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The economic impact of Brexit: Evidence from modelling free trade agreements

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Ansgar Belke
Daniel Gros

The Economic Impact of Brexit: Evidence from Modelling Free Trade Agreements

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Ansgar Belke and Daniel Gros[1]

The Economic Impact of Brexit: Evidence from Modelling Free Trade Agreements

Abstract

This paper assesses the economic implications of the United Kingdom leaving the European Union. The basic data on trade in goods and services and investment between the two parties suggest that cost of 'Brexit' could be substantial. Trade between the UK and the EU27 is large and of a similar order of magnitude as transatlantic trade (between the EU and the US). The precise nature of the (hopefully free) trade agreement UK-EU-27 is still being negotiated. But all available studies concur that a significant disruption of trade links will impose economic costs on both sides. However, the EU27 would bear only a disproportionally small share of the total cost – not just because it is about five times larger than the UK in economic terms but also for fundamental reasons such as greater market power of its enterprises. Other studies on different free trade arrangements confirm the general proposition that the smaller party has more to gain from eliminating trade barriers (and to lose from imposing them). This implies that the EU will have the stronger negotiating position.

JEL Classification: F15, C63, C68

Keywords: Brexit; European Union; free trade agreements; trade in goods and services; FDI

June 2017

1 Ansgar Belke, UDE, CEPS Brussels, and IZA Bonn; Daniel Gros, CEPS Brussels. – *This paper profited very much from insights gained from the participants in the panel "The Macroeconomics and Political Economy of Brexit", 83rd International Atlantic Economic Conference, March 22-25, 2017, Berlin, Michael Burda, Henrik Enderlein and Michael Wohlgemuth. The usual disclaimer applies.* – *All correspondence to: Ansgar Belke, ad personam Jean Monnet Chair for Macroeconomics, University of Duisburg-Essen, Universitätsstr. 12, 45117 Essen, Germany, e-mail: ansgar.belke@uni-due.de*

1. INTRODUCTION

On June 23, 2016, the UK voted narrowly (52:48) to leave the European Union (EU). The UK government then notified the EU officially on March 29, 2017, of its intention to leave, thus triggering Article 50 of the EU Treaty which specifies that within two years the UK will cease to be a member. The date for 'Brexit' is thus clear, but the nature of the economic relationship between the UK and the remaining EU-27 is still to be defined.

First principles of economics suggest that Brexit will have an economic cost for both sides as trade in both goods and services between the UK and EU-27 will no longer be (nearly) frictionless as it is at present. The size of these economic costs is uncertain, but they are likely to be substantial since at present trade across the Channel is very large: €306 billion of exports of goods by the EU27 to the UK, versus €184 billion of imports. In terms of % shares of GDP, the EU27's exports to the UK amount to 2.5% of GDP, whereas the UK's exports to the EU27 amount to 7.5% of its GDP. For comparison, transatlantic trade of goods is only about 20 % larger than trade across the channel. [1]

For services the amounts are also large: €94 billion of exports by the EU27 to the UK, versus €122 billion of imports, and thus a surplus in this case for the UK (although here the statistics are not so reliable, with big differences seen in the 'mirror data' for the same items as measured by the EU27).

Foreign direct investments (FDI) flows and stocks are also very large on both sides. The EU27's stock of FDI in the UK is estimated at €985 billion, or 8.3% of its GDP, while the UK's investment in the EU27 total a little less in value at €683 billion but this is a much bigger in relation to its GDP (26.6%). However, there are indications that a significant proportion, maybe more than one

[1] In terms of data preparation and exposition, this paper heavily relies on Emerson, Busse, Di Salvo, Gros and Pelkmans (2017).

half, of this FDI represent financial operations whose purpose is to optimise tax liabilities of multinational corporations.

Leaving the EU will not affect only trade, but also the legal status of the large number of EU27 citizens living in the UK (estimated at 3.35 million as of end 2016). The largest number are workers (2,002,000), compared to pensioners (223,000) and the unemployed (102,000). The number of UK citizens living in EU27 countries is substantially less: 1,217,000, of which 400,000 are pensioners, with remainder being workers and their dependent families, and students.

Another economic impact of Brexit is that the UK will no longer contribute to the EU budget, which would thus no longer count on the €9 billion annual net contribution of the UK. This might be offset to some extent by a continuing contribution by the UK if it were agreed to secure a high degree or market access, or from tariff revenues if the relationship would be based just on WTO membership terms. There is a question also of other 'legacy costs', which as of now, however, are neither defined nor quantified beyond speculative remarks in the range of the order of €20-40 billion.

The focus of this contribution will be on trade relations and how the expected costs of leaving the EU's internal market would be distributed across the two parties, which in turn, should affect their negotiating positions.

In principle there are two alternative extreme scenarios: (1) the UK would accede to the European Economic Area (EEA) as a non-member state like Norway, or (2) the UK would have no preferential trade relationship with the EU, which would imply that cross Channel trade would take place only under general World Trade Organization (WTO) rules.

In between these two extremes there are quite a number of possibilities for free trade arrangements of varying depth, which are described below. However, the UK Prime Minister in her speech of

17 January 2017 narrowed the focus considerably, favouring a 'Comprehensive Free Trade Agreement (CFTA).

It is clear that the default scenario, in the event that the negotiations fail to reach agreement within two years after the triggering of Article 50, is the WTO scenario. This means that the most plausible range of possible outcomes now consists of some kind of CFTA as the most optimistic, through to the WTO as the most pessimistic.

Economic impacts in short

There has been a considerable amount of quantitative modelling work done on various Brexit scenarios by both official institutions (UK Treasury, OECD) and independent economists. These all cover ranges of scenarios in the optimistic-pessimistic spectrum, including the spread between the EEA and WTO scenarios highlighted above. However, as we have just noted, the plausible range of scenarios has been narrowed, excluding the EEA.

Nonetheless the modelling work has produced a *cluster of relatively consistent results*. The main story is one of *economic losses by both parties*, but *disproportionately between them* in money amounts in a ratio of around 1 to 2 or 3 for the UK and the EU27 respectively. In terms of percentages of GDP, the losses for the EU27 would be about 10 to 15 times lower given the 1:5 ratio in the GDP of the UK relative that of the EU-27.

For the EU27 the losses are virtually insignificant, averaging between 0.08% and 0.44% of GDP for the optimistic versus pessimistic scenarios respectively. These amounts are modelled as the totals cumulating up to 2030, so the annual average losses would be of the order of 0.008% to 0.044 % of GDP.

For the UK the losses average between 1.31% and 4.21% of GDP for the optimistic and pessimistic scenarios respectively, or 0.13% to 0.41% of GDP annually. Among the different models it is also notable that the losses for the UK are higher than average in the case of two

models (OECD and UK Treasury) that capture negative impacts on foreign direct investment (FDI), which is redirected in some degree away from the UK into the EU27. In their pessimistic scenarios the losses cumulate to about 7.5% of GDP, or 0.75% annually, which are highly significant amounts in macroeconomic terms. This FDI effect is not, however, reflected in models estimated for the EU27, and so implies that there might need to be some adjustment to the results reported above for the EU27.

In the following, we provide a study on several aspects of the possible economic impact of Brexit on the EU27, covering (1) the current level of trade in goods and services between the UK and EU27 as a share of GDP, and labour flows, distinguishing between member state and sectors, (2) an indication of the possible economic impact of at least two alternative scenarios, European Economic Area (EEA) or World Trade Organisation (WTO), and (3) an indication of the key characteristics of a wider range of different types of bilateral agreements that exist between the EU and third countries, including also customs unions, free trade agreements, association agreements, stabilisation and association agreements, partnership and cooperation agreements, etc.

We do not go into the details in which the 'middle' scenarios differ, address all these points, in a somewhat different order, and give particular attention to the idea of a Comprehensive Free Trade Agreement (CFTA), since this is what Prime Minister Theresa May announced as the UK's objective in her speech of 17 January 2017.

2. BASIC FACTS: TRADE AND INVESTMENT

2.1 Trade in goods

The volume or trade between the UK and EU27 is very substantial, with EU27 enjoying a large surplus. The EU27's exports to the UK totalled €306 billion, whereas it imports amounted to only

a little above half as much, at €184 billion (all data in this section relate to 2015 unless otherwise stated).

Table 1: Total trade in goods between the UK and the EU27, 2015

	Imports (€bn)	**% GDP**	**Exports(€bn)**	**% GDP**	**Trade (€bn)**	**% GDP**
EU27	184	1.5	306	2.5	491	4
UK	306	11.9	184	7.1	491	19.1

Source: Eurostat.

For comparison we note that trade between the EU(28) and the US is of a similar order of magnitude. In 2015 the EU exported goods worth €371 billion to the US and imported about €250 billion, both values are only about 20 % larger than the corresponding values for trade across the Channel reported in Table 1. From this point of view the impact of Brexit could be as important as the TTIP might have been (with the opposite sign of course).

In terms of % shares of GDP, the EU27's exports to the UK amount to 2.5% of GDP, whereas the UK's exports to the EU27 amount to 7.1% of GDP. Looked at from the import side the proportions are even wider, reflecting the UK's large trade deficit with the EU: UK's imports from the EU amount to 11.9% of GDP, whereas the EU27's imports from the UK amount to only 1.5% of their GDP.

As regards the sectoral breakdown of the trade flows, the aggregate data for the EU27's trade with the UK is given in Table 2. The sectoral distribution of this trade is highly diversified, with the following leading sectors for exports from the EU27 to the UK: machinery and transport equipment (€127 billion), of which road vehicles (€59 billion), followed by other manufactured goods (€70 billion), chemicals (€51 billion), food products (€32 billion), and mineral fuels (€11

billion). The UK has a deficit in most sectors, especially automotive and surplus mainly in mineral fuels and aircraft (and associated equipment).

2.2 Trade in services

The trade in services is also very substantial in volume, with €94 billion of exports from EU27 to the UK, and €122 in imports. When imports and exports of services are taken together their total of €306 billion is not all that much less than for the €394 billion total for goods. However, the big difference here is that the UK has a significant surplus with EU27 on account of services (€28 billion), compared to its huge deficit on account of goods (€128 billion).

Table 2: Total trade in services between the UK and EU27, 2015

	Import (€bn)	% GDP	Export (€bn)	% GDP	Trade (€bn)	% GDP
EU27	122	1	94	0.8	216	1.8
UK	94	3.6	122	4.7	216	8.4

Source: Eurostat.

Services is one area where Transatlantic trade is much more important the trade between the EU-27 and the UK. In 2015 EU exports of services were worth about €190 billion and imports worth almost €200 billion. The Transatlantic turnover in services trade was thus about 2 times larger than that across the Channel.

A big word of caution, however, is called for over these services data. Difficulties in the statistical recording of trade in services are known to be substantial. In particular ‘mirror statistics’ show big divergences. ‘Mirror statistics’ are where each side of a bilateral trade relationship is in principle measuring the same thing (e.g. UK exports to Belgium should equal Belgian imports from the UK). The actual ‘mirror statistics’ for UK-EU27 trade in services show indeed big

differences (Emerson et al., 2017, Annex 5). Thus the Belgian services deficit with the UK is recorded to be €1.8 billion according to UK data, whereas the Belgian data suggest the deficit to be only €0.1 billion. The biggest divergence is in the case of Ireland, where according to UK data the UK has a large surplus of €6.1 billion, whereas according to Irish data it is Ireland that enjoys an even bigger surplus of €11.5 billion. Unfortunately, the official statisticians, be it from Eurostat or national agencies, do not seem able to throw much light on these differences, no doubt because various service flows are so difficult to record.

Sectoral data also exist in the aggregate for UK services trade with the EU27, but not the full matrix by country and sector. We do not provide this detail as the data would anyway be highly unreliable for the reasons given above. See also Belke, Dubova and Osowski (2017).

In terms of the balance of trade in services the main items are the UK's surplus on account of financial services (€20 billion), its deficit on account of travel and transport (largely tourism, €11 billion), whereas the substantial trade in business services is more nearly balanced.

2.3 Foreign direct investment

Data is available on both stocks and flow of foreign direct investment (FDI) of the UK and the EU27. These data are relatively complete for the *worldwide* flows and stocks of FDI (Table 4 and Emerson et al., 2017, Annex 6). However, the bilateral data as between the UK and individual member states have some gaps, and contain some apparent distortions (Table 5 and Emerson et al., 2017, Annex 7).

The *worldwide* stocks of FDI are massive in both directions, with the EU27 having a stock of €7,033 billion of outward investments, while receiving €5,692 billion of inward investments. The UK has a stock of €1,386 outward investments and about the same amount of inward investments, at €1,314 billion.

UK investments in the EU27 of €683 billion looks reasonably proportioned in relation to the worldwide total of €5,692 billion investments in the EU27. However, in the statistics for EU27 investment in the UK the data seems implausible, with €985 billion of inward investments from the EU27 accounting for a very large share (75%) of the total worldwide investment in the UK of €1,314 billion. The source of this implausibility seems to be the huge reported amount of Dutch investments in the UK of €454 billion, which is related to the important amount of nominal investments in the Netherlands (see Emerson et al., 2017, Annex 7), which in reality are only intermediate investments in transit from other sources.

Table 4: Foreign direct investment of UK and EU27 worldwide, total flows and stock, 2015

	Flow				Stock			
	Inward		Outward		Inward		Outward	
	bn Euro	% GDP	bn Euro	% GDP	bn Euro	% GDP	bn Euro	% GDP
EU27	360	3%	494	4%	5,692	47%	7,033	58%
UK	36	1.4%	-55	-2%	1,314	51%	1,386	54%

Source: Eurostat.

Table 5: Foreign direct investment: bilateral between the UK and EU27, total flows and stock, 2015

	Flow				Stock			
	Inward		Outward		Inward		Outward	
	bn Euro	% GDP	bn Euro	% GDP	bn Euro	% GDP	bn Euro	% GDP
EU27	3.7	0.0%	-73	-0.6%	683	5.6%	985	8.1%
UK	-73	-2.8%	3.7	0.1%	985	38.2%	683	26.5%

Source: Eurostat.

Statistics on FDI stocks and flows have to be analysed with caution since they contain many inaccuracies and internal contradictions.

The first limitation is showcased by the mismatch of bilateral/multilateral FDI data and their corresponding 'mirror statistics'. The figures for FDI stocks are reported to be substantially different depending on whether one uses the recipient's or the investor's data. For example from the Irish (data) perspective the UK is a large net (FDI) investor in Ireland whereas the UK (data) view suggest it is only a small net investor (one-tenth of the Irish statistics). For Italy the net position vis-à-vis the UK even switches from a substantial net recipient to a net investor position, depending on which country's statistics one uses. As for the services data, official statistical offices have not been able to clear up these apparent contradictions.

The second limitation stems from 'hollow' FDI via special purpose entities or vehicles (SPEs), for example for taxation or other regulatory reasons. The share of SPE-driven FDI is particularly large in Luxembourg and the Netherlands. These two countries are also those who account for around 60% of the overall total inward and outward stocks of the EU27 (Eurostat, 2016). According to the OECD, on average for 2011-2015, 70% and 95% of all FDI inflows to the Netherlands and Luxembourg, respectively, were via SPEs[2][2]. This type of 'financial' FDI is less likely to take the form of productive investment. A reduction in 'financial' FDI may have different implications for economic growth, in particularly sustainable growth. A detailed breakdown for the UK into traditional and 'financial' FDI is not available, but it can be assumed that the UK is also heavily engaged in financial FDI given the role of the City of London as a financial hub. FDI stocks from and to the EU27 outside the Netherlands and Luxembourg might thus be a more reliable indication of the real links from direct investment than the overall figures for UK that include the Netherlands and Luxembourg. The limited bilateral data available (which excludes

[2] For data see OECD, 'Most recent FDI statistics for OECD and G20 countries', 2016.

Luxembourg) suggests that financial FDI accounts for about one half of UK investment in the EU27 and at least about one third of EU27 FDI in the UK.

3. ECONOMIC IMPACTS: QUANTITATIVE ESTIMATES

3.1 Model-based simulations

There has been a number of model-based attempts to *simulate the impact of Brexit*, of which several estimate the impacts on both the UK and the EU27. Of these three are from official sources (OECD, UK Treasury, Netherlands Central Planning Bureau), and three from independent academic institutions or think tanks (London School of Economics, IFO in Munich, Open Europe in London). Broadly speaking this cluster of studies represents the 'state of the art' in trade policy modelling, with both new and traditional methodologies – see Emerson et al (2017) for details.

While these model simulations cannot capture all the likely economic effects of the Brexit, they do provide a cluster of findings that are close to a consensus view on the relative size of the impacts. Given that the UK trade with the EU27 is a much bigger fraction of the UK's GDP than that of the EU27, it is hardly surprising that the economic impacts are much higher for the UK.

The hypotheses for these studies are quite similar, in that they all simulate a range of scenarios that we call either 'optimistic', meaning a small increase in trade barriers between the two parties, or 'pessimistic', meaning a much larger increase in trade barriers. Some also have a 'central' scenario between the two polar cases. The optimistic scenario in several cases assumes that the UK would enjoy a regime close to that as member of the European Economic Area like Norway. The pessimistic scenario usually assumes that the trading relationship between the UK and the EU27 is reduced to the terms of their WTO membership, with tariffs introduced at most favoured nations (m.f.n.) rates. This is widely called the 'hard Brexit'.

We will concentrate in most of this section on the impact of Brexit on GDP, which is also the focus of most models. Some of the models also report the impact on trade flows. For instance, Lawless and Morgenroth (2016) estimate a fall of the EU27's exports to the UK of 30% and for UK's exports to the EU27 of 22% taking into account only the introduction of WTO m.f.n. tariffs. However, given the differences in the size of trade flows this translates into a decline of only 2% of total (worldwide) EU27 exports. The impact of Brexit on some individual Member States, like Ireland and Belgium is of course estimated to be the much larger, with these two countries facing a reduction in total exports equal to 4% and 3.1%. For the UK, the impact of Brexit on total exports is considerably larger, 9.8%. Roja-Romagosa (2016) arrive at broadly similar results. They predict, that the fall in EU27 exports to the UK would amount to 3% in the WTO scenario and of 1.7% in the FTA scenario. For the UK, instead, total exports would decrease by 21.8% and 12.5% in the WTO and FTA scenarios respectively.

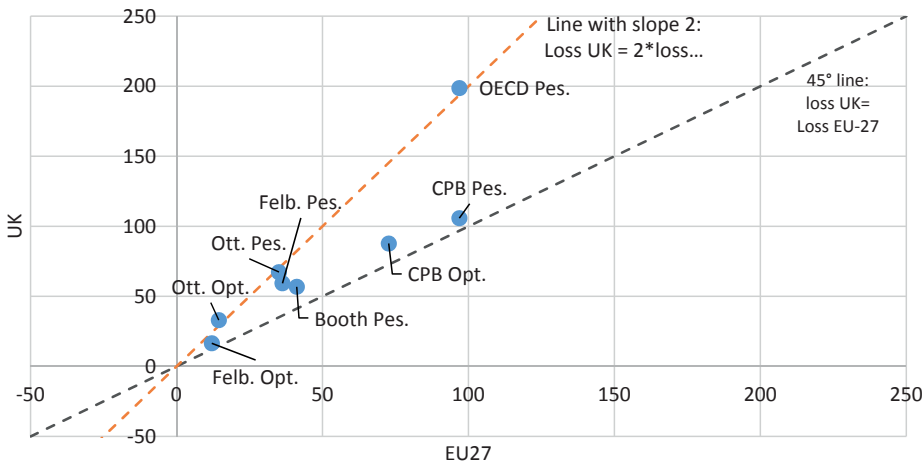
For the EU27 on average there are losses of 0.08 to 0.44% of GDP for the optimistic and pessimistic scenarios respectively. These results cumulate over the whole decade until 2030, which means that if the impacts were spread evenly over these years, the annual average impact would be of the order of 0.01 to 0.04% of GDP: i.e. the impacts would be insignificant and hardly noticeable at the macro-economic level for the whole EU27 economy. This does not exclude that individual sectors, or some small member states would be more significantly affected, on which we comment further below.

The results for the UK are much larger, where the losses average 1.31 to 4.21% of GDP for the optimistic and pessimist scenarios respectively. Since the ratio of the UK economy to the EU27 is about 1:5 a disproportionate result in terms of a % of GDP was to be expected. If the absolute loss were of the same size for both sides one would have expected that the loss as a % of GDP should be 'only' five times higher for the UK. But as a % of GDP the average loss for the UK is about ten times higher, or more.

Since the ratio of the UK economy to the EU27 is about 1:5 a disproportionate result in terms of a % of GDP was to be expected. If the absolute loss were of the same size for both sides one would have expected that the loss as a % of GDP should be 'only' five times higher for the UK. But as a % of GDP the average loss for the UK is about ten times higher, or more.

The model results in terms of the impacts on GDP are summarized in Figure 1 below in billions of euro. The loss for the EU-27 is on the horizontal axis, that for the UK on the vertical axis. This figure also contains a 45 degrees line. All points are above this line, which indicates that the absolute loss is in all cases to be estimated to be higher for the UK than for the EU. Moreover, most of the studies (essentially all except CPB) align on a line with slope 2, implying that most studies find that the losses from Brexit would be twice as high for the UK as for the EU-27.

Figure 1: Absolute losses for UK and EU27 GDP (in € Billion)



Note: GDP figures are sourced from OECD stat. For the UK, the amount is converted from Pound to Euro using the annual average exchange rate for 2015. The blue spots represent the different model-based estimates, with indication of authors. Pes. = pessimistic scenario; Opt. = optimistic scenario; Booth = Booth, Howarth and Persson. (2015); CPB = Roja-Romagosa (2016); Felb. = Aichele and Felbermayr (2015); OECD = OECD (2016); Ott. = Ottaviano et al. (2016).

Source: Authors' own elaboration.

Why is the loss (from leaving the EU's internal market) distributed so asymmetrically? Economic theory predicts only that both sides will lose from creating new trade barriers. However, general economic principles also suggest that larger economies lose less from the imposition of a tariff because of the greater market power of its enterprises. Suppose that two trading partners both impose a tariff of 5% on each other's exports. Firms from the larger economy will be more likely to face an inelastic demand curve, allowing them to adjust their selling price for the tariff. By contrast, firms from the smaller economy are more likely to be price takers. They might thus have to cut the export price to keep market shares, and so bear the cost themselves. There is thus a fundamental reason why trade agreements between large and small countries tend to be asymmetric, and why the losses from Brexit are likely to be borne primarily by the UK (despite the fact that the UK is a net importer of goods from the EU).

The OECD and UK Treasury models represent a deeper set of impacts from FDI, which go beyond investment and trade volumes (OECD, 2016, Treasury, 2016). FDI is found, in various empirical studies taken into account in the two models, to have a favourable impact on R & D expenditures and thence on innovation and competitiveness, as also on general management quality.[3]

One outlier among the model results is that of Booth/Open Europe, which, however, adopts a radically different 'optimistic' scenario, namely the ultra-liberal formula whereby the UK would adopt free trade unilaterally both with the EU and the whole of the rest of the world, without negotiating counterpart concessions from anyone (Booth, Howarth and Persson, 2015).

[3] It is notable also that two of the studies, by the OECD and the UK Treasury, give significantly higher losses for the UK, which may be explained by the more extensive range of economic impacts that they take into account, notably negative impacts on FDI. In the pessimistic scenarios the losses for the UK, according to these two studies, mount up to around 7.5% of GDP which would be highly significant from a macroeconomic point of view, meaning a reduction of GDP growth over a decade of around 0.75% annually.

3.2 Going beyond the models: lessons from other approaches

3.2.1 Transatlantic Trade and Investment Partnership (TTIP)

Another way to estimate the costs of Brexit for the EU27 is to use the studies done in preparation of TTIP, which would have involved the opposite of Brexit, namely an elimination of WTO m.f.n. tariffs and a reduction of non-tariff barriers (NTBs).

The comparison between Brexit and TTIP is more interesting than appears at first sight. The US economy is of course several times larger than that of the UK, but trans-Atlantic trade is of a similar order of magnitude to trans-Channel trade. Trans-Atlantic goods trade was in 2015 only about 20 % larger than the trade in goods between the UK and the EU27. The impact of Brexit might thus be comparable to that of TTIP with the sign reversed. Trade in services is, however, twice as large across the Atlantic than across the Channel.

Studies of scenarios for the TTIP came to the conclusion that the elimination of tariffs alone would not lead to large gains. The Commission's own website puts it succinctly: "Given the low average tariffs (under 3%), the key to unlocking this potential lies in the tackling of non-tariff barriers. These consist mainly of customs procedures and behind the border regulatory restrictions."[4]

The widely accepted result from the economic impact studies which used a similar approach (and models) to those surveyed here for Brexit, was that TTIP would increase EU GDP by about 0.5 % of GDP, with 0.1 % of GDP due to the elimination of tariffs between the EU and the US, and 0.4 % of GDP due to the lowering (typically halving) of NTBs.[5]

[4] See http://ec.europa.eu/trade/policy/countries-and-regions/countries/united-states/.

[5] See http://trade.ec.europa.eu/doclib/docs/2013/september/tradoc_151787.pdf.

3.2.2 Lessons from the literature on the benefits of EU membership

Another way to estimate the cost of Brexit is to consider that the cost of Brexit should be the mirror of the benefit of EU membership. There is a substantial literature which shows significant gains from EU and single market membership. If one were to accept the conclusions of this literature, one would conclude models surveyed here might understate the cost of Brexit.

One of the first studies to incorporate the many effects of a Single Market, was done by the CPB (Straathof et al., 2008), which used a blended CGE/macro-econometric model (Worldscan) to arrive at benefits of EU membership of 10 % of GDP or more. A novel attempt was undertaken by Campos, Coricelli and Moretti (2014) based on a synthetic counterfactual for the EU countries which joined in 1973 or later: they come to an average gain of 12 % of GDP (except for Greece), with more for the UK. Because the WTO has become more comprehensive in scope and a little 'deeper' too, in the meantime, the implied costs of exiting might be today a little less high.

Another variant of the counterfactual approach is Breuss (2006), comparing Switzerland and Austria given their respective choices for market integration in Europe, which also arrives at large benefits for Austria.

A related way to estimate the cost of Brexit is to consider the benefits expected from existing or planned free trade agreements of the EU with other nations around the globe. The exits costs can be derived from so-called impact assessment studies on the free trade agreements EU-Canada, EU-India, EU-Japan, EU-Mercosur, EU-Mexico and EU-South Korea.

Table 6 below summarises the expected benefits from these free trade agreements or just plans. They involve different degrees of trade liberalisation and different levels of development. However, a general trend is clear. In all these cases, the EU would enjoy only a disproportionally small share of the total benefit – not just because it is economically larger than its counterparts but also for fundamental reasons such as greater market power of its enterprises. With a changed

sign this implies that exiting these free trade agreements would impose the majority of the costs on the exiting country.

In any event, the large negative effects in the models used on Brexit are a priori consistent with this new literature on the EU benefits for countries concluding a free trade agreement with the EU being quite large, and should not be dismissed too swiftly.

Table 6: Model simulations of economic impact of free trade agreements on the EU and the partner economy

Free trade agreement	**Type of model**	**Long-term effects on GDP**	
Country-pair	**Econometric model and scenarios**	**Absolute**	**Percent**
EU-Canada European Commission (2011)	Computable general equilibrium model (GTAP) 4 scenarios Scenario A: 95% reduction in tariffs and less ambitious cuts in trade costs of services (taking the cuts used in the 2008 Joint Study and multiplying them by a factor of 0.6) Scenario B: 95% reduction in tariffs and ambitious cuts in trade costs of services (taking the cuts used in the 2008 Joint Study) Scenario C: 100% reduction in tariffs and cuts in trade costs of services as employed in the 2008 Joint Study multiplied by a factor of 0.6 (i.e. less ambitious liberalisation of services) Scenario D: 100% reduction in tariffs and cuts in trade costs of services as employed in the 2008 Joint Study (i.e. less ambitious liberalisation of services).	EU27: +1,964.22 to 3,400.98 Canada: +1,796.87 to 2,931.87 Welfare of FTA measured by Equivalent Variations (GTAP) Scenario A versus scenario D	EU27: +0.02 to 0.03% Canada: +0.18 to 0.36% GDP percentage difference from baseline Scenario A versus scenario D
EU-India Felbermayr et al. (2016)[6]	IFO trade model according to Aichele, Felbermayr and Heiland, 2014)	EU28: +23 $ bn India: +28 $ bn	EU28: +0.14 % India: +1.30%

[6] One should note that the exit of the United Kingdom from the EU (Brexit) lowers the potential gains that India can hope to achieve by approximately one fifth. A new trade deal between the UK outside of the EU and India would prove to be marginally more beneficial for Britain than if the country had remained in the EU, whereas India would not incur any significant disadvantages. However, simulations confirm that the costs of Brexit would turn out to be more than ten times as big as the potential gains from a new India-UK deal (Roy and Mathur, 2016, and Felbermayr et al., 2016, p. 18).

	Static General Equilibrium Trade Model Broad-based trade and investment agreement	= yearly add-up to GDP	= yearly add-up to GDP
EU-Japan Felbermayr et al. (2017)[7]	IFO trade model according to Aichele, Felbermayr and Heiland, 2014) Static General Equilibrium Trade Model[8] Conservative scenario (modelled on the experience of the EU-Korea trade agreement): European-Japanese free trade agreement abolishes non-tariff trade barriers only rudimentarily	EU28: +11 € bn in 2014 prices Japan: +9 € bn in 2014 prices = yearly add-up to GDP	EU28: +0.1 % Japan: +0.23 % = yearly add-up to GDP
EU-Mercosur Burrell et al. (2011)	GLOBE simulation results Computable general equilibrium (CGE) model Scenario 2 = Mercosur request granted Reference scenario = No Doha Round agreement reached and Mercosur request not granted	EU12: + 273.86 € bn in 2020 prices EU15: +5,214.39 € bn in 2020 prices MERCOSUR: +1,523.28 € bn in 2020 prices = Absolute difference from reference scenario	EU12: +0.02 % EU15: +0.02 % MERCOSUR: +0.16 % = Percentage difference from reference scenario
EU-Mexico[9] Ecorys (2015): Ex-post analysis of 2000 agreement European Commision (2015): Ex ante analysis	Computable general equilibrium model plus gravity model Ex-post analysis of the current EU-Mexico FTA put in place in 2000. Ex ante analysis of agreement modernisation.	**Ex-post analysis:** EU28: +1,559 € mn Mexico: +2,876 € mn **Ex-ante analysis:** **Conservative modernisation**	**Ex-post analysis:** EU28: +0.01 % Mexico: +0.34 % **Ex-ante analysis:** **Conservative modernisation**

[7] Virtually, Francois, Manchin and Norberg (2011) which employs data from 2007 is the seminal impact study referring to the opening of negotiations. However, the stance of the world economy and the deep parameters of the models have changed dramatically since then. Hence, we would like to refer to the most recent impact studies on a trade agreement between the EU and Japan.

[8] In their predecessor study to Felbermayr et al. (2017), Benz and Yalcin (2013) investigate the economic effects of an encompassing liberalisation ("non-tariff barrier (NTB)" scenario) of trade between the EU and Japan. As a result, they come up with an increase in GDP growth compared to the status quo of 0.21 percent for the EU. Japanese GDP growth is forecasted to be larger by 0.86 percent. The authors also investigate the weaker variant of a mere tariff abolition („tariff scenario"). In this case, both the Japanese and the EU GDP would be also affected positively, albeit to a lesser extent. EU real GDP would increase by 0.02 percent and Japanese GDP by 0.07 percent. Since the EU is a much larger market for Japanese products and services than Japan is for the EU, free trade would have a larger positive impact on Japan.

[9] See also the impact study by Serrano, Martínez, Rodríguez and Salazar (2015) based on a gravity model according to Kepaptsoglou, Karlaftis and Tsamboulas (2010) which, however, does not come up with concrete figures regarding GDP gains.

of agreement modernisation	**2 scenarios:** conservative versus ambitious modernisation	EU28: +0.5 € bn Mexico: +1.8 € bn **Ambitious modernisation** EU28: +1.8 € bn Mexico: +6.4 € bn = yearly add-up to GDP in 2028	EU28: +0.003% per annum by 2028 Mexico: +0.11% of GDP per annum by 2028 **Ambitious modernisation** EU28: +0.01 % Mexico: +0.39 % = yearly add-up to GDP in 2028
EU-South Korea CEPII/ATLASS (2010)	MIRAGE model according to Decreux and Valin (2007) Computable equilibrium model Ex ante assessment of Free Trade Agreement (FTA) between the European Union and Korea which was implemented in 2011 Baseline 1: Doha: No agreement, FTAs: only those currently in force, Services: increase in Korean protection by 50% Baseline 2: Doha: standard liberalisation, FTAs: including also Korea-USA, Korea-Canada, EU-India, EU-Singapore, EU-Canada, Services: increase in Korean protection by 25%	n.a.	EU: +0.07 to +0.08 % South Korea: +0.46 to +0.84 % Intervals = Baseline 1 versus baseline 2

Note: The numerical values given in the table should be understood to mean that GDP increases on a permanent basis to a level that is x percent higher by a target year in the future (e.g., 2028 or 2030) than it would be in the absence of a (modernization of a) trade agreement. They do not represent a compound gain which would see GDP increasing by X percentage points each year. For more institutional details of the six bilateral trade agreements see http://ec.europa.eu/trade/policy/countries-and-regions/countries/.

4. CONCLUSIONS

This paper has focussed on the economic impact of Brexit on the EU27. Our main conclusions are the following. Trade between the UK and the EU27 is of a similar order of magnitude as transatlantic trade (between the EU and the US). Investment links between the UK and EU27 appear to be stronger, but the picture is heavily influenced by financial transactions whose main

purpose might be tax optimisation. For the EU, Brexit might thus of comparable importance (with the opposite sign) as TTIP.

All available studies concur that Brexit will lead to a significant disruption of trade links and will impose economic costs on both sides. However, the EU27 would bear only a disproportionally small share of the total cost. A similar picture emerges from the literature studying the potential benefits from free trade agreements the EU has, or is, negotiating with third countries (e.g. Japan, Korea, etc.). The relationship between economic size and bargaining power has two implications: First of all, the EU should have the stronger bargaining position in the negotiations on the future economic arrangements between the UK and the EU27. The cost of the disruption resulting from not reaching an agreement would fall primarily on the UK. Secondly, the Britain might have difficulties negotiating favourable trade arrangements with other large countries, such as the US, Japan or China. The most recent results from the general election 2017 in the UK and the uncertainty generated by them will of course tend to increase the economic costs of Brexit for the country even further via their negative impact on investment-type decisions.

REFERENCES

Aichele, Rahel, and Gabriel Felbermayr. "Costs and benefits of a United Kingdom exit from the European Union." *Guetersloh: Bertelsmann Stiftung* (2015).

Aichele, Rahel, Felbermayr, Gabriel, and Inga Heiland. “Going deep: The trade and welfare effects of TTIP.” *CESifo Working Paper* 5150, Munich (2014).

Burrell, Alison, Ferrari, Emanuele, González Mellado, Aida, Himics, Mihaly, Michalek, Jerzy, Shrestha, Shailesh, and Benjamin Van Doorslaer: Potential EU-Mercosur free trade agreement: impact assessment, Volume 1: Main results, *JRC Reference Reports*, European Commission, Brussels (2011).

Barrett, Alan, Bergin, Adele, FitzGerald, John, Lambert, Derek, McCoy, Daire, Morgenroth, Edgar, Siedschlag, Iulia and Zuzanna Studnicka. "Scoping the possible economic implications of Brexit on Ireland." *ESRI Research Series* 48, The Economic and Social Research Institute, Dublin, November (2015).

Belke, Ansgar, Dubova, Irina, and Thomas Osowski. “Policy uncertainty and international financial markets: The case of Brexit.” *Applied Economics* (2017).

Benz, Sebastian, and Erdal Yalcin. “Ökonomische Effekte eines Freihandelsabkommens zwischen Japan und der EU.” *ifo Schnelldienst* 66 (2013): 35-40.

Booth, Stephen, Howarth, Christopher, and Mats Persson. "What if…? The consequences, challenges and opportunities facing Britain outside EU." *Open Europe Report* 3 (2015): 15.

Breuss, Fritz. "Austria and Switzerland – Experiences with and without EU Membership." *Austrian Economic Quarterly* 1.2006 (2006): 13-39.

Busch, Berthold, and Jürgen Matthes. "Brexit - The economic impact: A meta-study, *IW-Report* 10, Institut der deutschen Wirtschaft, Koeln (2016).

Campos, Nauro F., Coricelli, Fabrizio, and Luigi Moretti. "Economic growth and political integration: estimating the benefits from membership in the European Union using the synthetic counterfactuals method." *IZA Discussion Paper* No. 8162, Institute for the Study of Labor, Bonn (2014).

CEPII/ATLASS. The economic impact of the Free Trade Agreement (FTA) between the European Union and Korea.“ Report for the European Commission DG Trade (framework contract TRADE/07/A2: Korea II), Brussels (2010).Decreux, Yvan, and Hugo Valin. “MIRAGE, Updated version of the model for trade policy analysis: Focus on agriculture and dynamics.” *CEPII Working Paper* 2007/15, Centre d'Etudes Prospectives et d'Informations Internationales, Paris (2007).

Duprez, Colette, and Luc Dresse (2013). “The Belgian economy in global value chains – An exploratory analysis.” *NBB Economic Review*, National Bank of Belgium, Brussels, September, web: https://www.nbb.be/doc/ts/publications/economicreview/2013/ecorevii2013_h1.pdf (2013).

Ecorys. Ex-post evaluation of the implementation of the EU-Mexico Free Trade Agreement, *Interim technical report*, Client: European Commission - DG Trade, Rotterdam, 11 May (2015).

Emerson, Michael, Busse, Matthias, Di Salvo, Mattia, Gros, Daniel, and Jacques Pelkmans. "An Assessment of the Economic Impact of Brexit on the EU27." *Briefing Paper for the Internal market and Consumer Protection Committee of the European Parliament*, Brussels, January (2017).

European Commission. "A Trade SIA relating to the negotiation of a comprehensive economic and trade agreement (CETA) between the EU and Canada", *Draft final report*, Trade 10/B3/B06, Brussels, web: www.eucanada-sia.org (2011).

European Commission. "Impact Assessment, accompanying the document Recommendation for a Council Decision authorising the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy to open negotiations and to negotiate with Mexico a modernised Global Agreement." *Commission Staff Working Document* SWD(2015) 289 final, Brussels, 16 December (2015).

Felbermayr, Gabriel, Mitra, Devashish, Aichele, Rahel, and Jasmin Groeschl. „Europe and India: Relaunching a troubled trade relationship, *ifo Forschungsberichte* No. 80, Ifo Center for International Economics, IFO Institute, Munich (2016).

Felbermayr, Gabriel, Kimura, Fukunari, Okubo, Toshihiro, Steininger, Marina, Yalcin, Erdal. "On the economics of an EU-Japan Free Trade Agreement." *GED Study*, Study of the Ifo Institute on behalf of the Bertelsmann Foundation, Final Report, March 3 (2017).

Francois, J., Manchin, M., Norberg, H. "Economic impact assessment of an FTA between the EU and Japan." *Technical Report* for the European Commission, Brussels (2011).

Kierzenkowski, Rafal, Pain, Nigel, Rusticelli, Elena, and Sanne Zwart. "The economic consequences of Brexit: a taxing decision." *OECD Economic Policy Papers* 16, April (2016).

Lawless, Martina, and Edgar Morgenroth. "The product and sector level impact of a hard Brexit across the EU." *ESRI Working Paper* No. 550, Economic and Social Research Institute, Dublin (2016).

Kepaptsoglou, Konstantinos, Karlaftis, Matthew G., and Dimitrios Tsamboulas. "The Gravity Model Specification for Modeling International Trade Flows and Free Trade Agreement Effects: A 10-Year Review of Empirical Studies." *Open Economics Journal* 3: 1-13 (2010).

Nunez Ferrer, Jorge. "The impact of Brexit on the EU budget – a non-catastrophic event." *CEPS Policy Brief* No. 347, Centre for European Policy Studies, Brussels, September (2016).

OECD. "The economic consequences of Brexit – A taxing decision." *OECD Policy Paper* No. 16, Organisation for Economic Co-Operation and Development, Paris, April (2016).

Ottaviano, Gianmarco, et al. "The costs and benefits of leaving the EU: trade effects." Centre for Economic Performance Technical Report, Centre for Economic Performance, London School of Economics, London (2016).

Roy, Amrita, and Somesh K. Mathur. “Brexit and India-EU Free Trade Agreement.” *Journal of Economic Integration* 31(4): 740-773 (2016).

Rojas-Romagos, Hugo. “Trade effects of Brexit for the Netherlands”. *CPB Background Document*, CPB Netherlands Bureau for Economic Policy Analysis, Rotterdam, June (2016).

Serrano, Carlos, Martínez, Alma, Rodríguez, Arnulfo, and Saidé Salazar. “Evaluation of the effects of the Free Trade Agreement between the European Union and Mexico on bilateral trade and investment.” *BBVA Working Paper* 15/14, Banco Bilbao Vizcaya Argentaria, Madrid (2015).

Straathof, Bas, Linders, Gert-Jan, Lejour, Arjan and Jan Moehlmann. The Internal Market and the Dutch economy: Implications for trade and economic growth. *CPB Document* No. 168. CPB Netherlands Bureau for Economic Policy Analysis, Rotterdam (2008).

Treasury, HM. "HM Treasury analysis: the long-term economic impact of EU membership and the alternatives." Presented to Parliament by the Chancellor of the Exchequer by command of Her Majesty, Cm 925, April (2016).