK would have to unilaterally reduce its trade barriers sooner rather than later. Yet, if it does so, this bargaining chip is no longer available in bilateral trade negotiations. As a result, it is not certain that the UK would manage to obtain significant market access for its exporters to third countries.

**Figure 3-1: Relative economic size 2014**
Size of three selected UK export destinations relative to the UK (blue bubbles) and EU-28 (grey bubbles); size of bubbles reflects size of UK exports in 2014, relative market size measured with GDP-Relations




Sources: CEPR, 2013a, 72; Eurostat; own calculations

## Free movement of services

In the EU, cross-border market access for services could still be improved. Nevertheless, intra-EU market access for services is much more liberal than the multilateral service trade regime relevant for third countries (General Agreement on Trade in Services – GATS). GATS could become relevant for the UK in some of the options depicted below. It leaves much more room for protectionism and the discriminatory treatment of foreign suppliers than is allowed in the Internal Market.

In this respect, UK service providers could find it more difficult to sell their services to EU countries in the case of a Brexit. Non-tariff barriers would then raise the costs of doing business in the EU. In the service industries, the NTBs of the EU towards third countries are the highest for the sectors transport, travel and ICT-Services (CEPR, 2013a, 61).

Potentially new barriers for the free movement of services would be particularly relevant for the UK, as the British economy is extraordinarily strong in this sector (Chapter 2). Thus, the British service sector – and in particular the financial services sector – would (very) likely suffer more from a Brexit than the manufacturing sector. This is also true because the WTO-rules for merchandise trade are more liberal than the

GATS-rules for services. The concrete effect depends on the negotiated relationship to the EU.

**Free movement of capital**

The UK could lose the ability to participate in the free movement of capital in the EU. This is all the more likely, as the UK would probably want to use regained autonomy to change the regulation of the capital market imposed by the EU. As a result, a significant divergence of capital market regulation could arise over time, making the free movement of capital basically impossible. In such a case, the UK capital markets would become less integrated within the EU. This is all the more relevant, as the EU aims to create a Capital Markets Union which is meant to further facilitate the free movement of capital within the EU and which would rather lead to regulatory divergence sooner.

The City of London has developed into the dominant financial market within Europe. This applies particularly to euro denominated wholesale financing, interest rate derivatives and currency transactions. It appears highly questionable whether the European Central Bank (ECB) would further tolerate this situation after a Brexit. Outside the EU, the UK could no longer rely on the European Court of Justice for protection in this respect.

**Foreign Direct Investment**

FDI in a country is highly relevant, because less FDI due to a Brexit would mean less production and employment and probably also less technical progress and productivity due to less competition.

First, legal aspects play an important role, because in the case of a Brexit the right of establishment in an EU country would be weakened for UK firms. Moreover, the UK would no longer enjoy the protection of EU law in this respect.

Secondly, economic considerations are relevant when evaluating the effects of a Brexit on FDI flows. Different FDI motives have to be taken into account:

- MNCs have the choice to serve foreign markets via exports or local production in these markets by means of FDI. Important considerations for this decision concern competitiveness of the location, but also trade costs due to distance and trade barriers are relevant in this respect. If trade barriers are higher, exporting becomes more expensive and (barrier-hopping) FDI in foreign markets becomes relatively more attractive compared to exporting. Should trade barri-

ers between the EU and the UK increase after a Brexit, this effect would work in both directions and increase incentives for barrier-hopping FDI. However, as the EU is a larger market, production relocations from the UK to the EU would seem to be more likely than in the other direction. In the service industry in particular, where the relevance of trade barriers is higher, relocations could take place to the EU. With regard to financial services and the relevance of the City of London, Frankfurt, Paris, or Dublin might be potential alternative locations for UK-based financial services firms (Central Bank of Ireland, 2015, 38).

- Another motive for FDI is in connection with the optimisation of international supply chains that involve production sites in different countries. Trade costs and timelines are important considerations in this respect. Thus, higher barriers to trade and new potentially time consuming custom procedures could act as ‘a spanner in the works’. British companies might relocate production back from the EU, but EU companies could also cut the UK out of their international value chains or abstain from establishing new value chains that include the UK.
- The UK traditionally serves as a bridgehead to the continent for non-European and US firms in particular. This function could be eroded after a Brexit depending on the degree of new trade barriers that arise for the UK when accessing the EU. For example, the presence of US financial firms is clearly related to EU passporting rules for financial players which allow free service provision in the EU (Lannoo, 2016).

There is much at stake with regard to FDI in the UK, because the UK is the largest recipient country for FDI in the EU, and the EU is the most important source of FDI in the UK (Chapter 2). The UK is host for half of all European headquarters of non-EU companies (Global Counsel, 2015, 12).

What is more, there is empirical evidence that access to the EU market is indeed a relevant factor for FDI in Britain: Barret et al. (2015, 35) have calculated location probabilities based on data for the location of newly established foreign affiliates in 28 EU countries from 2005 to 2014 (Lawless et al., 2014, 10). The probability to establish a new foreign affiliate in the UK is 12.7 percent in the baseline scenario. It would fall to 7.1 percent in case the UK’s market access to the EU was reduced by 25 percent and to 2.9 percent in case of a reduction of access conditions by 50 percent (Barret et al., 2015, 72).

Furthermore, there are also some indications that investment relocations could take place to the detriment of production and employment in the UK. Several global banks have announced they could move operations out of the UK in the case of a Brexit (Reuters, 2015a). Also, Nissan has announced it would have to reconsider its loca-

tion decisions (FAZ, 2016), while Toyota has pledged to stay in the UK even if the country left the EU (FT, 2016).

This sporadic evidence is supported by a survey of 101 of TheCityUK members, consisting of financial and related professional services players. Around half of the firms surveyed regard access to EU customers a benefit of their location in London and close to 40 percent regard a relocation of jobs as fairly likely, very likely or certain (Ipsos Mori, 2013).

**Free movement of persons**

The UK would lose the ability to benefit from the free movement of persons if it chose a relatively loose bilateral arrangement with the EU. However, the discussion in the UK does not focus on emigration of British citizens to the EU, but on immigration of people from other EU countries to the UK and their access to the British social system. However, the effects of a Brexit are somewhat ambiguous regarding immigration. On the one hand, the UK could use its regained competences to limit the influx of foreigners or to manage it according to the needs of the UK economy. On the other hand, the UK could provoke political retaliation measures by EU countries in both cases, due to the political sensitivity of this issue (see Chapter 3.4).

The UK is already relatively hesitant concerning the immigration of refugees from third countries. This stance could be upheld after a Brexit. Moreover, if the EU found an arrangement of country quotas, the UK would not have to participate. However, the existence of the Eurotunnel is somewhat of a weak link in the case of a restrictive UK policy on refugees, because the UK also relies on France to prevent refugees from entering it.[14]

### 3.2.2 Regulatory autonomy and costs related to EU regulations

In case of a withdrawal from the EU, the UK would regain competences and sovereignty from Brussels. The country could replace regulations induced by EU law with national laws and regulations. This aspect ranks high among EU sceptics in the UK. In fact, the new institutional arrangement with the EU could be chosen in such a way that economic policy would be determined only by British politicians.

Recently, Open Europe has tried to identify the top 100 most costly EU-induced regulations that in total are estimated to cost the UK economy GBP 33.3 billion per year

[14] http://uk.reuters.com/article/uk-britain-eu-france-idUKKCN0W50PC [2016-3-24].

(Open Europe, 2015b). However, regulations are not only a cost factor, but are intended to improve the welfare of consumers and the economy, even if this is sometimes achieved in a rather costly way. According to Open Europe (2015b) the British Government's impact assessments of these rules, are estimated to cause a benefit of GBP 58.6 billion per year – a figure which Open Europe regards as overstated. In an earlier study (Gaskel/Persson, 2010), Open Europe estimated the benefit-cost ratio of EU regulations since 1998 to be positive at 1.02. This result is considerably lower than the obtained result for UK regulations (2.35), however.

At the top of Open Europe's (2015b) list ranks the UK Renewable Energy Strategy, followed by the CRD IV banking regulation package. Third place is held by the working time regulations of 1998 and its amendments in 2003, followed by the EU Climate and Energy Package. The Agency Workers Regulation 2010 comes in at rank five.

Regarding future developments, two aspects have to be considered which are relevant for the economic effects of a Brexit:

- Firstly, how would the course of British regulatory policy differ from the course taken if the UK remains in the EU and was more constrained. In this respect, certain administrative costs might be reduced. However, it is noteworthy that the EU has not prevented the UK from having rather deregulated and thus flexible labour and product markets in international comparison. Thus, there will be limits to further deregulations in case of a Brexit in this respect.
- Secondly, the EU would also move forward with new regulations that can either cause new costs or new benefits. Apart from the Capital Markets Union, the intended improvement of the Single Market is also a case where the UK would no longer be able to benefit in the case of a Brexit.

### 3.2.3 Uncertainty and financial market reaction

The uncertainty after a Brexit could hurt the general business and investment climate in the UK. This has already clouded the outlook for Britain's economy in 2016 according to a Reuters poll amongst 42 economists (Reuters, 2015b). Besides this, the perceived negative economic impact of a Brexit could be priced in by financial markets, causing a certain degree of financial turmoil during an adjustment period after the official announcement of a Brexit.

In particular, the verdict of rating agencies could be relevant in this respect. For example, Moody's is cited with assessing that an exit "would hurt Britain's economy by damaging trade and investment and could put its credit rating at risk of a downgrade"

(Reuters, 2015b). Standard & Poors warned in December 2015, a country's withdrawal from the EU could weaken economic stability and diminish growth potential for years. Such a development could ultimately affect the credit ratings of these countries.[15]

The financial impact could be felt in security markets if investors withdraw capital from the UK – and as a result also in the currency markets in form of depreciation of the GBP.

## 3.3 Access options to the Internal Market and economic implications

After a Brexit, alternative bilateral institutional arrangements are possible between the UK and the EU. Options for the UK that are often discussed (Booth/Howarth, 2012, 30 ff.; CBI, 2013, 132 ff.; Etzold, 2013; House of Commons, 2013; House of Commons Foreign Affairs Committee, 2013;) comprise of:

- admission to the European Economic Area (EEA), often called the "Norwegian" option,
- the "Swiss" option which implies a bundle of bilateral agreements with the EU,
- the "Turkish" option, i.e. a customs union between the UK and the EU and
- the "WTO" option where the UK's trade relations with the EU would be organised according to the Most-Favoured-Nation (MFN) principle, which applies for all third countries where the EU does not have a preferential trade agreement.

Compared to the WTO option, the Norwegian option stands for the other end of the scale of possible relations as it would encompass an ambitious FTA between the EU and the UK.

The future relationship between the UK and the EU is the big unknown. Even if none of these alternatives provide a tailor-made solution for the relations of the UK with the EU, it would be worthwhile briefly introducing them.

[15] http://de.reuters.com/article/economicsNews/idDEKBN0TX1IV20151214 [2016-3-24]

### 3.3.1 Norwegian option – European Economic Area agreement

As members of the EFTA (European Free Trade Association), Norway, Iceland and Liechtenstein are also members of the EEA and thus part of the Internal Market of the EU. The EEA is referred to as an in-depth free trade area between the EU and EFTA (excluding Switzerland).[16] The EEA agreement came into force on 1st January 1994 and has expanded the Internal Market to these three countries. It guarantees the free movement of goods, persons, services and capital. However, the degree of integration with the EU is not all-embracing. The EEA does not cover an agricultural and fisheries policy, trade policy, foreign and security policy, nor the Customs Union, justice and home affairs (JHA) (Booth/Howarth, 2012, 30).

Norway has the closest relationship with the EU of any non-member state because it is also a member of the Schengen area and participates in a number of additional EU political measures: justice and home affairs of the EU, as well as defence policy initiatives (Booth/Howarth, 2012, 31; ONR, 2012, 3). In the words of an official Norwegian report: Norway is both outside and inside the EU – simultaneously (ONR; 2012, 3).

If the UK chose the EEA or Norwegian option, it would have to apply to join the EFTA which could entail a difficult application process (House of Commons, 2013, 19).

Participation in the Internal Market is not for free. The EEA countries are bound by the Internal Market rules of the EU, but they have no real say in the making of these rules. Their influence is limited to the participation of EEA experts in the European Commission and Council committees (Booth/Howarth, 2012, 30). In addition, EEA countries have no influence in the European Parliament. According to a report of the Norwegian government, Norway has adopted more than 75 percent of all EU laws.

An EEA agreement would mean for the UK, for example, that it has to maintain social and employment regulations such as the working time directive (CBI, 2013, 141), as this area of policy is also part of the Internal Market regulations. Moreover, the country would remain bound by the regulations of the financial markets of the EU if the City of London were allowed the free movement of capital in the EU. All in all, the country would have to maintain those arrangements, which are seen particularly critically – without the ability and scope to participate in shaping them. Thus, the UK would have to give up even more of its sovereignty if it decided to go for the Norwegian option.

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[16] Switzerland is affiliated with Norway, Iceland and Liechtenstein in the EFTA but has not ratified the EEA Agreement due to a negative referendum.

Another disadvantage concerns higher trade costs. The EEA is not a customs union, therefore, RoO on goods traded with third countries would have to be complied with and customs procedures are required for trade between the UK and the EU (Oppermann, 2009, 52; House of Commons, 2013, 30–31; House of Commons Foreign Affairs Committee, 2013, 74).

Moreover, in the case of a Brexit, the UK would have to renegotiate all trade agreements with third countries, no matter whether they are already concluded or are still being negotiated.

After a Brexit, the UK would only partly save its contributions to the budget of the EU in case of the Norwegian option. It would still be obliged to participate financially in the cohesion policy of the EU for the benefit of the new EU member states of 2004 and thereafter. In the period from 2009 to 2014 the respective financial obligations of Norway amounted to 1.7 billion euros[17], or on average 283 million euros per year. The population in the UK is twelve times as high as in Norway. On this basis, one could roughly expect that the UK's financial contribution would amount to 3.4 billion euros per year. Access to the common market is not for free.

### 3.3.2 Swiss option – many bilateral agreements and a free trade agreement

Switzerland's relationship with the EU is regulated by the free trade agreement of 1972 and a number of sectoral bilateral agreements. Bilateral Agreements I include seven agreements (free movement of persons, technical barriers to trade, government procurement, agriculture, land transport, air transport, research) and Bilateral Agreements II include nine agreements (Schengen, Dublin, interest taxation, anti-fraud, processed agricultural products, the environment, statistics, film promotion, pensions). The subjects of Bilateral Agreements I are primarily liberalization and market opening. With Bilateral Agreements II, economic cooperation has been strengthened and extended to cover further areas (Swiss Confederation, 2015). Around 120 bilateral agreements and amendments with the EU are in force of which 20 are decisive for relations (Tobler et al., 2010, 10).

Overall, the level of EU integration in the case of Switzerland is well below the level that the EEA has reached with the EU (Tobler et al., 2010, 32). In particular, a comprehensive agreement between the EU and Switzerland could not be reached with regard to the free movement of services. The relationship in this field offers a very

[17] http://eeagrants.org/Who-we-are/Norway-Grants and http://eeagrants.org/Who-we-are/EEA-Grants [2015-12-4].

complex picture, because the freedom to provide services is only selectively regula–ted by bilateral law and uses different instruments (Tobler et al., 2010, 17).

Such a situation could prove to be disadvantageous for the UK due to its particular strength in the service sector. With regard to financial services especially, there is only one small bilateral agreement between Switzerland and the EU, i.e. on non-life insurance. Swiss banks cannot generally access the Internal Market for financial services, as the EU obtains regulatory barriers to entry via third countries, in particular for cross border service delivery. However, service provision is possible by way of subsidiaries, but this option is costly and implies that Switzerland benefits much less from employment and value added (Booth/Howarth, 2012, 37). Therefore, the UK would probably want to negotiate a broader service agreement with the EU focusing on financial and business services. However, as an 'applicant' its negotiating position does not appear very strong.

A further disadvantage would arise for the UK because British companies would have to apply the EU RoO, and customs procedures are also required (Eidgenössisches Departement, 2015, 14).

Concerning regulatory issues, Switzerland remains formally sovereign in bilateral agreements with the EU. But it also has no say in the EU decision-making process (Tobler et al., 2010, 12). Nevertheless, it must conform to the regulations made by the EU as far as these laws influence the fields that are a part of bilateral agreements. Some agreements include a literal adoption of EU law, for instance in the case of civil aviation and the Schengen rules (Booth/Howarth, 2012, 36).

However, one advantage of the Swiss option for the UK might be that it would no longer have to comply with the EU social and employment regulations and would not be included in the Common Agricultural Policy (CAP) and regional policy. Thus, no regular contribution to the EU budget would have to be paid. Nevertheless, Switzerland participates financially in the EU cohesion policy to a limited extent. In 2006, the EU and Switzerland signed a Memorandum of Understanding (MoU), in which Switzerland agreed to make an initial contribution to European cohesion amounting to 1 billion Swiss francs over five years. After the EU accession of Bulgaria and Romania, this contribution was increased by a further 257 million francs. The Swiss contribution is justified by the fact that EU enlargement also expanded the Internal Market for Switzerland by around 100 million consumers[18].

[18] http://eeas.europa.eu/delegations/switzerland/eu_switzerland/political_relations/enlargement_contribution/index_de.htm [2016-3-24]

Another point concerning regulatory aspects is that bilateral agreements are static. An automatic adaptation to new EU rules is not foreseen. Newly imposed regulations in the EU can be disadvantageous for Swiss companies. In order to reduce these disadvantages, a new specific agreement between the EU and Switzerland would be needed.

The Swiss Option is not very popular in the EU. The Bilateral Agreements were originally intended as an interim solution before EU-accession of Switzerland. Another problem refers to migration issues: Switzerland's relations with the EU suffered after the Swiss voted in a referendum (February 2014) against the free movement of persons. It is thus very questionable whether the EU is willing to accept a similar relationship with the UK.

### 3.3.3 Turkish option – a customs union

Since 1996, the EU and Turkey have formed a customs union, which includes the tariff-free movement of manufactured goods and processed agricultural products. Other agricultural products, as well as coal and steel products, are not included. Free movement of goods implies in the case of Turkey the elimination of tariffs and quantitative restrictions "between the two parts of the customs union for goods either wholly produced or put into free circulation after their importation from third countries in either Turkey or the Union".[19] RoO are thus not required (Booth/Howarth, 2012, 41). Compared to the EEA, the institutional arrangements with Turkey include fewer far-reaching rules on the freedom of persons and services (Tobler et al., 2010, 8). Turkey is outside the full Internal Market (House of Commons Foreign Affairs Committee, 2013, 74).

The Turkish option can be characterised as a privileged partnership. An important advantage for the UK would be that the free movement of goods could still be maintained. Moreover, policies could be abandoned which are often perceived as undesirable in the UK: EU social and employment regulations, Common Agricultural Policy and the Common Fisheries Policy as well as the Cohesion Policy. Contributions to the common budget would stop as well as the jurisdiction of the EU Court of Justice. The influence of other EU institutions such as the Council and the European Parliament would also expire. From the perspective of many British EU opponents, the advantage of this model could particularly lie in the fact that the UK would be able to regulate its labour market again autonomously.

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[19] http://ec.europa.eu/taxation_customs/customs/customs_duties/rules_origin/preferential/article_414_en.htm [2016-3-3].

However, the free movement of services, capital and persons is not included in the Turkish option. The UK's service sectors and especially its financial industry would be excluded from the Internal Market of the EU. To tackle this substantial drawback, the UK would have to negotiate an agreement on the freedom of services and capital with the EU, in addition to the customs union. The UK position in such negotiations would probably not be strong, as the country relies heavily on its financial industry and would thus be a supplicant.

In addition, the UK would have to maintain or take over the necessary regulations for the free movement of goods, but it could not influence them: customs valuation, customs declaration, etc. The agreement on a customs union between the EU and Turkey contains the alignment of Turkey on Community common customs tariffs, including imports from countries with preferential arrangements with the EU, harmonisation of commercial policy measures, the approximation of customs law and mutual assistance in customs matters.[20] The UK would also have to further comply with the anti-trust rules and state aid rules of the EU, as well as common product standards.

Becoming a member of the customs union does not only have advantages compared to the EEA option, such as waiving the RoO. There would be an important disadvantage for the UK, as third countries with a free trade agreement with the EU enjoy preferential access to the Internal Market and thus also to third countries with which the EU forms a customs union. This does not apply vice versa, i.e. the UK would not benefit from the preferential access to the markets of third countries (CBI, 2013, 150). Thus, the incentive for third countries to conclude a free trade agreement with the UK would be significantly reduced.

All in all, it appears doubtful whether the economic relations between the UK and the EU would be sufficiently organised with a customs union. Duties have decreased in importance and non-tariff barriers are all the more important. Thus, the lack of access to the Internal Market weighs heavily in many respects. This is all the more relevant, because in contrast to Turkey, the British service sector is much more important. However, a customs union agreement does not cover the service sector.

It is also questionable to some degree whether the EU would accept a customs union as an option for an exit; the customs union with Turkey was certainly intended as a precursor for eventual membership (CBI, 2013, 148).

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[20] http://ec.europa.eu/taxation_customs/customs/customs_duties/rules_origin/preferential/article_414_en.htm [2016-3-3].

### 3.3.4 WTO option – most favourite nation's principle

The UK's membership in the World Trade Organisation (WTO) would remain as a fall-back position in the case of a withdrawal from the EU. WTO membership offers only limited access to the EU market based on MFN treatment. This means that the country's market access is granted under the same rules and conditions as all other WTO members without preferential trade agreements with the EU. However, the MFN principle ensures that the UK could not be charged higher tariffs than those imposed on the same product imported from another WTO member state (CEPR, 2013a, 35).

British companies would have to pay the EU import tariffs if they want to export to the EU. While the average EU external tariffs are relatively low at around 4.2 percent[21], 90 percent of the UK export values in the EU would be affected by duties (House of Commons, 2013, 27). For some products, EU tariff rates are significantly higher: 10 percent for passenger cars and even 15 percent for food products (Springford et al., 2014, 32–33).

Moreover, British exporters would have to comply with new non-tariff barriers due to the limited access for goods to the Internal Market. The other freedoms of the Internal Market would also be affected. The GATS of the WTO allows only a much lower degree of market access than the rules of the Internal Market (CBI, 2013, 135). In particular, British companies would no longer have an automatic right of establishment in a member state of the EU. Moreover, an end of the freedom of movement for persons would hinder both the British citizen and British companies that do business with the European mainland. New rules would also apply to trade with third countries, as the UK would have to renegotiate existing FTAs.

On the positive side, the UK would regain full regulatory sovereignty with regard to the competences that are now communal at the EU level and that have been criticised as an unnecessary burden for the UK. Moreover, British payments to the EU budget would be brought to an end.

The fall-back position of the WTO membership could be considered if it is not possible to negotiate an agreement with the EU within the two-year period of the TEU.

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[21] http://stat.wto.org/TariffProfile/WSDBTariffPFView.aspx?Language=E&Country=E28 [2016-3-3].

### 3.3.5 Overview of possible options

Table 3-2 provides an overview of the options depicted above. It has to be kept in mind that the UK would not have to choose one of these particular options but has some freedom to construct a tailor-made solution in the form of a more or less comprehensive preferential trade agreement.

**Table 3-2: Possible alternatives to EU membership and their consequences**

| | | Norway / EEA | Switzerland | Turkey | WTO |
|---|---|---|---|---|---|
| Decision-making rights and representation in EU | | No | No | No | No |
| Customs Union | | No | No | Yes | No |
| Tariffs on the UK exports to the EU | | No | No | No | Yes |
| Single Market | Free movement of goods | Yes | Partial | Partial | No |
| | Free movement of persons | Yes | Partial / limited | No | No |
| | Free movement of capital | Yes | No | No | No |
| | Free movement of services | Yes | Partial / limited | No, GATS Rules | No, GATS-Rules |
| Renegotiation of FTAs | | Yes | Yes | Yes* | Yes |
| Increased trade costs due to RoO | | Yes | Yes | No | No |
| Cost of customs clearance | | Yes | Yes | No | Yes |
| Regulatory autonomy | | Limited | Limited | Partial | Yes |
| Influence on EU Regulation | | Very limited | No | No | No |
| Financial Contributions | | Yes, partial | Yes, partial | No | No |

*There is little incentive for third countries as they already benefit from low tariffs to the UK.
Sources: House of Commons Foreign Affairs Committee, 2013; own compilation

However, even with a tailor-made solution, an important trade-off cannot be evaded: The higher the degree of integration between both sides (and the better the market access for UK firms to the EU market), the less the perceived burden of EU regulations would be alleviated and the less regulatory sovereignty could be regained by the UK. In the case of the Norwegian option, the sovereignty would even decrease as the UK would have to adopt many regulations without being able to significantly exert influence in Brussels.

### 3.3.6 EU's negotiating stance towards the UK

As depicted above, there is a large menu of possible bilateral arrangements with the EU after a Brexit. However, the UK will not be completely free to choose options with the best cost-benefit relation. The institutional relationship with the EU has to be negotiated. Thus, the negotiating stance of the EU might constrain the UK when choosing the preferred option.

Hence, the question about the negotiating position of the EU arises. Currently, there is no clear indication in this respect. On the positive side and from the UK perspective, one could be of the opinion that the EU would want to offer favourable access conditions to the EU market, because the many remaining EU countries might want to secure their trade surplus in merchandise trade with the UK and because they would remain interested in keeping good political relations with a close and important neighbour.

On the negative side, the UK would rely more on market access to the EU than vice versa and would thus be in a relatively weaker tactical negotiating position. As with Switzerland, the EU's inclination to cooperate could worsen if the UK chose to significantly restrict labour migration from the EU.

Moreover, the EU might fear that other EU countries could follow the UK in exiting the EU. In this case, the precedent of the new bilateral institutional arrangement with the UK will have an important signalling function. As a result, the EU would probably not be very generous. Trade restrictions by the EU appear most likely in sensitive sectors where market access for third countries is limited by tariffs and regulations. Moreover, it cannot be precluded that the EU might erect barriers particularly in the service sector where the UK has a comparative advantage. Financial centres in the EU could then benefit at the expense of the City of London.

# 4. Existing studies on the economic impact of Brexit for the UK

## 4.1 Overview of main ex ante studies

Various studies have been conducted to estimate the economic effect of a possible Brexit in a forward looking manner (ex ante). They can be broadly lumped into two groups: Academic model-based studies and non-model based studies that build on literature reviews to different extents and on rule of thumb estimates that are mostly based on other existing studies. The main conceptions, assumptions and results of

the studies are briefly highlighted – an overview of important features can be found in the Annex. An evaluation of the relevance of the depicted studies is provided in Chapter 4.2 and Chapter 4.3.

### 4.1.1 Studies based on ex ante trade models

**Booth et al. (2015) (Open Europe)**

An important and very detailed model-based study regarding the impact of a Brexit (Booth et al., 2015) was published by Open Europe, a British think tank. The study employs a so-called Computable General Equilibrium (CGE) trade model to estimate ex ante effects (see Box 1).[22]

The authors differentiate between four scenarios resulting in a range of possible effects by 2030:

- Worst case: The UK does not negotiate a new preferential trading agreement with the EU so that new trade barriers affect the access of UK firms to the EU – similar to the above-mentioned WTO option. FTAs with third countries remain in place. The UK's annual net contribution to the EU budget is saved. This scenario results in a permanent loss of 2.2 percent of GDP.
- Mid-range FTA 1: The UK negotiates a comprehensive Free Trade Agreement with the EU which involves Internal Market style access for goods and moderate increases in trade barriers in services and regarding FDI. FTAs with third countries remain basically in place. Only parts of the countries' contribution to the EU budget are saved. The permanent GDP loss reaches 0.8 percent.
- Mid-range FTA 2: On top of the above-mentioned comprehensive Free Trade Agreement with the EU, the UK chooses a unilateral free trade approach with the rest of the world. This would result in additional gains for the UK due to the removal of tariffs and due to low cost competition from other parts of the world which would lead to lower costs and more specialisation (+0.75 percent of GDP). The UK also pursues an ambitious deregulation agenda that brings additional gains (+0.7 percent). Taken together, the UK would experience a gain of 0.64 percent of GDP.

[22] The multi-sectoral and multi-country CGE model (which also reflects inter-sectoral input-output links based on GTAP) has perfectly competitive markets (no mark-ups, no economies of scale). It also includes some basic dynamic effects as investment and capital accumulation (which can also be influenced by FDI inflows) react to higher capital returns. Dynamic growth effects of higher technical progress, e.g. via FDI spillover effects, higher competition or selection effects are not included. The focus of the analysis lies on merchandise goods, while the impact of trade barriers on services and on global value chains is not considered mainly due to the lack of data (Booth et al., 2015, 70, 72).

- Best case: In addition to the former scenario, the UK would also introduce an extremely ambitious deregulation approach. The overall gain rises to 1.55 percent.

**Box 1: Computable General Equilibrium models**

Computable General Equilibrium (CGE) models are standard tools to estimate the impact of trade policy measures such as trade agreements (Piermartini/Teh, 2005; Plummer et al., 2010). Thus, they are also suited to simulate a Brexit or to quantify the benefits for the UK from free trade of goods and services with other EU member states. The CGE model tries to capture the effects of a trade agreement on (endogenous) target variables such as GDP, employment, consumption or exports. The results are measured as the difference between two future equilibria (after several years) – the target variable value that results in the equilibrium of the economy with the simulated shock and in another equilibrium without it. A CGE model is meant to represent a simplified version of the whole economy (general equilibrium) – and not only of a single sector or market (partial equilibrium). Therefore, it usually includes many countries and sectors as well as the main relevant existing channels of economic transactions. Moreover, the model tries to capture interdependencies and possible second round effects among the variables.[23] This makes it relatively complex, but allows the inclusion of different channels through which a trade agreement influences the target variable.

A CGE model has several advantages for policy makers who need to gauge the economic impact of certain policy measures. It is based on economic theory and allows an ex ante simulation of results, so that all-embracing impact assessments can be made before a policy option is implemented. In addition, the model can be constructed (calibrated) to reflect past economic outcomes and thus the “real world”. Different assumptions can be used in order to test the sensitivity of results to such variations.

However, there are also several weaknesses. CGE models are relatively elaborate in terms of requirements for data, time and software. Moreover, the results depend crucially on the underlying theory, the construction and the assumptions of the model as well as the data used. How exactly these features influence the results is very difficult to understand even for experts, due to the complexity of CGE models (black box character). Furthermore, CGE models concerning trade issues are mostly static in nature (CEPS, 2013) and compare the status of the economy today with the status of the economy in the future when a new equilibrium has been achieved after adaptation to the shock. The way towards this new equilibrium is not modelled and it is not exactly clear how long the adaptation phase takes. Dynamic productivity and growth effects deriving from higher innovation or investment are generally not included (Chapter 4.3).

Overall, the interpretation of the CGE model results requires caution. The focus should lie more on the direction and magnitude of results. Plausibility should be checked by comparing the results obtained with estimates from other models.

[23] Take, for example, a currency depreciation which lowers imports and raises exports. These effects tend to increase GDP and domestic demand. Higher demand also leads to higher imports, which tend to lead to a further depreciation of the domestic currency while the initial import decrease is mitigated to some extent due to the effect of higher income.

The study also mentions a significant risk that a post-Brexit British government could increase costs on business and undermine competitiveness by pursuing interventionist policies.

According to the authors, the politically realistic range would be between –0.8 percent and +0.6 percent of GDP.

**Ottaviano et al. (2014a and b)**

Ottaviano et al. (2014) provide one of two studies employing a new quantitative trade model (NQTM, see Box 2), which uses a type of gravity model (see Box 3) as its core.[24] The authors distinguish between two scenarios:

Optimistic scenario:

- The UK can negotiate an agreement with the EU, similar to Switzerland and Norway. As a result, tariffs continue to be zero and non-tariff barriers amount to one quarter of the reducible NTBs faced by US exporters to the EU.
- After a Brexit, the UK would not benefit from future reductions in NTBs within the EU. It is assumed that intra-EU barriers will fall 20 percent faster than in the rest of the world over the next ten years.

Pessimistic scenario

- The UK is not able to negotiate favourable terms and there are substantial increases in trade costs. MFN tariffs on goods are applied to the UK–EU trade and the UK faces two thirds of the reducible non-tariff barriers of US exports to the EU.
- Intra-EU NTBs will fall 40 percent faster than in the rest of the world in the next ten years.

In both scenarios the main potential benefit of Brexit is the saved net contribution to the budget of the EU amounting to 0.53 percent of GDP.

In the optimistic case, the level of the UK's GDP will be reduced by 1.1 percent, in the pessimistic case by 3.1 percent in the longer term (Table 4-1).

[24] The model features perfectly competitive firms (thus no mark-ups, no economies of scale) and trade in intermediates. It does not include dynamic investment effects via capital accumulation, FDI, or any kind of growth enhancing effects, e.g. via higher technical progress.

## Box 2: New Quantitative Trade Models

With so-called New Quantitative Trade Models (NQTM) a new class of trade models has become popular recently which can be used to estimate effects of FTAs ex ante. Two of the more sophisticated Brexit studies (Ottaviano et al., 2014a; Aichele/Felbermayr, 2015) use this new method. It builds on the insight that usual CGE models and several other trade models have a common core under certain assumptions. On this basis, the complexity of CGE models has been ingeniously reduced so that only several relatively straightforward equations are required to capture this core mathematically (Arkolakis et al., 2012; Costinot/Rodríguez-Clare, 2014). The central equation is based on a special form of gravity equation (see Box 3), but is able to show how changes in trade barriers (and thus trade costs) impact welfare.[25]

The basic idea behind this equation can be summarised as follows: The more trade is created (and substitutes for expenditure on domestic goods), the more welfare increases in general. A key parameter is the so-called trade elasticity, i.e. the likelihood that a consumer buys imports instead of domestic goods when imports become relatively cheaper because tariff barriers were reduced. The higher this likelihood (and the elasticity), the more trade is created. However, there is also an effect working in the other direction: With higher trade elasticity, consumers implicitly value foreign goods less compared to domestic goods, so that both can be relatively easily substituted. Thus, the impact of increased trade on welfare tends to be somewhat lower (per unit of trade) compared to a situation where trade elasticity is lower and foreign goods are less similar to domestic goods and are therefore valued higher.

One advantage of NQTMs lies in the fact that several real world features can be included which are important as sources of gains from trade, for example, trade in intermediates, different form of market structures, multiple countries and sectors, and heterogeneous firms. Moreover, compared to CGE models which rely on similar basic assumptions, NQTMs are better founded in microeconomic theory and are considerably more transparent. It is easier (for experts) to understand how parameters influence results because fewer parameters are required and their origin or estimation can and should be documented thoroughly.

However, CGE models share many drawbacks. NQTMs are in essence still a rather theoretical exercise, particularly in the sense that the derivation of the core equation relies on certain potentially sensitive theoretical assumptions (similar to CGE models). For example, the choice of market structure can strongly influence results, so that researchers need to choose market structures found in the real world. Therefore, results should be interpreted with caution and taken as qualitative indications. Moreover, like CGE models NQTMs are also only static in nature as they do not include dynamic effects on economic growth (Chapter 4.3).

Nevertheless, NQTMs should be regarded as a step forward in estimating the impact of free trade agreements or other trade policy measures ex ante. They represent state-of-the-art economic approaches, and key publications using NQTMs are featured in renowned refereed economic journals or handbooks (Arkolakis et al., 2012; Costinot/Rodríguez-Clare, 2014; Ottaviano et al., 2014a; Felbermayr et al., 2015).

[25] In order to calculate this impact, only a limited number of macroeconomic parameters has to be determined that are relatively easily accessible from databases, or from other studies, or that can be structurally estimated by the authors.

**Table 4-1: The results of Ottaviano et al. in detail**

| | |
|---|---|
| **Optimistic Scenario** | |
| Increase in EU/UK Tradable Tariffs | 0 % |
| Increase in EU/UK Non-Tariff Barriers | –0.4 % |
| Future Falls in EU/UK Non-Tariff Barriers | –1.26 % |
| Fiscal Benefit | 0.53 % |
| **Total Welfare Change** | **–1.13 %** |
| **Pessimistic Scenario** | |
| Increase in EU/UK Tradable Tariffs (MFN EU Tariffs) | –0.14% |
| Increase in EU/UK Non-Tariff Barriers | –0.93% |
| Future Falls in EU/UK Non-Tariff Barriers | –2.55% |
| Fiscal Benefit | 0.53% |
| **Total Welfare Change** | **–3.09%** |

Source: Ottaviano et al., 2014a 8

The authors regard their estimates as a lower bound for losses, because many other sources of gains from economic integration are not considered (see Chapter 4.3 for additional estimates by Ottaviano et al., 2014a)

In an updated version of the study with broadly similar assumptions, Dhingra et al. (2016) come to comparable results. One minor change applies to the assumptions concerning fiscal benefits which are reduced compared to Ottaviano et al. (2014), particularly in the optimistic (Norwegian) case.

**Box 3: Gravity models**

A gravity model is an often used econometric approach for estimating the economic impact of trade agreements on trade flows between countries (Piermartini/Teh, 2005; Plummer et al., 2010). It is an ex post method that relies on existing data and basically answers the question what would have happened to trade flows without the trade agreement. Gravity models explain bilateral trade flows with a range of variables such as the income of the trading countries and the distance between them. The term “gravity” originates from Newton’s physical law of gravity. The gravity trade model likewise assumes that the bilateral trade volume (like the gravitational force) is higher when the (economic) size of the two countries is larger and when their (economic) distance is smaller (i.e. the countries are closer to each other and have lower trade costs). Additional explanatory variables can be included such as a common language or a common border. These additional variables are often used to improve the fit of the regression that econometrically relates the explanatory variables to the bilateral trade flow. The results of the econometric analysis indicate how far the estimated model can be used to explain past trade flows and how important free trade agreements are in this context.

The effect of trade agreements can be measured by including a (dummy) variable in the regression equation. This variable takes the value one if a country is a member of a trade agreement, and otherwise zero. Thus, if trade flow increases due to a trade agreement, this dummy variable would be assigned a strong explanatory power. The regression approach generally allows the disentanglement of the effects of FTAs from other reasons for higher trade flows. Due to this advantage, gravity models are a useful tool to study the impact of trade agreements or membership of institutions, such as the EU or the WTO. An additional advantage lies in the fact that their explanatory power of real-world trade data is usually high.

But gravity models also show some weaknesses. Although they have a firm theoretical foundation, they do not include the interaction between sectors and markets. Furthermore, gravity models explain only trade flows and not welfare or employment. Results of gravity models might be distorted if important explanatory variables are omitted or strongly influence each other or if the employed data is measured incorrectly. New estimations try to cope with important problems (see Chapter 4.3).

**Aichele/Felbermayr (2015)**[26]

A second study based on a New Quantitative Trade Model (NQTM) with a gravity model at its core (see Boxes 2 and 3) was conducted by Aichele and Felbermayr (2015) and was published by the Bertelsmann Foundation. It is based on the recently developed trade model of the ifo Institute (Aichele et al., 2014). The study is broadly comparable to Ottaviano et al. (2014a), e.g. it is also based on trade specialisation by comparative advantage and includes trade in intermediates.[27]

Three scenarios are distinguished:

- Soft exit: The UK has a status similar to Norway or Switzerland and a trade agreement with the EU. Trade is not hampered by tariffs but by some non-tariff barriers. New trading costs are generated, because decreased in trading costs due to EU accession are reversed. As a result, the UK's real GDP per capita would be around 0.6 percent lower in 2030 than if the country remained in the EU.
- Deep cut: No trade agreement is negotiated with the EU. There are tariffs and higher non-tariff barriers in trade between the UK and the EU. The tariffs are at a level as in trade relations between EU and the US. GDP per head in 2030 would be between 1.5 and 2.8 percent lower than without a withdrawal.

[26] A short version is also available: Schoof et al. (2015).
[27] The model does not include dynamic investment effects via capital accumulation, FDI, or any kind of growth enhancing effects, e.g. via higher technical progress.

- Isolation of the UK: In the least favourable scenario, the UK also loses all privileges from the free trade agreements the EU has with third countries. The UK can negotiate new agreements but this is a lengthy process and the UK's negotiating power is less than that of the EU. In this scenario, GDP per head in 2030 would be between 1.6 and 3.0 percent lower.

The negative effect would be even higher if future trade gains to EU members were considered which could result from the completion of ongoing trade negotiations with third countries. Taking these effects (about –1 to –5 percent) into consideration on top of the above effects, the UK would lose increases in income between about 1.5 and more than 7.5 percent in the long run.

The income losses must be slightly reduced, however, as the UK would save all (or in the case of a soft exit part of the) contributions to the EU budget which amounts to around 0.5 percent of GDP.

### 4.1.2 Studies based on ex ante macroeconomic models

Several studies use macroeconomic CGE models which do not incorporate trade relations in a differentiated way. They include only total UK exports and imports and related overall average trade barriers (modelled as trade costs). For this reason, the effects of changing trade barriers on trade costs with particular partners like the EU or the US can only be roughly estimated and have to be set with a certain degree of arbitrariness. Moreover, the effects of trade specialisation which are key factors in CGE trade models are hardly covered.

**PwC (2016)**

PwC (2016) has conducted a very recent and rather comprehensive study. The authors use a CGE model for the UK economy featuring many different channels of influence, in particular the effects of changes in migration policies and higher uncertainty in the short run after a Brexit. [28]

[28] The CGE model is based on imperfect competition (implying mark-ups and economies of scale). It explicitly includes (partly dynamic) effects of higher trade barriers, regulatory changes (and uncertainty) on investment (via the return on capital). A higher capital stock and lower regulations can increase productivity levels. Dynamic growth effects of higher technical progress, e.g. via FDI spillover effects, higher competition or selection effects are not included.

The authors distinguish between two scenarios.[29]

In an **FTA scenario**, the UK negotiates an FTA with the EU that enables the UK to remain relatively largely integrated:

- The FTA with the EU allows zero tariffs in bilateral trade. Non-tariff barriers rise moderately as regulations would diverge somewhat over time. NTBs increase by one quarter of the differential between the NTBs on UK exports to the rest of the world and the EU – implying a trade cost increase of 0.5 percent of UK bilateral exports and of 0.7 percent of UK imports from the EU.
- Concerning trade relations with third countries, the FTAs of the EU continue to apply and there is no change in trade relations with countries that do not have an FTA with the EU. Moreover, the UK manages to quickly achieve an FTA with the US which comes into force in 2021. Bilateral tariffs decrease by 75% immediately in 2021 and the remaining tariff level is gradually lowered to zero by 2030. This UK-US FTA implies cost reductions on UK bilateral exports by 0.4 percent and by 0.3 percent on UK imports from the US by 2030.
- Due to more freedom in immigration policies, the net inflow of low-skilled migrants from the EU ceases. However, the UK alleviates rules for the immigration of high-skilled migrants so that half of the decline in the labour supply is offset by high-skilled immigration, resulting in an overall decline in the UK labour supply of 0.7 percent by 2030 compared to the base scenario of staying in the EU. The reduction in labour supply reduces the output level.
- Uncertainty after a Brexit is also considered in the form of higher risk premiums and thus higher capital costs for UK companies – amounting to 0.5 percentage points for debt and 0.2 percentage points for equity. In this more positive scenario, the impact of uncertainty applies for five years and fades away over the second half of this period.

In a **WTO scenario**, the UK fails to achieve an FTA with the EU:

- Regarding trade relations with EU, WTO tariffs (of 2.5 percent on average) apply for UK exports to the EU, while the UK levies tariffs of 2.9 percent on average on imports from the EU. Due to larger regulatory divergence with the EU, non-tariff barriers rise by three quarters (instead of one quarter) of the differential between the NTBs on UK exports to the rest of the world and the EU – implying a larger cost increase of 1.4 percent of UK bilateral exports and of 1.8 percent of UK imports from the EU.

[29] A scenario with closer integration to the EU as in the case of Norway and Switzerland is considered unrealistic, as it would not accommodate the striving for more regulatory sovereignty.

- Concerning trade relations with third countries, the FTAs of the EU cease to apply and have to be renegotiated so that they come into force again in 2026 with the same conditions. Trade relations with countries that do not have an FTA with the EU do not change. The UK is also negotiating an FTA with the US which, however, will first come into force in 2026 (instead of 2021). Tariffs will likewise decrease by 75% immediately in 2026 and the remaining tariff level will be gradually lowered to zero by 2030. Due to this coming into force later, the UK-US FTA would imply somewhat lower cost reductions by 2030 – on UK bilateral exports by 0.3 percent and by between 0.2 and 0.3 percent on UK imports from the US.
- Due to more freedom in immigration policies, the net inflow of low-skilled migrants from the EU will also cease. However, unlike the FTA scenario, there is no increase in immigration of high-skilled employees so that the UK labour supply will be reduced by 1.4 percent by 2030 compared to the base scenario of staying in the EU.
- The impact of uncertainty is the same with regard to capital costs but lasts for nine (instead of five years) – it will also fade away in the second half of this period.

Several assumptions are identical across both scenarios:

- The savings from fiscal contributions to the EU budget[30] (the net contributions amounting to 0.5 percent of GDP) are used by the government in equal shares for debt reduction and capital investment.
- As the bulk of EU regulations no longer applies to the UK, the regulatory cost burden decreases. However, the positive effect is considered to be rather small (0.3 percent of GDP in 2030), due in part to adjustment costs and leakages (e.g. higher imports). Moreover, the freedom to set new rules is constrained by global rules particularly in the financial sector. The authors of the PwC study point out that the benefits of regulations are not considered, so that the positive effect of more regulatory freedom could be even smaller.

Overall, these effects amount to a decrease of 3 to 5.4 percent of real GDP per capita in both scenarios, respectively, in the shorter run by 2020 (compared to the baseline scenario of staying in the EU). The short run effect is driven to a considerable extent by the impact of uncertainty which will fade out over time, however (Table 4-2). By 2030, real GDP per capita is estimated to decline between 0.8 and 2.7 percent – with the largest share coming from trade and migration effects. Corresponding de-

[30] The UK continues to fund some particular fund: the European Agricultural Guarantee Fund and the European Agricultural Fund for Rural Development as well as social and regional development funds.

clines in GDP per household will amount to GPB 2,100 to 3,700 in the shorter run and GPB 800 to 1,800 in the longer run. By 2030, employment is estimated to decline by 350,000 to 600,000 (Table 4-3).

**Table 4-2: Results of the PwC study – GDP**
(Percentage change in real GDP from levels in counterfactual scenario):

| | FTA scenario | | | WTO scenario | | |
|---|---|---|---|---|---|---|
| | 2020 | 2025 | 2030 | 2020 | 2025 | 2030 |
| Uncertainty | –1.9 | –0.1 | –0.1 | –2.6 | –0.9 | –0.1 |
| Trade | –0.5 | –0.5 | –0.5 | –1.7 | –1.9 | –2.1 |
| Migration | –0.8 | –0.8 | –1.0 | –1.3 | –1.6 | –1.6 |
| Regulations | 0.0 | 0.3 | 0.3 | 0.0 | 0.3 | 0.3 |
| Fiscal | 0.1 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| Total impact on GDP | –3.1 | –1.1 | –1.2 | –5.5 | –4.1 | –3.5 |
| Change in population | 0.0 | –0.2 | –0.4 | –0.1 | –0.5 | –0.9 |
| Impact on GDP per Capita | –3.0 | –0.9 | –0.8 | –5.4 | –3.6 | –2.7 |

Source: PwC (2016)

**Table 4-3: Results of the PwC study – employment**
(Impact on total UK employment relative to counterfactual):

| | 2020 | 2025 | 2030 |
|---|---|---|---|
| FTA scenario | –550,000 | –450,000 | –350,000 |
| WTO scenario | –950,000 | –950,000 | –600,000 |

Source: PwC (2016)

**Oxford Economics (2016)**

Oxford Economics (2016) has also conducted a very recent and comprehensive study on the implications of a Brexit. However, only an executive summary is available free of charge, so that the coverage can only be limited here. The study explores nine scenarios regarding the trade relationship between the UK and the EU after a Brexit. It takes account of the impact of regulatory, migration and fiscal policy choices on economic conditions. The findings are based on the Oxford Economics' Global Economic Model which is a highly elaborated (but non-trade) CGE model.

A brief overview of selected scenarios highlights the following results:

- In the best-case scenario that closely resembles EU membership (customs union with the EU and high levels of immigration), real GDP is only 0.1 percent lower in 2030.
- In the worst case (no free trade deal with the EU, and 'populist' measures, such as controls on immigration and no alleviation of regulation), real GDP is 3.9 percent lower by 2030.
- Most scenarios impose a significant long-term cost on the UK economy. However, Oxford Economics describes even the worst case scenarios as "far from disastrous".
- The authors point out that the UK government can contain potential economic costs by adopting liberal economic policies, such as deregulations, tax reductions, and only limited restrictions on immigration.

**Pain/Young**

An older but often cited study was conducted by Pain and Young (2004). The authors conduct simulations with a CGE model – the National Institute model of the UK economy (NiDEM). Similar to the PwC study, this model is also designed only for analysis of the UK economy and does not model trade relations in detail like CGE trade models.[31]

The modelling analysis includes several elements which would be relevant in case of a Brexit:

- Concerning trade policy, the EU market access would be more costly due to tariffs and higher administrative burdens associated with border controls to control adherence to the rule of origin.
- The authors tailor the model to capture FDI influences on productivity and technological progress. It is estimated that a 1 percent change in the stock of FDI in manufacturing eventually changes the labour augmenting technical progress in manufacturing by 0.32 percent. In distribution and financial services the figure is 0.135 percent. FDI also enhances export performance.
- Some changes due to an exit from the CAP are also included in the model.
- The net contributions to the budget of the EU are saved and a part of this "windfall gain" is used to reduce employers' national insurance contributions,

[31] The model does not feature economies of scale and mark-ups, but includes certain dynamic effects. First, investment reacts to the gap between the return on capital and the capital costs so that lower trade barriers induce capital accumulation. Secondly, FDI influences technical progress.

because the authors expect some short-term employment costs associated with an exit from the EU.

In total, the authors calculate that GDP at constant prices would be 2¼ percent permanently lower as a consequence of a Brexit.

### 4.1.3 Ex ante studies not based on own models

**CEPR (2013a)**

CEPR (2013a) describes its approach as an accounting exercise and not a substitute for a full model-based assessment. In particular, the authors draw on studies on Transatlantic Trade and Investment Partnership (TTIP) to obtain NTB costs, as these provide an assessment of EU barriers to firms based both inside and outside the Internal Market (Berden et al., 2009) – these are used to estimate the effect of TTIP for the EU and the US by means of a modern CGE trade model (CEPR, 2013b).

On this basis, they differentiate between two scenarios for the UK after a Brexit:

- WTO-like option with MFN market access to the EU. This includes MFN levels for the common external tariff and NTB costs assumed similar to those estimated for the US when accessing the EU Internal Market.
- FTA similar to TTIP: No tariffs and NTB costs similar to those envisioned for the US under the proposed TTIP.

RoO costs are included in both scenarios (assuming 6 percent costs as a share of the value of goods sold).

The welfare costs for the UK are 1.77 percent in the case of WTO membership and 1.24 percent in the case of an FTA comparable to a future TTIP.

**Mansfield (2014)**[32]

Mansfield also draws on other models and estimates. In particular, he also draws on the TTIP study by CEPR (2013b) for the EU and US (which employ a modern CGE trade model) to roughly approximate the costs of a Brexit for the UK.

[32] The study of Mansfield was awarded the Brexit Prize 2014 by the Institute of Economic Affairs.

The author distinguishes three scenarios:

In the best case scenario, the UK can increase its GDP by an estimated 1.1 percent – based on the following assumptions:

- Negotiation of a generous exit agreement with the EU, securing EFTA access and access for significant service exports and accepts half or less of the EU's "Aquis communautaire" (entire body of the EU law).
- The FTAs with existing EU trading partners are maintained, some with minor amendments. The UK also negotiates a range of new agreements with external trading partners: Australia, Brazil, China, India and Russia.
- Inward FDI increases by 10 percent. The regulatory burden can be reduced from GBP 7.5 billion[33] to GBP 3.75 billion. The net contribution to the EU budget is reduced from GBP 10 billion to zero.

In the most probable scenario, the total impact on GDP is estimated at 0.1 percent (45) – based on the following assumptions:

- Negotiation of a satisfactory exit agreement with the EU. The UK secures EFTA access and access for significant service exports but has to accept two thirds of the EU's "Aquis communautaire".
- Existing EU trading partners maintain their FTA with the UK. The UK negotiates new agreements with trade partners such as Australia and Brazil. Negotiations go more slowly with China, Russia and the US.
- Inward FDI remains constant. The regulatory burden falls to GBP 5 billion. Contributions to the EU are phased out over a period of five years but the UK contributes to a small number of common programs.

In the worst case scenario, the UK GDP is estimated to decrease by 2.6 percent – based on the following assumptions:

- Withdrawal from the EU without an agreement. Access to the Internal Market is lost. The UK exporters have to pay the most favoured nation tariffs.
- No other FTAs are signed and some existing FTAs with the EU cannot be adapted to the new situation.
- Inward FDI decreases by 35 percent. The UK cuts burdensome regulation to GBP 3.75 billion, but this cannot offset the impact of being isolated from world markets. The net contribution to the EU budget is reduced to zero.

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[33] This estimate is taken from British Chamber of Commerce 'Burden Barometer', 2010.

- In a crisis scenario, interest rates rise by 1.5 percentage points implying a higher debt service burden.

The author concludes: “Although the most likely scenario shows a small positive gain, it should be emphasised that this should not be taken to mean that a UK exit would automatically be a good thing. The +0.1 percent gain is well within the margin of error for such estimations”.

**Gonand (2016)**

Gonand (2016) argues – as this study does – that standard trade models fall short of capturing important additional welfare effects of trade integration. He draws on important academic studies and focuses on specific additional static and dynamic firm level trade effects that raise aggregate productivity of an economy: a selection effect among exporters of an industry and a technology effect to the benefit of importing firms that is related to the technology content of import goods, in particular intermediates (see also Chapter 4.3).

The author draws on specific academic studies to quantify these additional trade effects and arrives at the following rough estimation of the long-term welfare effects of a Brexit: more than 2 percent based on traditional models, 3.2 percent due to the exporter selection effect and about 1.8 percent from the imported technology effect. Summing up, he arrives at a total (lower bound) effect on the level of GDP of more that 7 percent over 15 years. Broken down into an annual figure, this then boils down into a transitional decline of the annual GDP growth rate of about 0.5 percentage points.

**CEBR (2015)**

The CEBR (2015) is unique insofar as it does not deal with exit scenarios. Instead, it tries to quantify the future benefits to the UK, if the UK remains an EU member and if the Internal Market is deepened and new trade agreements between the EU and other countries can be concluded. The analysis is based on already existing studies, especially on a study conducted by the European Parliament’s Added Value Unit (European Added Value Unit, 2015) as well as on the judgement of the authors. The estimates comprise the following results that would be realised in the longer term:

**Table 4-4: Potential benefits to the UK from future progress in EU FTAs and Internal Market integration**
Permanent increase in level of GDP by 2030 in percent of UK GDP

| | |
|---|---|
| Completion of Digital Single Market | + 0.16 |
| Completion of Single Market for Consumers and Citizens | + 1.04 |
| Completion of Financial Markets | + 0.10 |
| Improvement in Transport and Tourism | + 0.10 |
| Further Reform of Energy Markets | + 0.16 |
| TTIP | + 0.26 |
| Other measures | + 0.88 |
| Overall benefit | + 2.80 |

Source: own compilation based on CEBR (2015)

Overall, the level of GDP would increase by 2.8 percent in 2030 in case the UK stays inside the EU (Table 4-2). This is equivalent to at least GBP 58.6 billion (in constant 2015 prices) and would be accompanied by 791,000 new jobs.

**Congdon (2014)**

Congdon (2014) – a study published by UKIP – focuses solely on the costs of EU membership for the UK. Various cost categories are included:

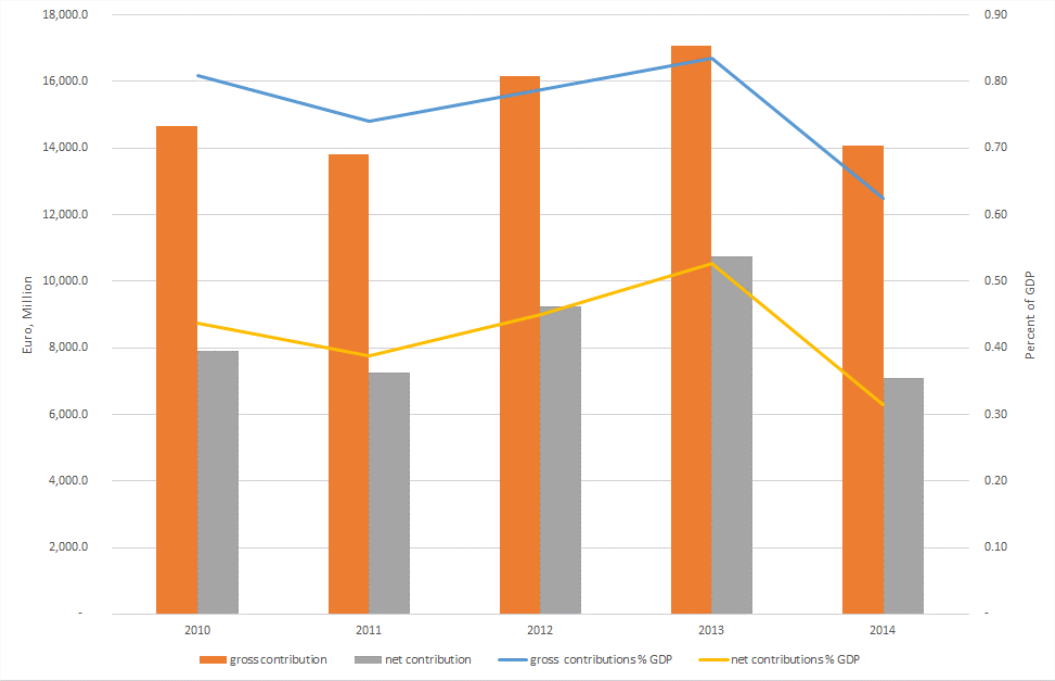
- Direct fiscal costs i.e. the gross financial contribution to the EU's budget is assumed to amount to 1.25 percent of GDP. A brief remark is justified concerning this estimate: The figures are not adjusted by the return flows from the EU budget to the UK. The figure of 1.25 percent seems too high, if the official data of the Commission is used (see Figure 4-1).
- The indirect costs are summarised under several headings including costs of regulation (6 percent of GDP) and costs of resource misallocation (3.25 percent of GDP).
    - The costs of regulation are more or less roughly estimated using quotations from third parties, for instance, Peter Mandelson and Günter Verheugen (Congdon, 2012, 16).
    - The costs of resource misallocation stems from CAP (0.5 percent of GDP), and other EU protectionism in manufacturing due to trade diversion are estimated by Minford et al. (2005) to be of the order of 3 percent of GDP.
    - Further indirect costs (3/8 percent of GDP) are costs of lost jobs, because according to this study immigrants from new member states took

jobs away from British-born subjects. The costs are calculated using figures from a study conducted by the chairman of the Migration Advisory Committee (Congdon, 2012, 34).

- Two further minor points are the costs of waste, fraud and corruption (3/8 percent of GDP) and the potential costs of contingent liabilities (1/4 percent), which include the costs of 'benefits tourism' plus the allowance for possible recapitalisation of EIB and other EU institutions (Congdon, 2012, 4).

Overall, the author calculates that the total costs of the UK's EU membership amount to roughly 11.5 percent of GDP or about GBP 185 billion a year (Congdon, 2014, 5).

**Figure 4-1: The UK and the EU: fiscal relations**
UK gross and net contribution to the EU budget




Gross contribution after the UK correction.
Sources: European Commission; Eurostat; own calculations

**Minford et al. (2005)[34]**

Minford et al. is an older study that argues along similar lines to Congdon (2014), as the authors also focus on the cost side of EU membership. They use CGE models to a limited extent but largely draw on existing studies to derive their results.

Their estimate includes the following items:

- The net contribution of the UK to the budget of the EU is 0.4 percent of GDP, a similar size as in the EU budget of 2014.
- Manufacturing trade costs (as the authors call them) arise due to the fact that the EU is a customs union which imposes tariffs and other trade barriers on imports from third countries. As a result, prices for manufactured goods tend to be higher in the EU (and trade is diverted away from third countries to EU member states). Minford et al. attempt to capture the negative welfare effect of higher prices in the EU by using results of other studies for their model-based estimate. They put manufacturing trade cost at 2.5 to 3 percent of GDP.[35]
- The costs of the CAP are similarly estimated to be 0.3 percent to 0.5 percent of GDP. These costs arise because the CAP raises the prices for food above world prices. The assessment is derived from model-based studies and is described as “a fairly typical estimate from the range available”.

Overall, Minford et al. estimate the ongoing costs of UK membership to be in a range of 3.2 to 3.7 percent of GDP. According to the authors, countervailing economic benefits of EU Membership are hard to identify. British consumers would allegedly not benefit from a potentially possible Single Market in services because they already enjoy competitive prices for services, due to a highly competitive market.

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[34] Le et al. (2011) (with Minford as a co-author) come to very similar conclusion as they use the same approach and model. Milne (2004) rates EU membership similarly negative as Minford. The publication is based on already existing studies and works with plausibility considerations. A positive impact of the Single Market is denied. Outside the EU, the UK economy would allegedly be more and not less attractive to inward investors than it is at present. The ’most likely’ estimate of annual net cost is put at 4 percent of GDP per year (XIV, 4).

[35] The authors use a small CGE world model to estimate trade effects that would result from eliminating trade protection of manufacturing goods in the EU. Welfare changes are calculated largely independent of the model in a traditional rudimentary way – based on the model estimates of trade changes. Protection changes – as a key and sensitive input to the model – are taken from the literature: Bradford (2003) derives estimates for trade protection in EU countries from a comparison of price data from eight advanced countries. Remarkably, this results in an average protection estimate for all manufactured goods except textiles and furniture of 58 percent (as a trade weighted tariff equivalent). The estimates for agricultural goods (39 percent) and textiles and furniture (16 percent) are considerably lower. This pattern of trade protection appears somewhat surprising as trade economists usually consider trade barriers to be higher in agriculture and textiles than in modern manufacturing products. Thus, the question arises whether the method of Bradford (2003) correctly achieves the aim to derive trade protection estimates from price disparities.

In addition, substantial potential future costs would arise according to the authors due to future harmonisation, pension sharing and Euro membership.[36] Elements of harmonisation are the unionisation rate, the average direct tax rate on workers, the tax and contribution rate paid by employers and the unemployment benefit rate. Using the Liverpool Macroeconomic Model of the UK (Minford et al., 1984), they estimate an output loss of between 6 percent (partial harmonisation) and 25 percent (total harmonisation).

## 4.2 Mainstream conclusions

The range of estimates for the potential economic consequences of a Brexit (derived mostly from forward looking ex ante estimates) is amazingly wide (see Annex):

- The most pessimistic study concludes that the UK is about 11.5 percent of GDP worse-off because of EU membership (Congdon, 2014, 25). Conversely, a withdrawal from the EU would mean an increase in British GDP by the same order of magnitude.
- The other extreme is covered by studies presented in the following section that estimate the possible benefits of the UK's EU membership to be in the range of 20 percent (GDP per capita) and more (see Chapter 4.3). In case of a Brexit, a significant part of this benefit would vanish (depending on post-exit integration arrangements) and thus turn into a cost for the UK.

A range in the order of more than 30 percentage points certainly appears to be quite astounding. This can be explained by significantly different methods, different assumptions, and the different aspects which are included. The Annex provides an overview of the key characteristics of each study. This overview shows that the approaches as well as the coverage of relevant aspects differ significantly.

Obviously, only studies that include positive **and** negative effects of a Brexit provide a sound basis for summarising conclusions. On the positive side, fiscal savings due to the (partial) elimination of EU contributions and lower economic distortions caused by potentially lower external trade barriers and the absence of the CAP after a Brexit may be relevant. On the negative side, apart from the basic losses due to reduced trade integration, future losses from foregone new EU trade agreements and foregone reductions of non-tariff barriers in the Internal Market also play a role. Studies that only estimate the positive effects of a Brexit (i.e. the negative cost-related effects

[36] Pension sharing in the EU and Euro membership of the UK seem somewhat exaggerated. So the estimated costs are not considered here.

of EU membership) can serve as a focused illustration of this particular aspect, depending on their accuracy.

Based on the more reliable and comprehensive ex ante studies and methods, a certain consensus appears to have emerged about the potentially realistic range of the economic cost of a Brexit. Several reviews of the existing studies come to similar mainstream conclusions that the economic costs seem to lie in the low single digit range:

- CEBR summarises: "The most independent-looking of these studies appear to converge on a permanent loss to the UK GDP of between 1 percent and 3 percent as a result of the UK exit from the EU" (CEBR, 2015, 28).
- A study by the CBI (2013, 79) concludes: "most studies cited find that the net benefit of EU membership to the UK is around 2 to 3 percent of GDP".
- A German expert on EU integration states that in most cases, certain losses are expected, but not unmanageable risks (Ohr, 2015, 107, 108).

It is striking that this kind of consensus has emerged despite the fact that no forward looking study covers all relevant aspects at the same time in sufficient detail. However, this drawback appears to be of limited quantitative relevance when the arguments presented in the next section are taken into account. In the following, additional positive influences of economic integration on income and growth are considered which are attempted to be captured by backward looking studies.

## 4.3 Remaining risks and uncertainties

The methods applied in the above depicted ex ante studies fail to cover all relevant channels by which economic integration raises the level of welfare. Thus, the question arises whether the moderate conclusion of the last section is overly optimistic and whether a Brexit could cause significantly higher economic damage to the UK. However, going beyond the evidence presented in Chapter 4.2 implies entering less solid ground in economic terms. While wide-ranging and substantial theoretical deliberations exist about various additional welfare effects of free trade, available empirical evidence is more scattered. It is also more general and less focussed on European integration or the case of a Brexit. The following section gathers available indications.

It first summarises the substantial but scattered evidence available on individual additional effects of trade or economic integration on welfare and growth: The pertinent forward looking model-based studies are unable to include important specific static

and dynamic trade effects, many of which have been shown by sound empirical research to substantially improve welfare and/or growth. The same is true for additional positive non-trade effects of economic integration. Currently, there is no universally accepted forward looking method of estimation available to integrate all of these specific effects in a comprehensive way.

Based on these insights, several backward looking studies will be described that attempt to quantify these additional welfare effects of EU integration or a Brexit in a more comprehensive but only implicit way. All of these attempts can be criticised to some extent, but the overall evidence suggests that a Brexit could cause a significantly worse economic impact in a more pessimistic scenario than the mainstream conclusions indicate.

### 4.3.1 Additional effects of integration not covered in most studies

**Absence of additional static trade effects**

The above-mentioned static theoretical ex ante models to estimate the impact of EU integration or a Brexit cover only a limited range of possible economic effects. They mostly rely on the theoretical framework of perfectly competitive markets (e.g. Booth et al., 2015; Ottaviano, 2014) where prices merely cover costs and no durable profits exist. However, in reality markets are often not perfectly competitive and in particular firms that differentiate their goods can charge prices above their own costs (mark-up pricing). Higher international competition can lead to lower mark-ups to the benefit of consumers. Thus, the reliance on perfect competition excludes important benefits of economic integration which are particularly relevant for trade between industrialised countries. In fact, higher international competition indeed decreases mark-ups and raises efficiency in firms, as has been empirically proven (Tybout, 2001; Feenstra, 2010a; 2014; Feenstra/Weinstein, 2010; for evidence on EU countries see Chen et al., 2009). This in turn lowers prices and raises real incomes of consumers.

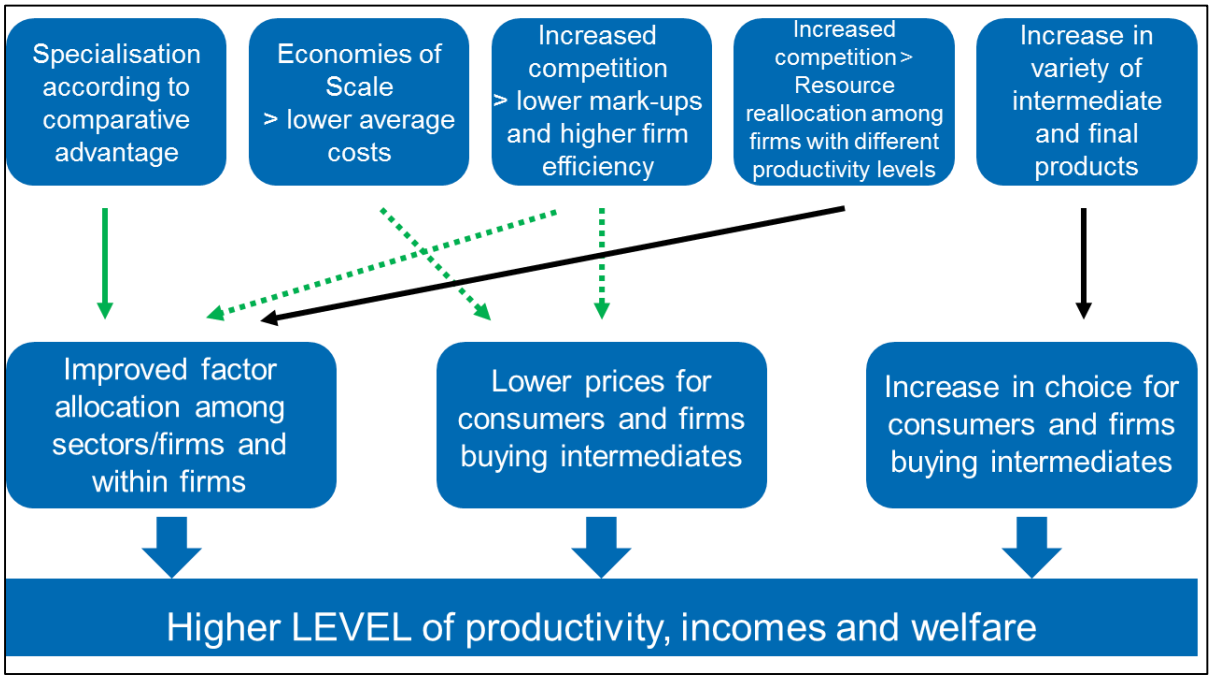
Additional positive static effects are also relevant (Figure 4-2):

- Lower prices also result from economies of scale when firms can serve larger markets via exporting and can spread fixed costs over a larger production volume (Krugman, 1979).
- The price dampening effect of open markets has been clearly demonstrated (e.g. Erixon, 2008)
- International trade increases product variety which also tends to raise consumer welfare. This important feature of international trade rests on thorough

theoretical insights (Krugman, 1980; Feenstra, 2010a; 2010b). Empirically, it has been shown for the US that the significant increase in imported product varieties over the last decades has raised consumer welfare by around 3 per-cent of GDP (Broda/Weinstein, 2006; see also Feenstra/Kee, 2008). Similar evidence also exists particularly for smaller European countries (Mohler/Seitz, 2012).

- Firms are heterogeneous in reality but not in the economic models employed in the mainstream studies. With heterogeneous firms, import competition as well as export opportunities tend to lead to a reallocation of resources (within and among sectors). This reallocation takes place from less productive firms (which shrink or close down) towards more productive firms (that can expand). This effect raises the productive efficiency of an economy, as has been shown by various studies (Tybout, 2001; Feenstra, 2010a; 2010b; Melitz/Redding, 2012; Edmond et al., 2012; for the EU see Corcos et al., 2012).

**Figure 4-2: Selected static effects of trade on welfare levels**




Green arrow: effect covered in most ex ante CGE and NQTM trade models (not in non-trade CGE models for UK).
Dotted green arrow: effect covered in at least one, but only few ex ante models; these models only cover selected effects.
Black arrow: effect not covered in ex ante models.
Source: own design

**Absence of additional dynamic trade effects**

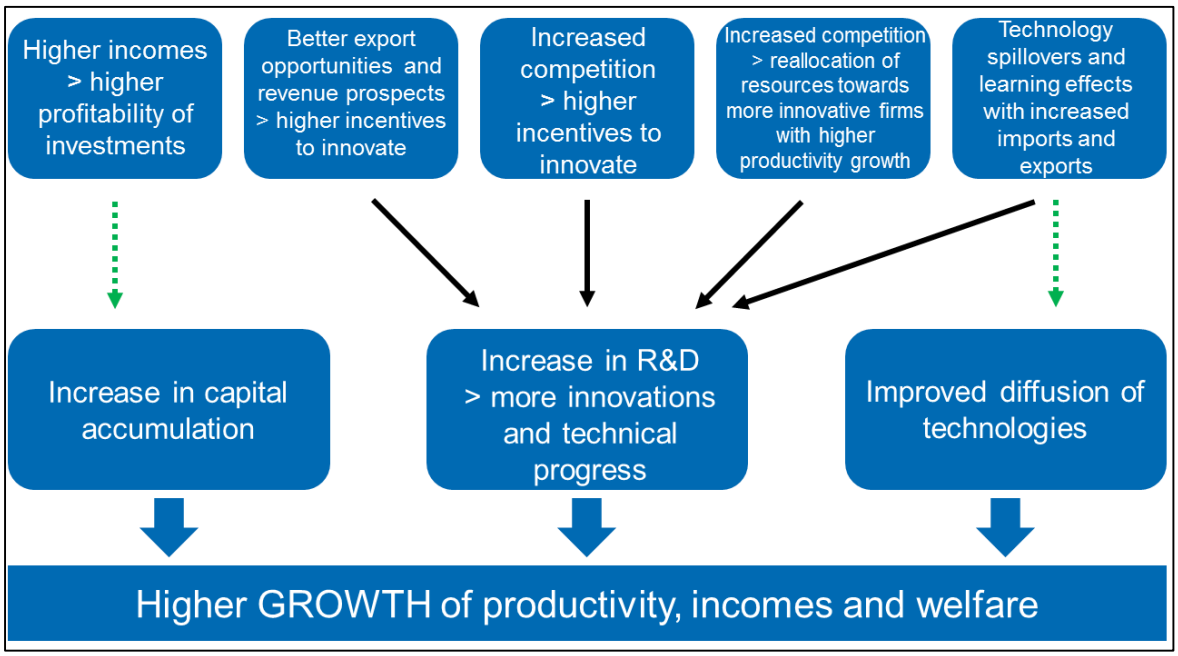
Potentially even more important is that the above-mentioned trade models lack dynamic effects which induce higher economic growth on a long-term or even permanent basis. The mainstream studies estimate a one-off change of the level of income (or of living standards) in the medium term by comparing two alternative scenarios for the future. In this respect they are called (comparative) static. However, sound theoretical deliberations support the notion that additional (dynamic) effects on economic growth are generated by freer trade and by more economic integration.

Various channels come to play in this respect (Figure 4-3):

- Higher incomes generated by the static effects raise capital returns and thus provide incentives for more investment which increases the capital stock and generates higher economic growth. The capital accumulation induced by lower trade barriers (Baldwin/Seghezza, 2008) might not only be transitory (until the new (static) production level in the medium term is achieved). It can also be dynamic when a self-reinforcing effect is set in motion that induces a more permanent dynamic effect on economic growth (Sauernheimer, 2008). Wacziarg (2001) as well as Wacziarg and Welch (2008) underline the relevance of capital accumulation as an important channel for the overall positive effect of trade on growth. Based on an analysis of a large country sample for the period 1950 to 1998, Wacziarg and Welch (2008) found that countries which have liberalised their trade regimes experienced about 1.5 percentage points higher annual economic growth rates and 1.5 to 2.0 percentage points higher annual investment rates than before liberalisation.
- The incentive and ability to invest in research and development (R&D) is raised as firms see more opportunities to increase export revenues and profitability when tariffs in foreign markets are lowered and better access to these markets becomes available (Bustos, 2011; Aw et al., 2011). Upgraded technologies and more innovations tend to raise economic growth and thus to have dynamic effects.
- Higher competition due to trade liberalisation also raises the incentives of firms to invest in R&D and to become more efficient and productive. The link between competition and more R&D efforts can be empirically supported (Bloom et al., 2011; Impullitti/Licandro, 2013). Moreover, several studies have shown that more international competition (particularly from lower wage countries) and higher productivity growth go hand in hand (for the US see Bernard et al., 2006; Auer/Fischer, 2008; for several EU countries see Chen et al., 2009).

- A positive dynamic effect on productivity growth and thus on economic growth can also result from higher competition via so-called selection effects that imply a reallocation of resources among firms in a sector (Bernard et al., 2006; Bloom et al., 2011; Impullitti/Licandro, 2013; Sampson, 2013). The least efficient firms tend to exit the market due to higher competitive pressures and more efficient firms with higher capacities for innovation and productivity growth tend to grow and absorb more resources. Moreover, the most productive and innovative firms tend to choose to become exporters (self-selection) and they expand with the new exporting opportunities (e.g. Aw et al., 2011). Therefore, a dynamic growth-enhancing reallocation of resources is set in motion towards firms with higher productivity growth and more innovative power.
- The effects of competition, higher innovation incentives and selection effects work in parallel and should thus be seen in combination. In fact, a few studies have attempted to quantify these combined effects: For example, Impullitti and Licandro (2013) estimate in a model simulation fitted to US data that these combined growth enhancing dynamic effects contribute around 60 percent to total welfare gains, if trade costs are reduced from 13 percent of import value to zero. Bloom et al. (2011) calculate for a panel of up to half a million firms across twelve European countries that between 2000 to 2007 increased competition from China alone accounts for around 15 percent of total European technology upgrading. These results should be taken with caution and only as a broad indication, as they rely on the specifications of the respective models.
- Dynamic effects on economic growth can theoretically also be caused by technology spillovers and learning effects that are induced by trade (Grossman/Helpman, 1991). Imported goods contain technological know-how that can be decoded by the domestic firms, as has been shown empirically particularly for imported intermediate goods (Keller, 1999; 2002; Altomonte et al., 2013; for a brief overview see Gonand, 2016). Similarly, exporters can learn from technologies in the world market and can also gain experience and become more productive after entry to export markets (Albornoz et al., 2012; Loecker, 2013). Overall, technological transmission was found to be a relevant channel and to contribute about 20 percent to the positive effect of trade liberalisation on economic growth which was identified by Wacziarg (2001) in a study for 57 countries spanning the period from 1950 to 1989.

**Figure 4-3: Selected dynamic trade effects on economic growth**




Dotted green arrow: effect covered in at least one, but only few ex ante models; these models only cover selected effects.
Black arrow: effect not covered in ex ante models.
Source: own design

**Absence of additional non-trade effects of economic integration**

The above-mentioned deliberations apply solely to effects of trade on welfare. However, the Single Market relies on the four freedoms. In order to provide a comprehensive picture of possible economic effects of a Brexit, the welfare effects of the free movement of capital and of labour also need to be considered. Figure 4-4 provides an overview of selected channels in this respect and focuses on the relevance of inward FDI. The following section provides some illustrative highlights on these effects.

Generally, mobility of production factors allows for a better allocation of resource internationally that enhances welfare. This is true for capital (Jäger-Ambrożewicz/ Matthes, 2012) and – despite the political sensitivity of the migration issue – basically also pertains to labour mobility (Giovanni et al., 2012; Aichele/Felbermayr, 2015; Wadsworth, 2015). Regarding capital, for example, investors can better diversify their portfolio to optimise the return-risk relationship.

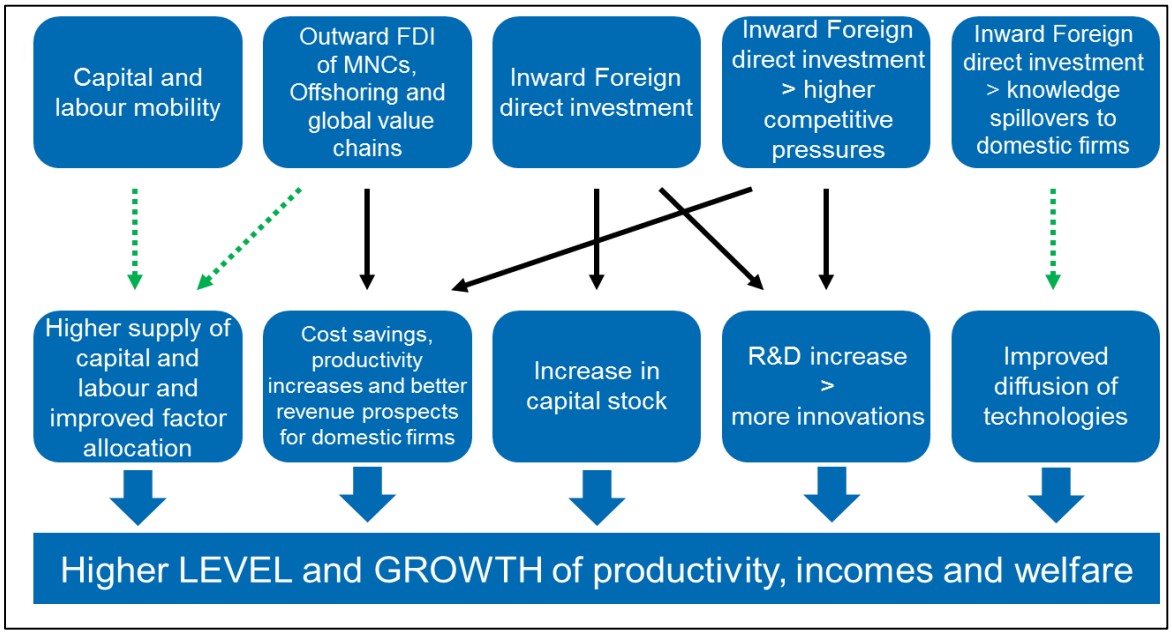
On the enterprise side, if domestic manufacturing firms and service providers are free to choose their locations internationally they can optimise global value chains and production networks by means of offshoring as well as sales and production abroad (Markusen, 2002). In particular, British providers of financial and business services take advantage of this opportunity. Empirically, the inclusion of the activities of multi-

national companies (MNCs) is highly relevant in terms of economic welfare. Including production of foreign subsidiaries of MNCs in addition to trade effects, up to double welfare effects of international transactions can result (Ramondo/Rodriguez-Clare, 2013). In addition, in particular offshoring has been shown to increase productivity, competitiveness and also welfare in general (OECD, 2007; Grossman/Rossi-Hansberg, 2008; Matthes, 2008; Melitz/Redding, 2014).

Inward FDI is particularly important for the UK as the largest European recipient country. Several positive economic effects on welfare and growth can be distinguished in this respect: Inward FDI can

- increase the domestic capital stock, if it does not substitute for domestic investment, which is only likely if capital utilisation is high (Booth et al., 2015).
- raise competitive pressures so that the incentives of domestic firms increase to become more productive and innovative.
- lead to spillovers of technology and knowledge from foreign to domestic firms. As a result, diffusion of technical progress is enhanced and best practices in management are spread (Mac Duffie/Helper, 1997; Baldwin et al., 2005).
- Overall, Pain and Young (2004) provide evidence that an increase in the level of the inward FDI stock raises the level of technical progress.

**Figure 4-4: Selected effects on non-trade integration**




Dotted green arrow: effect covered in at least one, but only few ex ante models; these models only cover selected effects.
Black arrow: effect not covered in ex ante models.
Source: own design

### 4.3.2 Attempts to quantify additional trade effects (on income)

**Ex post analyses with higher effects than ex ante models**

As ex ante studies such as CGE or NQTM models fail to incorporate most of the above-mentioned additional static and dynamic effects of lower trade barriers on welfare and growth, the question arises whether ex post studies of trade agreements come to different conclusions than ex ante models. Ex post studies like gravity models (see Box 3) usually focus only on trade outcomes of trade agreements, so that comparison has to be made to the results of ex ante models with regard to trade (and not welfare) effects.

In fact, ex post studies tend to find significantly larger trade effects of trade agreements than ex ante models, such as CGE models (Baier et al., 2008; Pelkmans et al., 2014). Moreover, CGE models are widely criticised that they tend to considerably underestimate the effects of trade agreements on trade (Rosa/Gilbert, 2005). As depicted above, CGE models cover short-term static effects and largely neglect longer-term dynamic effects (Sally, 2007). This also affects results regarding trade outcomes. Furthermore, CGE models underestimate the extent of trade protection and do not incorporate RoO and are not able to cover a range of non-tariff barriers. Analyses of the impact of NAFTA (North American Free Trade Agreement) show, for instance, that the underestimation bias can be substantial (Kehoe, 2003). A static CGE model predicted an increase of Mexico's exports (imports) relative to GDP amounting to 51 (34) percent during the period from 1988 to 1999 (Brown et al., 1992). Ex post analysis shows though that the relative increase in exports (imports) during that period was substantially larger than 140 (50) percent (Kehoe, 2003).

**New gravity models with higher trade effects of FTAs than traditional ones**

Recent developments in economics tend to increase the divergence between ex ante and ex post trade effects of trade agreements. A new strand of literature argues that even traditional gravity models – the workhorse for ex post analysis of trade agreements – tend to underestimate trade outcomes (Baier/Bergstrand, 2007; Egger et al., 2011). In fact, early traditional gravity models often failed to identify significant effects of trade agreements (Baier et al., 2008). For instance, Frankel (1997) applied the gravity approach and found positive significant effects from Mercosur, insignificant effects from the Andean Pact, and even significant negative effects from membership in the EC. Ghosh and Yamarik (2004) address the fragility of estimated FTA treatment effects and show that classic gravity equation estimations are rather fragile and do not deliver reliable ex post estimates of FTAs.

One important reason for these shortcomings lies in the fact that unobservable determinants of FTAs typically have a negative effect on bilateral trade volumes. When this is ignored, traditional gravity models deliver downward biased results (Egger et al., 2011). Another important reason is a so-called endogeneity problem: Countries that trade intensively with each other are more likely to have a bilateral FTA. Thus, the causation can go in both directions: on the one hand, much bilateral trade leads to an FTA and, on the other hand, an FTA increases bilateral trade. Traditional gravity models do not account for this problem (Baier/Bergstrand, 2007). Researchers who correct this shortcoming find much higher effects of FTAs on trade. For example, Baier and Bergstrand (2007) and Baier et al. (2008) conclude that FTAs approximately double two members' bilateral trade after 10 to 15 years. The FTA effect estimated in other studies is even higher – Baier and Bergstrand (2009) point out that international trade can increase by about 300 percent due to FTAs in the long term.

These modern methods have also been applied to the EU context – in the long run and also with a more recent focus:

- Baier et al., (2008) estimate for the time period 1960-2000 that membership of the EU and its institutional predecessors has raised trade between members over a 15-year period by 4.8 to 5.6 percent per year on average. This is equivalent to a cumulated increase of 100 to 125 percent over this period.
- Bergstrand et al. (2011) estimate the effect of six recent EU FTAs. They find strong evidence of increasing EU exports for instance to Chile, Tunisia, and Morocco as a result of the FTA. Even though only a limited time has lapsed, the latter two FTAs seem to have increased EU exports by 80 percent. The exports to Chile appear to have already doubled as a result of the FTA. All in all, the authors find sound evidence of a strong impact of FTAs on trade in cases where initial tariffs were high and where these tariffs were removed quickly and substantially across all types of goods and services.

Springford et al. (2014) use a traditional gravity model, but focus explicitly on the UK to estimate the effect of EU membership on bilateral trade with the EU. The trade effect is estimated from a panel from 181 countries and bilateral trade data with the UK between 1980 and 2010. The findings indicate that the UK's trade with the other EU members is 55 percent higher than one would expect, given the size of these countries' economies, real exchange rates and other variables typically controlled for in gravity models.[37] The large volume of actual trade could theoretically result be-

[37] The other effects are intended to be taken into account by means of so-called fixed effects. Fixed effects are country-specific variables that capture country specific influence on bilateral trade but do not enter directly in the model.

cause trade is diverted from third countries facing higher trade barriers to EU countries, even though third country goods are cheaper. However, no evidence for trade diversion is found. Even though Springford et al. (2014) employ a traditional and not very complex gravity model, the results do appear sizeable compared to more modern gravity models.

**Attempts to quantify additional trade effects on income**

Bearing these results in mind, the challenge arises how the higher trade effects of ex post studies can be translated into income or welfare effects. These translated “ex post” income effects could then be compared to the income effects estimated by ex ante studies.

One path that has been trod to solve this problem relies on other studies which focus on identifying this link between trade and growth. This approach has been deemed to have been pulled “out of nowhere” and its credibility has been fundamentally challenged (Open Europe, 2015c). The following section will point out that while there are significant uncertainties regarding this approach, it should not be principally denounced. Due to the lack of alternative methods, it appears useful to step forward into this unchartered territory, but to remain cautious in interpreting the results.

One key problem lies in the fact that the relationship between trade and growth is complex. Various studies have attempted to identify it reliably.[38] A particular problem lies in the fact that causality can go in both directions: On the one hand, trade can induce more growth via the channels depicted above. On the other hand, economic growth can also lead to more intensive trade. Thus, it is essential to isolate the direct causal effect of trade on economic growth. Economists use an indirect (so-called instrumentation) method for this aim. The reliability of the results of this econometric exercise depends decisively on the quality of the indicators chosen that are used as ‘instruments‘. Two newer studies venture on this path with different instrumental approaches, but come to similar conclusions (Feyrer, 2009; Felbermayr/Gröschl, 2014). Feyrer (2009) concludes that the trade-income elasticity should lie between one half and three quarters – i.e. when trade increases by 1 percent, economic growth rises by between 0.5 and 0.75 percent.

Based on these insights, Ottaviano et al. (2014a; 2014b), Aichele/Felbermayr (2015), and Crafts (2015) estimate income effects of a possible Brexit. They base their tenta-

[38] For an overview of earlier studies see Matthes (2005).

tive results on trade effects of former trade agreements that have been derived from state-of-the-art gravity models as depicted in the former section:

- Ottaviano relies on a robust estimation result of Baier et al. (2008) implying that the UK's trade with the EU is likely to decline by around 25 percent in the longer term, if the UK leaves the EU and enters EFTA. This scenario should be broadly comparable to the Norwegian or Swiss option where the UK still would remain relatively closely integrated with the EU. As the UK's trade with the EU accounts for slightly more than 50 percent of total UK trade, the bilateral trade decrease of 25 percent between the UK and the EU translates into a decrease of 12.6 percent in UK total trade. This figure can be used to calculate the income effects. Taking Feyrer's estimates of a trade-income elasticity of between one half and three quarters, Ottaviano arrives at an income decline for the UK between 6.3 and 9.5 percent. This is equivalent to a decline in income per household between GBP 4,200 and GBP 6,400 (Dhingra et al., 2016). Bearing in mind that this result pertains to the EFTA option, the income declines could be even larger if the UK went for more sovereignty and less economic integration, e.g. by choosing the WTO option.
- Aichele and Felbermayr (2015) also use a modern gravity model and derive their own results of overall trade declines for the UK after a Brexit. Depending on the scenario, total UK trade would decline between 3 percent in an optimistic scenario and 13 percent in a pessimistic scenario that broadly compares to the WTO option. Note that this prediction is more optimistic than that of Ottaviano et al. (2014a) who arrive at a similar decline of total UK trade of 12.6 percent, but in this case for the EFTA option. Aichele and Felbermayr (2015) use a somewhat higher trade-income elasticity derived by Felbermayr and Gröschl (2014) and calculate income declines for the UK between more than 3 percent and about 14 percent. Using the somewhat lower trade-income elasticity of 0.66 from Feyrer (2009), they arrive at slightly lower income losses for the UK of between 2 percent in the optimistic and nearly 9 percent in the more pessimistic case.
- Crafts (2015) performs a similar calculation, but for European integration in general for the EU in 2000. He departs from the above-mentioned estimation of the complete trade EU-integration effect of Baier et al. (2008) in the range of 100 to 125 percent of intra EU trade and uses a trade-income-elasticity of Frankel/Romer (1999) of 0.5. This is applied to rise in intra-EU trade exposure from around 16 percent of GDP in the counterfactual to the actual intra-EU trade exposure of nearly 35 percent. As a result, the trade-induced increase of GDP is estimated to be in the order of 9 percent.

An important shortcoming of these approaches lies in the absence of a trade-income elasticity that exactly suits the UK. The trade-income elasticities employed are derived from large country samples and represent an international average. Thus, they might not be suitable for the UK. However, such large samples are indispensable to calculate robust trade-income elasticities, so that alternative ways to calculate the impact of lower trade on the UK income go missing.

Bearing in mind the above-mentioned caveats, the various additional channels depicted for the effects of trade on welfare as well as the presented estimates of the "ex post" welfare impact corroborate the notion that the economic consequences of a Brexit could be significantly larger than the mainstream results of Chapter 4.2 suggest. As a cautious interim conclusion, it cannot be precluded that income losses in the order of 10 percent could occur in a more pessimistic scenario in the longer run.

### 4.3.3 Attempts to quantify additional effects of economic integration

Additional tentative approaches have been used to attempt a quantification of the positive effects of trade and economic integration. Considering all the above-mentioned insights, it appears useful to try to measure the benefits of EU integration in a more comprehensive way as the few following studies attempt to do, however only in an implicit way. [39] In case of a Brexit, not all but a significant share of these benefits would vanish depending on the integration scenario after secession.

#### Regression analyses

As theoretically founded ex ante models are unable to capture the variety of economic integration effects depicted above, several studies use regression analyses of ex post data that attempt to identify explanatory variables (including EU membership) for the level or growth of income or GDP. Regressions use a statistical method that identifies how closely a target variable (here GDP) is aligned with the explanatory variables. EU membership is not a typical explanatory variable of economic growth compared to education, investment or trade openness, so that the latter (and possibly additional) variables need to be included as control variables. Ideally, all relevant variables should be taken into account.

[39] For an overview of a more focused literature see Badinger/Breuss (2011) who survey ex ante models that estimate the effects of the Single Market and the euro. The results concerning the Single Market are in a similar range than the mainstream results of ex ante model-based estimates presented in section 4.1.

Like gravity models, such regression analyses are less well-founded theoretically as the exact channels of influence are not captured individually. But regressions have the potential to implicitly capture EU effects in a comprehensive manner irrespective of their origin. However, as the level and growth of GDP is influenced by a large variety of factors, different approaches can be used to set up a growth regression analysis (Durlauf, 2005) that intends to identify the effect of EU membership. Moreover, the danger arises that relevant factors are omitted and that results are not completely robust to different set-ups for regression analyses.

The main existing studies are very briefly summarised in the following:

- Henrekson et al. (1997) estimate regressions for many variables and combinations thereof in order to reduce the risk of omitted variables. The effect of EU membership is captured by a (so-called dummy) variable that obtains the value 1 for an EU member country and zero for a non-member. While their results are not completely robust with respect to changes in the set of control variables, the authors find that EU membership not only affects the level of GDP but also the rate of economic growth. More specifically, membership in the EC (and similarly in EFTA) is found to increase growth rates considerably by around 0.6 to 0.8 percentage points per year. This amounts to a substantial effect over time. For example, a growth rate which is 0.6 percentage points higher with EU membership would lead to a level of real GDP which is 13 percent higher after 20 years and about 27 percent higher after 40 years compared to a base case without EU membership.
- Badinger (2005) choses a slightly different approach and measures EU-15 integration not as a yes-no dichotomy but with an integration index which reflects different depths of European-wide integration. The result of the regression analysis suggests that EU membership does not permanently influence the speed of economic growth but only the level of GDP. Based on the period from 1950 to 2000, the effect of EU on the level of GDP is estimated to be very sizeable with on average one fifth (of the GDP level in the year 2000) and 25.5 percent for the case of the UK. The results are not completely robust, when control variables are included for common time effects. These could, for example, capture possible situations when GDP is reduced in several countries due to a common recession. However, such time fixed effects are likely to also capture part of the integration influence as over time several countries joined the EU in the same year. This explanation renders the lack of robustness somewhat less relevant.
- Crespo Cuaresma et al. (2008) tried to measure the influence of EU membership on economic growth by focussing on the duration of EU membership. The hypothesis behind this approach is that the EU has become larger over time

and that in a larger EU market competition is more intense which increases the incentives for R&D investment. As innovation is a key driver of economic growth, with each enlargement new growth impulses could have arisen in this perspective. Indeed, the authors conclude that the length of EU membership is found to have a significant positive effect on economic growth, (which is relatively higher for poorer countries). The longer a country has been a member of the EU, the more it profits from membership. The growth effect is not quantified in a comparable way to the former studies due to the focus on the duration of EU membership). Remarkably, the growth effect is found to be permanent and not only temporary as in Badinger (2005).

Overall, the regression approaches to explain effects of EU membership on GDP differ in certain important aspects of their results. In particular, the question whether there is a permanent or only a temporary growth effect does not receive a definite answer. However, compared to earlier studies – which did not find clear effects of regional integration on economic growth (Melo et al., 1992; Landau et al., 1995) – the more modern studies can identify sizeable effects on the level or the growth of GDP. Further support for the basic reliability of the results can be drawn from the fact that the newer studies use better econometric methods and have also been published in renowned refereed journals and publications. It is true that the results are in part not completely robust and some uncertainties remain because growth regressions are notoriously difficult to make watertight. However, the large effects identified do again caution that a Brexit could possibly have significantly larger negative economic effects than just in the low single digit range.

**Synthetic Counterfactuals Method**

Campos et al. (2014, 2015) also estimate the overall benefits of EU membership for the UK and other member countries. Remarkably, the authors apply a new method, the so-called Synthetic Counterfactuals Method (SCM). The authors ask: What would the GDP per capita level and the level of labour productivity have been if the respective country had not become an EU member? A valid identification of such a counterfactual situation is impossible as it simply does not exist. Even though, it would be essential to exactly quantify the true benefits of EU membership.

Campos et al. (2014, 2015) follow a recently developed approach (Abadie/ Gardeazabal, 2003) and construct a synthetic control group as a counterfactual. The underlying idea is derived from clinical trials where one group of patients is treated with a new drug and another (control) group is not. The problem in macro-economics lies in the fact that unlike in medical science, controlled experiments are basically impossible. Thus, an artificial control group is constructed by selecting countries simi-

lar to the EU member in question with regard to economic developments over a longer time *before* the country joined the EU (pre-treatment period). A weighted combination of such "similar" countries forms the synthetic control group. The country weights are chosen to match as closely as possible the economic development of the respective EU member with respect to a set of variables that influence GDP. As in medical science, after treatment the effect of the medical drug (in this case EU accession) can be deduced from the difference between the outcome for the EU member and that for the control group. Like the regression approaches above, this method has the potential to implicitly reflect the comprehensive (economic, financial and political) benefits of EU membership.

Campos et al. (2015) compare the developments of real GDP per capita and productivity between the UK which joined the EU in 1973 and the respective synthetic control group which comprises mainly of New Zealand and to a small degree Argentina (also Japan in the case of productivity comparisons). In the long run up to 2008, real GDP per capita in the UK proves to be nearly 24 percent higher than in the synthetic control group. The estimated difference ten years after the EU accession of the UK amounts to nearly 9 percent for real GDP and also for productivity levels.

As these results point to substantial benefits of EU membership, the question arises how reliable and robust are these results. On the positive side, the study by Abadie and Gardeazabal (2003) who introduced the SCM approach (by estimating the effects of ETA terrorism in the Basque country in Spain) was published in a very high ranking refereed economic journal and has been very widely cited.[40] Moreover, the relevance of non-trade effects is highlighted as Campos et al. can establish a correlation between the net benefits of EU membership and financial integration. In addition, the SCM of Campos et al. (2015) delivers plausible positive results of EU membership for nearly all countries (with the exception of Greece), when taking account of anticipation effects for eastern European countries.

However, on the more sceptical side, the evidence on the robustness of the results is mixed. Obviously, the choice of the control group for the UK is sensitive. Assigning a large weight to one single country (New Zealand) in the control group makes the choice of the counterfactual very susceptible to particular country-specific developments after 1973 which might not have happened to the UK if it had not joined the EU. Campos et al. (2015) conduct robustness checks which in fact deliver lower results for the net benefit of the UK from EU membership. Focussing on the more robust findings on productivity increases over a ten year horizon, the comparable re-

[40] https://ideas.repec.org/a/aea/aecrev/v93y2003i1p113-132.html [2016-3-24].

sults lie in the range of 6.5 to 10 percent. This is still a substantial result, particularly when taking into consideration that benefits might have further increased over a longer time horizon.

Overall, the study by Campos et al. (2015) is a remarkable effort in moving forward in quantifying the economic gains from EU membership. While the results for the UK still display certain fragilities, the authors provide an additional indication that the economic loss of a Brexit to the UK could be significantly larger than in the low single digit range.

## 5. Conclusion

The economic transactions between the UK and the EU are intense and the Internal Market is of prime importance for the British economy. Therefore, much could be at stake for the UK economy in case of a Brexit, because new trade barriers could be erected depending on the institutional arrangement after a Brexit. While it might appear less likely that tariff rates would increase considerably in merchandise trade, the customs procedures, rules of origin, and limitations of mutual recognition for goods could render trade with the EU more expensive. Moreover, the UK could partially lose access to the Internal Market which would particularly affect the freedom to provide services and the right for establishment in the EU. These considerations are highly relevant because the EU is still the UK's largest trade partner and also because the UK has a particular strength as an exporter of financial and business services. Also, the implications of a Brexit for FDI inflows and for the City of London have to be considered.

Taking a deeper look at bilateral trade relations, several features are striking and of key importance in respect to the Brexit debate:

- The EU is still the dominant export destination for British goods and services. It is the destination for around 45 percent of all British exports of goods and around 38 percent of total exported UK services.
- There has been a relative decline in the share of the EU in total UK exports over the last decade. However, this does not imply that a Brexit would be harmless to the UK. The decline is much less pronounced for British imports from the EU. Looking at total merchandise trade (exports and imports), the decline of the EU's share in total UK merchandise trade is smaller than the decline of the US share.

- Looking solely at the shares of exports of the UK to the EU underestimates the importance of membership in the EU. Around 60 percent of the UK's external trade is with countries either in the EU or with an EU trade agreement (TheCityUK, 2014). This share will rise to around 85 percent if current EU trade negotiations are successful. In the case of a Brexit, the trade relations to third countries could be negatively affected as existing trade agreements would no longer be applicable until they are renegotiated.
- The UK has a deficit with the EU in merchandise trade but a considerable surplus in service trade. About half of all service exports to the EU is accounted for by financial and other business services. The reliance on service exports renders the UK vulnerable to a loss of access to the Internal Market of the EU.
- Leaving the EU would also imply that the UK would no longer be able to benefit from further economic integration and progress in the Single Market.

Regarding FDI and also capital flows in general, a Brexit could also have significant implications – as the following suggest:

- The UK is the largest recipient of FDI in Europe, it hosts half of all European headquarters of non-EU companies. Moreover, the EU is the most important source of FDI in the UK. Thus, the question arises whether this prominent position could be endangered. Less new investment and the danger of relocation of production could dent employment in the UK.
- Higher trade barriers of the EU could induce UK companies to relocate production from the UK to the EU. Moreover, increased transaction costs and delays due to customs controls (which are particularly impeding for just-in-time trade in intermediates) could imply that the UK firms are cut out of cross border value chains in Europe.
- What is more, the position of the UK as a bridgehead to the continent for non-European firms could suffer. Companies from third countries (particularly the US) use the UK as a gateway to continental Europe because they can enjoy free access to the Internal Market (e.g. by using EU passporting rules for financial actors). Empirical evidence supports the notion that access to the EU market is a relevant factor for FDI in Britain (Barret et al., 2015, 35). The loss of free access could thus lead to relocations by MNCs to the detriment of the UK. For example, several global banks have announced they could move operations out of the UK in the case of a Brexit.[41]
- Also, the dominant position of the City of London in Euro-denominated wholesale financing, interest rate derivatives and currency transactions could be at

[41] FT, 21 May 2015, The British question; Reuters, 2015a, 3 Nov 2015: Citi, Morgan Stanley see a Brexit backlash against London as a financial centre.

stake. It appears questionable whether the ECB would further tolerate this situation after a Brexit.

- Concerning capital flows in general, it cannot be precluded that the relatively high current account deficit of the UK could make it vulnerable to a balance-of-payments crisis. If a Brexit caused significant uncertainty among financial investors, herd behaviour could lead to large capital outflows and also put the British pound under pressure.

**Possible strategic misconceptions**

After a Brexit, the UK would have to renegotiate the institutional relationship with the EU and also many trade agreements with third countries. Thus, the question arises which options the UK could choose from (Table 5-1) and how good its negotiating position would be. In this context, several misconceptions could lead to an over-optimistic evaluation.

**Table 5-1** (identical to table 3-2)
**Possible alternatives to EU membership and their consequences**

| | | Norway / EEA | Switzerland | Turkey | WTO |
|---|---|---|---|---|---|
| Decision-making rights and representation in EU | | No | No | No | No |
| Customs Union | | No | No | Yes | No |
| Tariffs on the UK exports to the EU | | No | No | No | Yes |
| Single Market | Free movement of goods | Yes | Partial | Partial | No |
| | Free movement of persons | Yes | Partial / limited | No | No |
| | Free movement of capital | Yes | No | No | No |
| | Free movement of services | Yes | Partial / limited | No, GATS Rules | No, GATS-Rules |
| Renegotiation of FTAs | | Yes | Yes | Yes* | Yes |
| Increased trade costs due to RoO | | Yes | Yes | No | No |
| Cost of customs clearance | | Yes | Yes | No | Yes |
| Regulatory autonomy | | Limited | Limited | Partial | Yes |
| Influence on EU Regulation | | Very limited | No | No | No |
| Financial Contributions | | Yes, partial | Yes, partial | No | No |

*Little incentive for third countries as they benefit from low tariffs to the UK already.
Sources: House of Commons Foreign Affairs Committee, 2013; own compilation

At first glance, the UK appears to have many options to choose from regarding a future institutional relationship with the EU – from close economic alignment similar to the Norwegian model to the fallback position of a third country with WTO status. Moreover, one could be of the opinion that the EU would offer favourable access conditions to the EU market, because many remaining EU countries might want to secure their trade surplus in merchandise trade with the UK and because they would remain interested in keeping good political relations with a close and important neighbour. However, this evaluation could prove to be misleading. In fact, the negotiating position of the UK could possibly be considerably weaker due to several reasons. Firstly, the UK would rely more on market access to the EU than vice versa and would thus be in a more defensive position. Secondly, political considerations could outweigh economic considerations, as the EU might fear that other EU countries could follow the UK in exiting the EU. To avoid a possible precedent, the EU might not be overly generous in offering market access to the EU. Thirdly, as with Switzerland, the EU's inclination to cooperate could worsen if the UK chose to significantly restrict labour migration from the EU.

A Brexit is often seen as a welcome opportunity for the UK to regain regulatory sovereignty and to achieve a relief from overly burdensome EU regulations. However, there would be no free lunch for the UK. The descriptions of the options for a future institutional arrangement with the EU (Table 5-1) show that there will be a trade-off between regaining regulatory sovereignty and maintaining market access to the EU: The more the striving for regulatory sovereignty, the higher would be the price for the UK in terms of lost market access to the EU. If the UK opted for the Norwegian model of very close economic integration, there would even be a loss of sovereignty.

An important advantage of a Brexit would lie in offering the opportunity for the UK to lower trade barriers vis à vis third countries, particularly in agriculture. This would be advantageous to the UK economy. It could also be seen as a good precondition to negotiate new trade agreements with third countries as offering lower tariffs could be used as an important negotiation chip for the UK. However, it is not obvious that the UK could obtain access conditions of similar quality than the EU. Firstly, the UK can offer only a significantly smaller market than the EU and it would probably be in the defensive position. Moreover, the negotiation capacity of the British government would come under strain if it had to deal with up to 30 bilateral and regional trade agreements (with over 50 countries) simultaneously. Due to this and also due to the fact that trade negotiations usually take several years, it could take relatively long until new agreements would enter into force. This would create a dilemma for the UK: In order to reap the welfare benefits of free trade, the UK would have to unilaterally reduce its trade barriers rather sooner than later. Yet, if it does so, the bargaining chip to eliminated trade barriers is no longer available in bilateral trade negotiations.

**Economic cost-benefit analysis**

Our paper provides an overview and basic evaluation of important existing studies that attempt to quantify the economic effects of a Brexit for the UK. Forward looking (ex ante) studies are distinguished between model-based and non-model-based approaches. The Annex provides an overview of the key characteristics and main results.

Apart from basically considering the above-mentioned channels of reduced economic integration (which depend on the post-exit institutional relationship with the EU), it is also important to include the economic advantages of a Brexit. They can consist, for example, of lower (or zero) net contributions to the EU budget, lower tariffs vis à vis third countries, and of a lower regulatory burden (while also considering benefits or regulations).

Forward looking studies that include both costs and benefits of a Brexit tend to find that the disadvantages from lower economic integration outweigh the economic advantages. However, the mainstream conclusions of other surveys point to only moderate net costs of a Brexit in the lower single digit area in relation to GDP.

**Higher risk potential**

Thus, the economic effects of a Brexit seem manageable and the decision to leave the EU appears to be mainly a political consideration about sovereignty and self-determination. However, we raise serious doubts about this mainstream conclusion. In fact, important shortcomings of the forward looking methods employed to estimate the economic effects of a Brexit could conceal significantly higher risks.

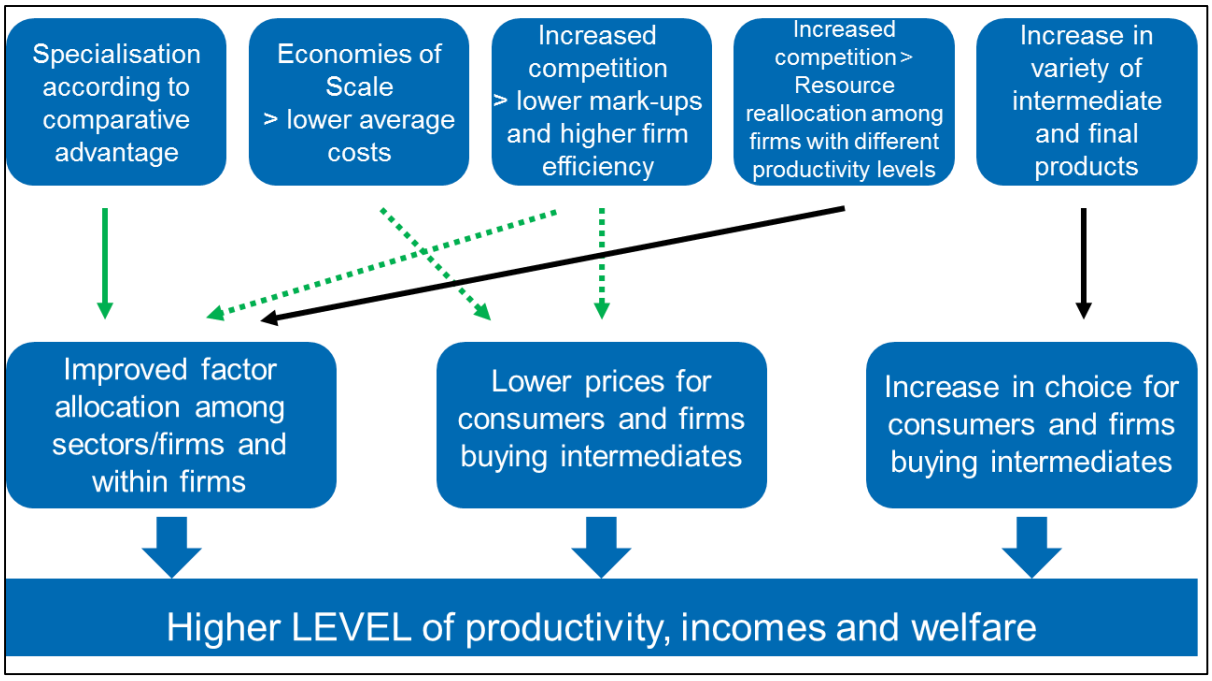
The pertinent forward looking studies are unable to cover all relevant channels by which economic integration raises welfare. Figures 5-1 to 5-3 provide an overview of the effects which are hardly covered: static and dynamic trade effects on welfare and growth as well as additional positive non-trade effects of economic integration. Wide-ranging and substantial theoretic deliberations exist about these additional welfare effects. Moreover, most of these specific welfare and growth effects are robustly supported by sound empirical research, as our study thoroughly highlights. However, the available empirical evidence is more general and less focussed on European integration or the case of a Brexit.

Currently, there is no universally accepted forward looking method of estimation available to integrate all of these specific effects in a comprehensive way. However, going beyond the pertinent forward looking studies implies entering less solid ground in economic terms. Several backward looking studies, which use existing data, are

presented that attempt to quantify these additional welfare effects of EU integration or a Brexit in a more comprehensive but only implicit way. All of these attempts can be criticised to some extent, but the overall evidence suggests that a Brexit could cause a significantly worse economic impact in a more pessimistic scenario than the mainstream conclusions indicate.

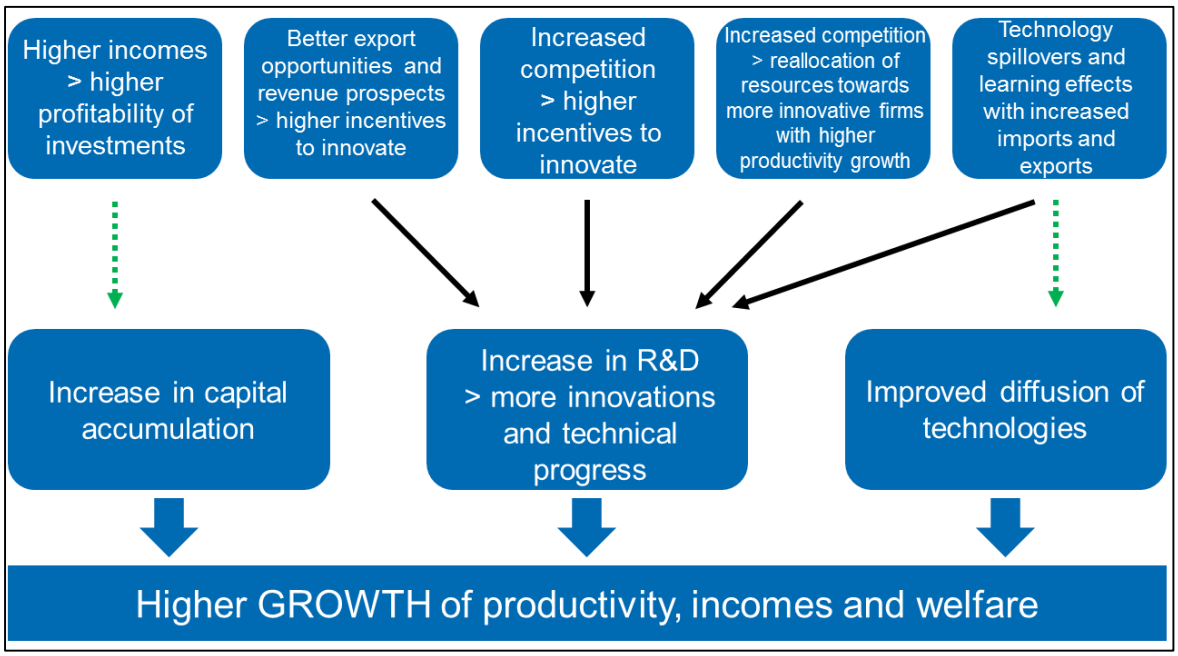
Robust evidence that theoretical forward looking trade models fail to quantify the full effects is provided by comparing ex ante and ex post estimates of trade effects of trade agreements (Rosa/Gilbert, 2005; CEPS, 2013). Particularly, so-called CGE models – the workhorse of most ex ante studies – forecast trade increases that are well below the trade effects that are found by means of so-called gravity models, which are the workhorse of ex post analysis of trade agreements.

**Figure 5-1: Selected static effects of trade on welfare levels**



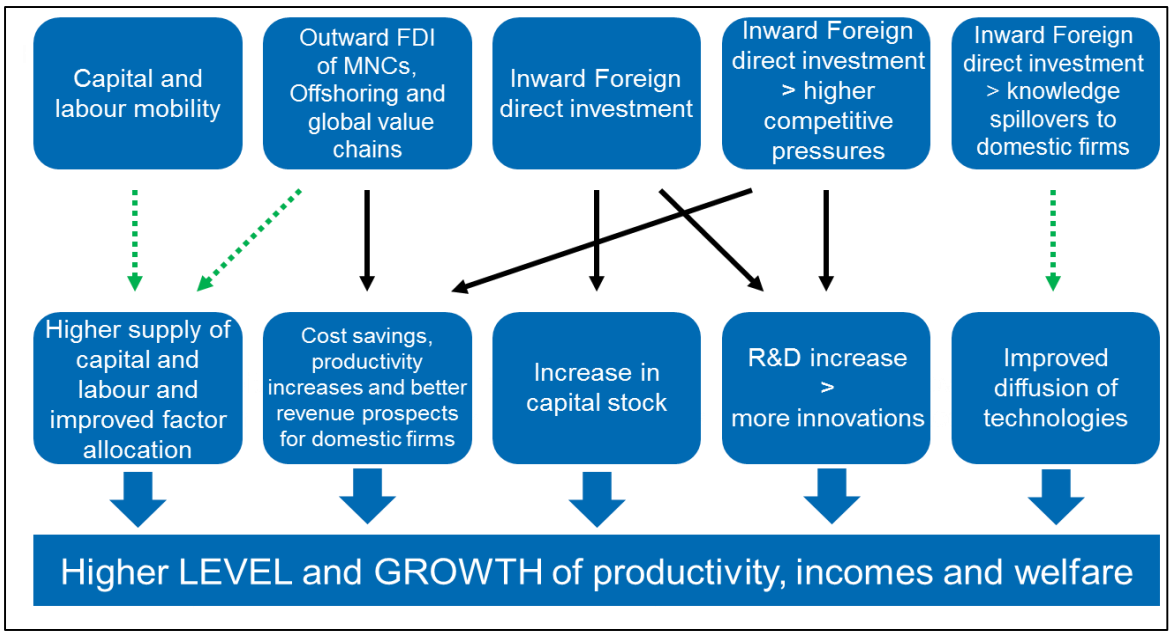

Green arrow: effect covered in most ex ante CGE and NQTM trade models (not in non-trade CGE models for UK).
Dotted green arrow: effect covered in at least one, but only a few ex ante models; these models only cover selected effects.
Black arrow: effect not covered in ex ante models.
Source: own design

**Figure 5-2: Selected dynamic effects of trade on economic growth**




Dotted green arrow: effect covered in at least one, but only a few ex ante models; these models only cover selected effects.
Black arrow: effect not covered in ex ante models.
Source: own design

**Figure 5-3: Selected effects on non-trade integration**




Dotted green arrow: effect covered in at least one, but only a few ex ante models; these models only cover selected effects.
Black arrow: effect not covered in ex ante models.
Source: own design

This divergence tends to increase further when newer generation gravity models are employed:

- For example, in the case of Mexico and the trade outcome of NAFTA, a static CGE model predicted an increase of Mexico's exports relative to GDP amounting to 51 percent over the 1990s ex ante, while ex post analysis based on available real-world data found an increase of more than 140 percent (Brown et al., 1992; Kehoe, 2003).
- More generally, influential studies found that on average bilateral trade doubles 10 to 15 years after a free trade agreement (Baier/Bergstrand, 2007; Baier et al., 2008).

Based on these insights, several studies are described that attempt to quantify additional welfare, income and growth effects in a more encompassing way.

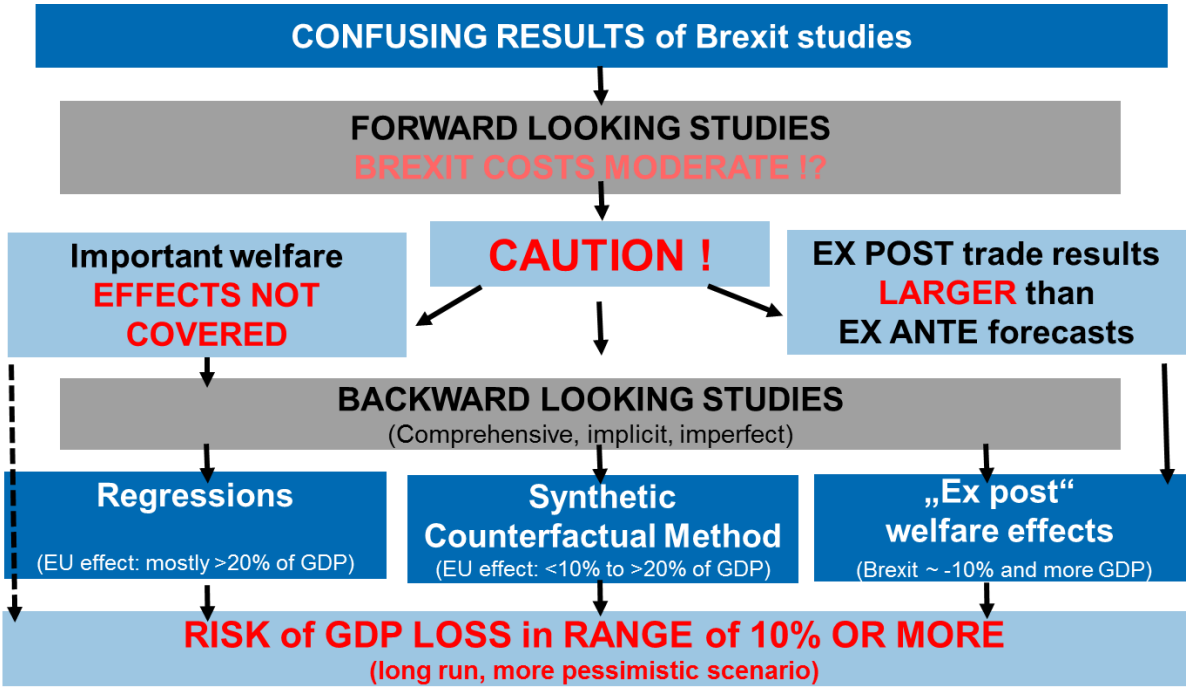
Using recent forecasts for the negative effects of a Brexit on bilateral trade between the UK and the EU, the induced income decline can be quantified in a tentative way. Based on a general **trade-income-relationship** calculated by recent thorough studies, two Brexit papers estimate that UK incomes could possibly decline by around 10 percent or more in a more pessimistic scenario regarding the future institutional relationship between the UK and the EU (Ottaviano et al., 2014a; Aichele/Felbermayr, 2015). An important shortcoming of these attempts lies in the fact that the trade-income relationship could not be tailored specifically to the UK.

Several thorough studies employ **regression analyses** of ex post data to implicitly but comprehensively capture the variety of economic integration effects depicted above (Henrekson et al., 1997; Badinger, 2005; Crespo Cuaresma et al., 2008). A regression uses a statistical method that identifies how closely a target variable (in this case GDP) is aligned with the explanatory variables, such as education, investment, or EU membership. Even though the results differ in their details, these studies identify sizeable effects of EU membership on the level of GDP in the long term – mostly in the range of 20 percent or more. Depending on the future integration scenario between the UK and the EU, not all but possibly a considerable share of these benefits would vanish. However, some uncertainties remain, as the results are in part not completely robust and as growth regressions are notoriously difficult to make watertight.

A very recent study attempts to also estimate the overall (economic, financial and political) benefits of EU membership for the UK and other member countries (Campos et al., 2015). The authors apply a new **Synthetic Counterfactuals Method** (SCM) which was developed by Abadie and Gardeazabal (2003) in a widely quoted

paper published in a high ranking refereed economic journal. The idea is to ask what would the GDP per capita level and the level of labour productivity have been, if the respective country had not become an EU member. The approach is very similar to clinical trials where one group of patients is treated with a new drug (here: EU membership) and another control group is not. The problem in macroeconomics lies in the fact that unlike in medical science controlled experiments are basically impossible. Thus, an artificial synthetic control group is constructed by selecting countries similar to the EU member in question with regard to economic developments during a longer time *before* the country joined the EU (pre-treatment period). As in medical science, the effect of the treatment can be deduced from the difference between the outcome for the EU member and that for the control group. Campos et al. (2015) estimate that in the long run (between EU accession of the UK in 1973 up to 2008), real GDP per capita in the UK is nearly 24 percent higher than in the synthetic control group. The estimated difference ten years after the EU accession of the UK amounts to nearly 9 percent for real GDP and also for productivity levels. However, the evidence on the robustness of the results is mixed. Robustness checks deliver significantly lower results for the long term GDP effect for the UK from EU membership. Focusing on the more robust findings on productivity increases over a ten year horizon, the comparable results lie in the higher single digit range (up to 10 percent). This is still a substantial result, particularly when taking into consideration that benefits might have further increased over a longer time horizon.

**Figure 5-4: Approach of the Meta study of existing studies on a Brexit**




Source: own design

Figure 5-4 provides an overview of the approach this Meta study has taken in reviewing and evaluating the existing studies on the economic consequences of a Brexit. The key messages are:

- The forward looking mainstream studies are unable to capture many additional effects of economic integration on welfare and growth. Therefore, the mainstream results which conclude that a Brexit would cause only moderate economic damage should be taken with caution.
- Higher risks appear likely when the specific additional welfare and growth effects are analysed and when the fact is taken into account that backward looking studies find significantly larger trade effects of economic integration agreements than forward looking models.
- Therefore, the backward looking studies should not be neglected in building an opinion on the possible economic outcome of a Brexit. While proving in part not completely robust, they provide important indications that the economic loss to the UK could be significantly larger than in the low single digit range.
- This will be particularly relevant if the political striving for regaining regulatory sovereignty in the UK prevails and, as a result, the future degree of economic integration between the UK and the EU deteriorates significantly.
- In such a more pessimistic scenario our study warns of the risk that GDP losses to the UK in the broad range of 10 percent or more cannot be ruled out in the long run in case of a Brexit.

The large uncertainty about possibly substantial negative impacts of a Brexit can in itself be damaging to the UK in the short term, as far as the general business and investment climate is concerned. Furthermore, the perceived negative economic impact of a Brexit could be priced in by financial markets, causing a certain degree of financial turmoil during an adjustment period after the official announcement of a Brexit. The uncertainty could also be more protracted. In fact, rating agencies point to the risk of rating downgrades. Moreover, the negotiation of new agreements with the EU and particularly with third countries could take years and leave the UK business in a fragile institutional environment. Overall, the economic impact of this short-term uncertainty could be significant as a recent study of PwC (2016) shows.

In conclusion, taken together the above considerations support the notion that a Brexit would resemble a potentially dangerous leap in the dark in terms of economic consequences.

# Annex: Overview of selected studies

## Studies based on ex ante trade models

| Study | Study focus | Estimation type | Trade specia-lisation effects | Dynamic and other trade effects | Future integration effects | Explicit regulatory effects | Economic distortions* | Fiscal effect** | Total long term effect (range according to different scenarios) |
|---|---|---|---|---|---|---|---|---|---|
| **Booth et al.**, 2015 (Open Europe) | Brexit-effect | Computable General Equilibrium trade model (CGE) | x | Investment (and FDI) partly dynamic<br>No Mark-ups<br>No Scale economies<br>No dynamic growth effects e.g. via technical progress | | Deregulation in some scenarios | Free trade in some scenarios | x | +1.5% to –2.2% of GDP (Brexit) |
| **Ottaviano et al**., 2014a (I) | Brexit-effect | New Quantitative Trade Model (NQTM) | x | Perfectly competitive firms implies no Mark-ups and no Scale economies<br>No investment<br>No dynamic growth effects e.g. via technical progress | Foregone benefits of future NTB reductions in internal market | | | x | –1.1% to –3.1% of income per capita (Brexit) |
| **Aichele/ Felbermayr**, 2015 (I) | Brexit-effect | New Quantitative Trade Model (NQTM) | x | No Mark-ups and no Scale economies (seemingly)<br>No investment<br>No dynamic growth effects e.g. via technical progress | Foregone benefits of future EU trade agreements | | | x | –1% to –7% of income per capita (Brexit) |

*Economic distortions: e.g. due to CAP or common EU external tariff compared to free trade.
**Fiscal effect: e.g. savings of contributions to EU budget.
Source: own compilation, based on available (partly incomplete) information

## Studies based on ex ante macroeconomic CGE models

| Study | Study focus | Estimation type | Trade specialisation | Dynamic and other trade effects | Future integration effects | Explicit regulatory effects | Economic distortions* | Fiscal effect** | Total long term effect (range according to different scenarios) |
|---|---|---|---|---|---|---|---|---|---|
| **PwC**, 2016 | Brexit-effect | CGE model for the UK economy (non-trade) | | Mark-ups<br>Scale economies<br>Investment (FDI) partly dynamic<br>Productivity<br>Immigration<br>Uncertainty<br>No dynamic growth effects e.g. via technical progress or firm selection | UK able to achieve FTA with US and other countries | Deregulation in both scenarios | | x | Short term (2020)<br>–3.0% to –5.4%<br>Long term (2030)<br>–0.8% to –2.7%<br>of GDP per capita<br>(Brexit) |
| **Oxford**, 2016 (study not available) | Brexit-effect | Oxford Global Economics' Model (non-trade) | n.a. | n.a. | n.a. | n.a. | n.a. | n.a. | –0.1% to –3.9%<br>of GDP<br>(Brexit) |
| **Pain/Young**, 2004 | Brexit-effect | NIDEM model for the UK economy (non-trade) | | No Mark-ups<br>No Scale economies<br>Investment (FDI) partly dynamic<br>FDI fosters innovation and exports<br>No dynamic growth effects via competition or firm selection | | | Common Agricultural Policy (CAP) | x | –2¼<br>of GDP<br>(Brexit) |
| **Minford**, 2005 (II) | EU-effect | Liverpool model for the UK economy (non-trade) | | | Costs of future harmonisation in EU | | | | –6% to –25%<br>of GDP<br>(EU effect) |

*Economic distortions: e.g. due to CAP or common EU external tariff compared to free trade.
**Fiscal effect: e.g. savings of contributions to EU budget.
Source: own compilation, based on available (partly incomplete) information

## Ex ante studies not based on own models

| Study | Study focus | Estimation type | Trade specialisation effects | Dynamic and other trade effects | Future integration effects | Explicit regulatory effects | Economic distortions* | Fiscal effect ** | **Total l effect** (Range according to different scenarios) |
|---|---|---|---|---|---|---|---|---|---|
| **CEPR**, 2013a | Brexit-effect | Use of CGE model for TTIP as approximation | x | Features of TTIP Model | | | | | –1.2% to –1.8% of GDP (Brexit) |
| **Mansfield**, 2014 | Brexit-effect | Use of other models and estimates | x | Features of TTIP model (in part)<br>FDI inflows<br>Higher risk premium on interest rates | New FTAs between the UK and third countries | Reduction of regulatory costs of EU | | x | –2.6% to +1.1% of GDP (Brexit) |
| **Gonand,** 2016 | Brexit effect | Use of other academic studies | x | Technology spillovers from imports<br>Firm selection | | | | | –7¼ % of GDP<br>–0.5%points of GDP growth (over 15 years) |
| **CEBR**, 2015 | EU-effect | Use of other model, literature review; rule of thumb estimates | x | | Future benefits from EU FTAs and internal EU liberalisation | | | | +2.8% of GDP (only future EU effect) |
| **Congdon**, 2014, (UKIP) | EU-effect | Literature review; rule of thumb estimates | (x) | | | Costs of EU regulation | CAP and EU protectionism | x | –11.5% of GDP (EU effect) |
| **Minford**, 2005 (I) | EU-effect | Use of existing studies | (x) | | | Costs of EU regulation | CAP and EU protectionism | x | –3.2% to –3.7% of GDP (EU effect) |

*Economic distortions: e.g. due to CAP or common EU external tariff compared to free trade.
**Fiscal effect: e.g. savings of contributions to EU budget.
Source: own compilation, based on available (partly incomplete) information

## Ex post studies attempting to implicitly quantify comprehensive effects of EU-integration or Brexit

| Study | Study focus | Estimation type | Trade specia-lisation effects | Dynamic and other trade effects | Future integration effects | Explicit regulatory effects | Economic distortions* | Fiscal effect** | Total long term effect (range according to different scenarios) |
|---|---|---|---|---|---|---|---|---|---|
| **Springford et al.**, 2014 | EU-effect | Gravity model | X | Comprehensive implicit dynamic effects | | | | | +55% of UK-EU trade (EU effect) |
| **Ottaviano et al**., 2014a (II) | Brexit-effect | Estimation based on trade-income-elasticity | X | Comprehensive implicit dynamic effects | | | | | –6.3% to –9.5% of income per capita (EU shift to EFTA) |
| **Aichele/ Felbermayr**, 2015 (II) | Brexit-effect | Estimation based on trade-income-elasticity | X | Comprehensive implicit dynamic effects | | | | | –3.3% to –14.1% of income per capita (Brexit) |
| **Badinger**, 2005 | EU-effect | Regression | X | Comprehensive implicit dynamic effects | | | | | +25.5% of GDP per capita (EU effect) |
| **Henrekson et al.,** 1997 | EU-effect | Regression | X | Comprehensive implicit dynamic effects | | | | | +0.6 to +0.8%points real GDP growth per annum (EU effect) |
| **Campos et al**., 2015 | EU-effect | Synthetic counterfactuals method (SCM) | X | Comprehensive implicit dynamic effects | | | | | +23.7 of GDP per capita (EU effect) |

*Economic distortions: e.g. due to CAP or common EU external tariff compared to free trade.
**Fiscal effect: e.g. savings of contributions to EU budget.
Source: own compilation, based on available (partly incomplete) information

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