

Policy brief

“Taking back control or losing it? An analysis of the possible economic impact of Brexit”

María C. Latorre (Universidad Complutense de Madrid)

Zoryana Olekseyuk (Deutsches Institut für Entwicklungspolitik)

Hidemichi Yonezawa (ETH Zurich)

July 2017

Introduction

This policy brief explains and summarizes the economic consensus on the impact of the historic decision of Brexit. Most of the studies derive that Brexit will have a negative impact for both the UK and the Rest of the European Union (REU). However, the harmful effects seem quite asymmetric, since the UK losses are much more sizeable than the ones of REU. Why? In order to understand these results, we first present data on UK's strong trade dependency with the Rest of the European Union (REU), which contrasts with the much smaller role of UK in REU's trade. Next we provide our own estimations of the effects of Brexit for both regions (UK and REU) for a broad set of macroeconomic aggregates: GDP, private consumption, wages, aggregate exports and aggregate imports. The underlying sectoral evolution is also discussed and is developed in length in Latorre, Olekseyuk and Yonezawa (2017). Our estimations incorporate original features, such as, differences in productivity and firms' selection within the same sector (à la Melitz, 2003) following the path-breaking approach of Balistreri, Hillberry and Rutherford (2011), further extended in Olekseyuk (2016) and Olekseyuk and Balistreri (2017). This approach allows us to better estimate the impact on trade than more traditional models. Another important characteristic of our methodology is that it includes the effects of foreign direct investment (FDI and multinationals) in services following Latorre and Yonezawa (2016a, 2016b), which has seldom been modelled in previous analyses of Brexit (Latorre, 2009; Tarr, 2013). This is very relevant for the UK economy, which is the top destination of FDI inflows in the EU, more than half of which is in services. Finally, we put our results in perspective with other economic estimations available. Our main conclusions are:

- Both REU, as a whole, and UK lose from Brexit. “There is no good Brexit “, as EU Commission President Jean Claude Juncker said. The larger the barriers to trade and FDI that Brexit generates after the negotiations, the more negative the impact is for both partners.
- The effects are much more harmful for UK than for REU. This is because European firms retain their preferential access to one of the largest markets in the world, namely, the EU itself. As a consequence they are able to substitute the reduced trade with the UK with more trade with other EU members. By contrast, UK manages to recover less of the trade it loses with the EU by trading with third nations.
- UK-REU bilateral trade and FDI would contract drastically after Brexit. This results in trade and output reductions across most sectors and leads to a decrease in GDP, welfare, wages and capital remuneration at the aggregate level in UK and REU.
- The impact of the, often neglected, FDI component is very significant, since it explains around one third of the negative effect in UK and somewhat less than a third in REU.

- Outsiders, such as the U.S., China, Japan, India and others, are nearly unaffected by Brexit at the aggregate level. Brexit seems, thus, confined to the European landscape.

The asymmetric negative outcomes from Brexit within the EU are consistent with the majority of economic studies that have been conducted so far. They generally obtain that a soft Brexit would dampen its harming potential for both regions and is preferable than a hard Brexit, i.e. it is preferably to erect small than large barriers for trade and FDI between the UK and REU. Let us now explain the main mechanisms that are behind these results.

1. UK's economic relations with the Rest of the European Union

Table 1 offers data on value added, exports and imports in UK. The information is available for the twenty one sectors in which the economies of our model have been split. The rows at the bottom of the table also show some summarizing aggregates of manufactures (labelled “all manufactures”), services (“all services”) and of all the twenty one sectors (“Total”).

The information refers to 2020, for which we assume full barriers stemming from Brexit are in place¹. The first three columns present the structure of value added and trade in the UK (i.e., the shares of all sectors in total value added, aggregate exports and aggregate imports). They show the well-known strong services' specialization of the UK, in which services account for 75.9% of total value added. Contrasting with the structure of value added, the bulk of trade is concentrated in manufactures, which explain 66.4% and 77.5% of UK's total exports and imports, respectively.

The next two columns in Table 1 display the shares of UK's exports going to and imports coming from REU in each of the sectors. REU is a crucial partner for UK's trade. 46.9% and 48.4% of UK's aggregate exports and imports are directed to or coming from REU, respectively. This dependency is of much relevance in general across all sectors. UK, by contrast, only explains around 6.3% (of exports) or 5.3% (of imports) of REU's trade, once intra-EU trade has been taken into account. The last two columns offer the size of exports and imports relative to the domestic production in each sector, which grasps each sector's dependency on foreign trade. Exports and imports are 14.3% and 15.5% of total production, respectively. Logically, there are important differences between manufactures and services in this respect. The latter are much more oriented to the home economy than the former.

¹ We update the information of the year 2011, which is the latest version available of the database GTAP9 (Narayanan, 2015), using IMF projections. Although full implementation of barriers may be later than in 2019, which is the initial deadline for the negotiations, extending the projections beyond 2020 would make the figures less reliable.

The information in Table 1 suggests there are potential sizeable negative effects of erecting barriers to trade and to foreign direct investment in the UK. Half of UK's trade will be affected by these barriers. It remains to be seen how large they will turn out to be. Furthermore, not all the barriers will appear suddenly after Brexit, since many of them are related to regulations. UK is in compliance with EU regulations at the moment so barriers will tend to grow as time passes by. However, other barriers, such as customs controls, will emerge soon after Brexit. In our estimations we assume two scenarios in which the resulting barriers to trade and FDI tend to be small (soft Brexit) or large (hard Brexit). In the case of hard Brexit, following Dhingra et al. (2017), we increase import tariffs between the EU and UK to the Most Favored Nation (MFN) level. We, thus, assume the UK would become a normal WTO member in its relation with the EU. In addition, in the hard Brexit UK and EU will face an increase in their respective bilateral Non-Tariff Barriers (NTBs) equivalent to the half of NTBs that US currently faces on the EU markets. Regarding FDI barriers, in the hard Brexit, we also assume an increase of existent FDI barriers between UK and the rest of the EU by 50 percent. In case of soft Brexit we remain zero import tariffs, but increase the NTBs and FDI barriers by 25 percent². As noted above, the impact of FDI has received less attention in the literature. To the best of our knowledge only Pain and Young (2004) and Ciuriak et al. (2015) have disentangled FDI effects from other forces present in their models. While the former study obtains a very significant effect from FDI, which is more in line with our results, the latter obtains a nearly negligible impact from it.

2. Economic impact of Brexit: estimations including changes in productivity within sectors and multinationals

Table 2 offers the medium run impact of Brexit on GDP, private consumption, wages, capital remuneration, aggregate exports and aggregate imports for the UK and REU. In Latorre, Olekseyuk and Yonezawa (2017) we also provide the details for: US, China, India, Japan, other advanced economies, South East Asia, Latin America, Middle East and Sub-Saharan Africa. Since most of the outcomes in all these latter regions are very close to zero, we derive that the effects of Brexit are confined to the economy in Europe.

The results in Table 2 display the outcomes for a soft and a hard Brexit, at the left and right of the table, respectively. We show the effects of different components, together with their joint impact. For the soft Brexit, we include increases in NTBs to trade (labelled as "NTBs") and barriers to FDI (labelled as "FDI") and their joint impact ("total"). For the hard Brexit, we add the impact of MFN tariffs (labelled as "Tariffs")

² The UK faces less barriers (and, therefore, costs) in the European markets than the US does. Therefore, we cut UK-REU barriers by a fraction of the total barrier. It is hard to know the exact percentage costs that cut would involve and in doing so we follow the approach of Dhingra et al., (2017).

to the impact of NTBs to trade and barriers to FDI. The two latter barriers in the hard Brexit are increased further than the soft Brexit, as explained above.

The negative impact is much more sizeable in the UK than in REU for all macroeconomic variables. GDP in UK could experience a contraction of -1.30% and -2.65% after a soft and hard Brexit, respectively. By contrast, for REU the fall in GDP would be much milder (-0.14% and -0.32% after hard and soft Brexit, respectively).

Reductions in private consumption are more pronounced than the ones of GDP in both regions. We can confirm that UK loses more than REU in the absolute change (\$billions of 2020) as well as in the percentage change. After a hard Brexit the consumption loss is of -3.32% (-65.650 \$billions) for UK vs. -0.50% (-48.913 \$billions) for REU. In the case of a soft Brexit, the consumption loss would be -1.66% (-32.840 \$billions) in UK and -0.21% (-21.005 \$billions) in REU. Hereby, NTBs to trade account for the largest share of the total negative impact and the evolution of FDI plays also a significant role, since it explains more than one third of the contraction in GDP and private consumption in UK. For the REU the impact of FDI is slightly smaller than in the UK, but still around one third of the total impact.

The results for wages and capital remuneration also run in parallel to the ones we have described for GDP and welfare. This implies that NTBs to trade induce the largest reduction in factor remunerations, even though FDI also has an important negative contribution to their overall decrease. Average wages and capital returns in the UK could go down by -3.06% and -3.59% in the UK with a hard Brexit, respectively and by -1.35% and -1.69%, respectively with a soft one. Reductions in wages and capital remuneration are eight and nine times larger in the UK than in REU, respectively.

Coming back to the impact on aggregate trade in Table 2, reductions in exports in the UK would be of -13.27% and -5.72% after a hard and soft Brexit, respectively, while they would be of -3.03% and -1.32%, respectively in REU. The outcomes are very similar for imports. The drop would be of -12.08% and -5.25% in UK and of -3.63% and -1.56% in REU.

Reductions in foreign trade in the UK are much stronger than in REU because the UK loses preferential access to the huge market of the EU to which it directs around half of its trade. By contrast, REU loses preferential access to a much smaller market (the UK) and it is able to recover an important share of the reduced exports and imports directed to the UK by trading more intensively within REU. The exact estimations for these effects appear in Table 3. This table presents at its top left the results for the percentage of REU lost exports to UK that is recovered via REU exports to the rest of partners and separately via intra-EU exports. Note that trade with the “rest of partners” includes trade within the REU (i.e., intra-REU trade) *and* trade with third nations. In the right part at the top of Table 3, we present the results for the percentage of UK lost exports to REU that is recovered with UK exports to third nations. The bottom of the table reproduces an analogous structure for the forgone imports that the Brexit partners are able to recover in other markets.

Regarding the capacity of REU to recover the exports it loses with UK by conducting more trade with all partners³, we see that the percentages of total trade recovered are beyond 40% irrespective of whether it is a soft or hard Brexit scenario. This total resembles the evolution of trade in manufactures, in which REU compensates the fall in exports with UK, to a great extent, by an expansion of its intra-EU free trade. Around half of the trade recovered is via intra-EU trade, while the other half is via trade with nations outside the Brexit block. UK's capacity to recover the exports it has lost with REU by trading with other partners is much more limited than the one of REU. UK could recover as much as 15.8% in the soft Brexit and a maximum of 9.8% with a hard Brexit.

The story is somewhat different for trade in services, however, for the two Brexit partners. REU recovers much of the lost services exports to UK by exporting more services to third nations rather than via intra-EU trade expansion. REU does a better job in recovering exports with UK via exports to third nations in services than in manufacturing. The UK is also able to recover a slightly larger share of services lost in trade with REU by exporting more to third nations than in the case of manufacturing. Our macroeconomic results had shown important drops in wages and capital remuneration, which reduce prices and help to increase in particular services' competitiveness. This is because services tend to generate more value added per unit of product than manufactures do. That is also the reason why imports from services (lower part of Table 3) coming from the rest of the world drop.

The fall in services imports contrasts (lower part of Table 3) with the evolution of exports (upper part of Table 3). When Brexit partners face the emergence of barriers, both of them tend to export more with other partners in manufactures *and* services. But when it comes to imports we see that even though they import more manufactures from other regions they diminish services imports. Due to the fall in factor remuneration, services of both REU and UK become very competitive and outsiders find it hard to compete with them. As a result, outsiders' exports of services directed to the Brexit region diminish, which is the same as reductions in services imports coming to both REU and UK (as reflected in Table 3). However, because the weight of manufactures in trade is much higher than the one of services, total imports from outside the Brexit region at the end go up. REU is able to recover around one third of its total lost imports in the UK, with more than one quarter of them coming via intra-EU trade. The UK is able to recover fewer imports than the EU does. Again the erosion of preferential access to REU damages import flows as happened with export flows.

As noted above, we model firms' selection effects and differences in productivity á la Melitz (2003) in several manufacturing sectors. Our results show that both REU and UK experience reductions in firms' productivity in after Brexit; however, the reductions

³ For all the values reflecting the "capacity to recover lost trade due to Brexit" in Table 3 we put the absolute values of trade with third nations (or via intra-EU trade) in the numerator and divide them by the absolute values of trade lost by one of the Brexit partners in trading with the other Brexit partner. Since trade between the Brexit partners falls, we take its absolute value for the calculation.

are much more pronounced in the UK than in REU. In addition, the drop in productivity is deeper after the hard Brexit than with the soft Brexit. The differences in these reductions of average productivity in the UK and REU vary across sectors. They range between 5 times larger drops after a hard Brexit in UK's textiles and other manufactures and 13 times larger reductions in the UK than in REU after a soft Brexit in chemicals and electronics.

3. Comparison with other studies

It is hard to summarize in a few paragraphs the different studies available on the impact of Brexit, many of which have still not been published. Our attempt to do so appears in Table 4. At its top, we have put the authors and the macroeconomic aggregate whose impact we report in the first row. In the case in which the study evaluates GDP we have chosen that variable. For some studies the results are only available for the UK. Whenever the comparison between the UK and REU is possible, it becomes clear that the impact would be negative for both but much more sizeable in the UK than in REU. In principle, studies covering both regions allow getting a better idea of the coherence and consistency of the results derived than the ones focusing on the UK alone.

Just below the row offering the impact in Table 4, another row offers the methodological approach and the next rows provide further details regarding which type of sectoral effects are included, the different barriers considered and the macroeconomic shocks. With respect to the methodological approach two broad types are available, either Computable General Equilibrium (CGE) modelling or econometrics (a modern variety of gravity models called "New quantitative trade models" (NQTMs), the VAR approach and the NiGEM model). CGE models include many detailed features of the economy, such as bilateral trade at disaggregated sector level, sectoral production and demand for labor, capital and intermediates, as well as many macroeconomic aggregates like the ones shown in Table 2. By contrast, modern gravity models include less detailed features but estimate their main parameters from the same database used for the simulation. They, further, can quantify uncertainty and provide confidence intervals for the results, as happens for the hard Brexit in the study of Aichele and Felbermayr (2015). Often, NQTMs are one-sector models with one factor of production and operating in perfect competition. However, recent attempts include many economic sectors, while keeping one factor of production in a perfect competition setting with no economies of scale (Aichele and Felbermayr, 2015; Dhingra et al. 2017). That is why these latter studies do not report impacts on factor returns.

The results we have presented in Table 2 (Latorre, Olekseyuk and Yonezawa, 2017) estimate a somewhat intermediate impact, compared to the rest of studies in Table 4.

They are in line with the ones derived with NQTM⁴, with the short run impact of the OECD study⁵, and with the long run impact derived in the dynamic setting of Ciuriak et al. (2015)⁶. Our results are more negative than the CGE analysis of Ortiz and Latorre (2017), because the latter does not include economies of scale, neither imperfect competition nor multinationals. Instead, Ortiz and Latorre (2017) model the simultaneous impact of trade (tariffs and NTBs) *and* migration. Table 4 only presents the results for trade, since there is a range of different possible results for migration. In order to analyze this issue, Ortiz and Latorre (2017) rely on the estimations of the OECD (2016) on the reductions of the net inflows of migrants following more or less restrictive policies in UK after Brexit. The variation of labor following these changes in net inflows is rather small, compared to the total amount of workers available (i.e., percentage reductions in the total stock of labor available are of -0.42%, -0.62 and -0.86% in an optimistic, central and pessimistic approach). As a result, Ortiz and Latorre (2017) derive small reductions in GDP ranging -0.04% and - 0.23% depending on the skills of migrants (five different levels are analyzed) and the exact percentage reductions in net inflows.

The results of Latorre, Olekseyuk and Yonezawa (2017) are less negative than the ones derived in the studies that include uncertainty (HM Treasury, 2016a, 2016b; the short run impact of the OECD, 2016; and Price Water House Coopers, 2016⁷). While the majority of studies explicitly consider trade barriers such as barriers and NTBs, the approach of HM Treasury (2016b) estimates the impact of reductions and trade and FDI in productivity and introduces these changes in productivity into a macroeconomic model to estimate the effect for UK's GDP. This makes their approach different to the rest of studies. In addition, HM Treasury (2016a, 2016b), OECD (2016) and Price Water House Coopers (2016) introduce changes in unemployment rates which tend to make deeper the impact they derive, compared to studies that maintain unemployment rates fixed⁸. On the other hand, the study of the OECD (2016) offers a particularly rich

⁴ Aichele and Felbermayr (2015) and Dhingra et al. (2017) switch to different models from the ones they had used to derive their short run impact in order to offer estimations for the long run or dynamic impact of Brexit. They derive much more negative outcomes for the UK in these long run estimations, compared to the short run ones. Dhingra et al. (2017) estimate reductions in GDP per capita in the UK in a range of -6.3% and -9.4%. The ones of Aichele and Felbermayr (2015) are even more extreme, GDP per capita income could fall between 6 and 26% in the UK. However, “we must warn readers here not to take the results too seriously because they always apply the average effect of openness (determined for many countries) to the specific case of a Brexit” (Aichele and Felbermayr, 2015, p. 50).

⁵ This study by the OECD also derives a long run impact in which the GDP fall in the UK is of 5.1%.

⁶ Ciuriak et al. (2015) offer estimations for different years, here we report the ones including full development of all Brexit barriers (in 2030), which are more compatible to the barriers we model, even though we do it in a static framework.

⁷ In Table 4 we include the results derived by Price Water House Coopers (2016) for 2030, in which uncertainty has nearly vanished as a determinant of the outcomes and all trade barriers are fully in place. They include uncertainty, which is the most negative component, in their results for 2020. As a consequence, they obtain quite negative outcomes of -3.1% and -5.5% reductions in the GDP of the UK for a soft and hard Brexit, respectively.

⁸ Dealing with unemployment rates in CGE models can be complicated. There are many reasons for maintaining the unemployment rate fixed, as a way of capturing a sort of “structural unemployment” in the model, which differs from cyclical unemployment. In general, relaxing the assumption of fixed structural unemployment tends to overestimate adjustments in the model.

approach to the modelling of value chains, which stands out among other attempts. However, the study lacks the effects of imperfect competition and economies of scale.

Jafari and Britz (2017) are one of the few that incorporate sectoral productivity effects à la Melitz, as we do, together with proxies for the impact of FDI and migration. They simulate a reduction in the stock of labor and population in the UK equivalent to 1.1 million less people, which probably explains why their estimations provide the most negative effect among medium run CGE approaches⁹. Another CGE model including Melitz effects is the one of Hosoe (2017), who does not report total percentage changes on macroeconomic aggregates but rather changes in private consumption measured in billions of dollars and that is why we have not included them in our main table. His estimations are consistent with ours in the sense that, as shown in Table 2, UK losses in absolute values surpass the ones of the EU. However, his negative outcomes are less sizeable than ours due to the different levels of barriers he assumes and to the fact that Hosoe (2017) does not cover the impact of FDI, despite his experience in modelling foreign multinationals in a dynamic setting (Latorre and Hosoe, 2016).

Finally, two outliers are the only studies that obtain a positive impact of Brexit. Booth et al. (2015) estimations for a soft and hard Brexit are based on the ones for 2030 of Ciuriak et al. (2015), from whom they were requested. The only difference is that in the report of Booth et al. (2015) they do not model but directly subtract the percentage savings in GDP due to the (partial) elimination of contributions to the EU budget from the CGE estimations of the trade aspects of Brexit. The impact of a hard and soft erosion of preferential access to the EU is still (after subtracting EU budget contributions) clearly negative for the UK. The positive outcomes they derive imply necessarily the UK simultaneously conducting trade liberalization not only with the EU but also with the rest of the world *and* a further liberal regulatory strategy in its economy. The 0.6% GDP increase shown in Table 4 arises from UK striking a free trade agreement with the UK and ROW, as well as deregulation and more liberal policies. Behind the 1.6% GDP increase, the UK also strikes a free trade agreement with the EU and ROW together with extremely ambitious deregulation. The authors themselves regard both the 1.6% GDP increase and -2.23% decrease as unrealistic. According to the OECD (2016) the UK is quite liberal by many standards and not much benefit can be attained from further liberalization. Price Water House Coopers (2016) also includes savings related to deregulation but have estimated their impact could be of 0.3% of GDP, while the assumptions in Booth et al. (2015) are much larger (of 0.75% or 1.3% with very ambitious liberalization), which turns the GDP impact positive to the previously commented 0.6% and 1.6% increases, respectively.

⁹ This reduction in the stock of labor contrasts with the reductions in the net inflows of migrants from the study of the OECD (2016) and Ortiz and Latorre (2017). Since the paper has only been presented to a congress there is not much detail on the contribution of each of the effects they model to the total impact they obtain. FDI, for example, is modelled as reductions in the stock of capital, rather than the presence of multinational firms operating together with domestic firms in the model, as in Latorre, Olekseyuk and Yonezawa (2017).

Minford et al. (2016) derive that UK could benefit if it trades with the EU under WTO rules and unilaterally removes all import tariffs. These results are based on dubious assumptions that have been criticized by Sampson et al. (2016). For example, Minford et al. (2016) make the shaky assumption that UK's prices of manufactures and agricultural goods will fall by 10% after Brexit. They also assume that trade flows respond disproportionately heavily to trade costs (i.e., they model an infinite elasticity in that response in each industry, which implies that tiny differences in price induce to buy the cheapest good irrespective of its quality and other price determinants). We know this elasticity varies by industry and is certainly far from infinite (e.g., Dhingra et al., 2017, Table A.3). In sum, the construction of their model leads to outcomes that do not resemble gravity relationships, which perform very well in predicting trade flows in hundreds of empirical studies. Dhingra et al. (2017) also estimate the impact of the UK trading under WTO rules and unilaterally removing all import tariffs. Contrasting with Minford et al (2016) they find that the UK would not be able to compensate the losses derived from less trade with the EU, with increased trade with other regions.

All in all, most of the studies revised are consistent with what economic intuition would tell us. For trade and FDI Brexit implies that markets shrink. This leads to a reduction in economies of scale and factor remuneration. However, the effects are asymmetric because the UK erodes its preferential access to its main natural partner and largest market. These effects are less intense for REU's firms. It is true that there are other elements to be considered such as contributions to the EU budget, migration or a different regulatory regime. However, it seems that the effect of trade and FDI prevails. Indeed, Brexit implies that history can be of much guidance. In 1961, UK applied for membership in the European Economic Community (EEC), which was the precursor of the European Union. UK had realized that its firms were facing rising discrimination and disadvantages in a much larger and faster growing market (i.e., in the EEC) than the one of the European Free Trade Association (EFTA), which UK itself had encouraged to form. EEC firms were benefiting from larger economies to scale, while UK firms had less scope for doing so (Baldwin, 2016).

4. Conclusions

- According to the majority of economic studies and to our own estimations, Brexit will be far more damaging for the UK than for REU. In Latorre, Olekseyuk and Yonezawa (2017) we obtain that GDP in UK could experience a contraction of -1.30% and -2.65% after a soft and hard Brexit, respectively. By contrast, for REU the fall in GDP would be much milder (-0.14% and -0.32% after hard and soft Brexit, respectively). From the economic point of view, it seems less harmful for both to be able to negotiate a soft Brexit with rather small barriers. However, for political reasons the EU may want to deter other nations

from following the UK's path and may want to negotiate a self-damaging hard Brexit.

- Brexit implies a shrinking of the EU market and, in that sense, is not good news for UK but also for REU. Firms lose profit opportunities. However, given the much larger size of REU, the process is much more harmful for UK. UK experiences much more sizeable losses in its industry productivity, foreign trade, production, wages, capital remuneration and value added creation than REU does. We provide quantitative estimations for the evolution of all those variables in Table 2.
- REU firms are more able to recover the lost exports to and imports from UK through intra-EU trade but also by trading more with third nations. REU firms recover more than 40% of its lost exports. Intra-EU exports alone compensate nearly one quarter of REU exports in UK that have dissipated. UK manages to recover less of its lost exports with REU. After a soft Brexit it could recover around 16% of them but if barriers are larger (i.e., with a hard Brexit) the percentages recovered would be only around 10%. UK firms lose much more productivity than REU firms do.
- Our inclusion of FDI in services also constitutes an extra source for losses, which has often been neglected in other general equilibrium approaches. FDI explains around one third of the overall fall in GDP, welfare and wages in the UK. Although the contribution of the impact of FDI is smaller for REU, for some variables, such as GDP and welfare, it nearly contributes to one third of the impact.
- Our assessment offers a somewhat intermediate negative impact compared to results in other studies, mainly because we focus on trade and FDI related aspects of Brexit. The negative impact of any of these two aspects turns out to be more important than UK's contributions to the EU budget (with a maximum net fiscal saving of -0.53% of UK's GDP), or reductions in the flows of migrants (with an impact of reductions in GDP ranging from -0.04% and - 0.23%, according to Ortiz and Latorre, 2017). However, trade and FDI effects seem less sizeable than the impact of the element of uncertainty derived by HM Treasury (2016a, 2016b), Price Water House Coopers (2016) or the OECD (2016). In addition, long run estimations could bring additional dynamic effects from trade in innovation and productivity, which are not included in our analysis and could lead to more negative impacts than the ones we estimate. According to Dhingra et al. (2017) the negative impact in the long run for the UK could be in a range of -6.3% and -9.4% in GDP *per cápita*.

- Regarding the opportunities for outsiders, we find one interesting pattern. The fact that REU firms trade less with UK firms implies opportunities for firms coming from third nations in manufacturing sectors, but not so much in services. While, in general, after Brexit outsiders increase their exports of manufactures to the Brexit region, for services they generally decrease them. This contrasting pattern is explained by the different costs structures of manufacturing and services firms. Services firms in REU and in UK are more labor intensive than manufacturing firms and also generate more value added per unit of output. After Brexit, production falls across most sectors in UK and REU, although more intensively in the former than in the latter. This implies that the economy is depressed and so become wages and capital remuneration. This has an impact on prices, which fall disproportionately more in services than in manufactures. As a consequence, exporters from third nations find it harder to compete in services than in manufactures within the Brexit block. And the impact of Brexit itself seems limited to the European economy.

References

Baldwin, Richard E. (2016) (Ed.) “Introduction” in Brexit Beckons: Thinking ahead by leading economists, CEPR Press, available in: http://www.eureferendum.com/documents/Brexit_Beckons_VoxEU.pdf

Balistreri, Edward J., Hillberry, Russel and Rutherford, Thomas F. 2011. “Structural estimation and solution of international trade models with heterogeneous firms”, *Journal of International Economics*, vol. 83, pp. 95 – 108.

Booth, Stephen, Howarth, Christopher Persson, Mats Ruparel, Raoul and Swidlicki, Pawel. 2015. “What if? The Consequences, challenges & opportunities facing Britain outside EU”, Open Europe.

Yaghoob, Jafari and Britz, Wolfgang. 2017. “Brexit – an economy-wide Impact Assessment looking into trade, immigration, and Foreign Direct Investment”, paper presented at the 20th Annual Conference on Global Economic Analysis, West Lafayette, Indiana, USA, June 7-9, 2017

Ciuriak, Dan, Xiao, Jingliang, Ciuriak, Natassia, Dadkhah, Ali, Lysenko, Dmitry and Narayanan G. Badri. 2015. “The trade-related impact of a UK exit from the EU single market”, Ciuriak Consulting, April.

Dhingra, S., Huang, H., Ottaviano, G., Pessoa, J.P., Sampson, T., & Van Reenen, J. 2017. “The Costs and Benefits of Leaving the EU: Trade Effects”, CEP Discussion Paper No 1478, April 2017.

HM Treasury. 2016a. HM Treasury analysis: the immediate economic impact of leaving the EU, Discussion paper, May.

HM Treasury. 2016b. HM Treasury analysis: the long-term economic impact of EU membership and the alternatives Discussion paper, April.

- Hosoe, Nonuhiro. 2016. “Impact of Brexit: Firm exit and loss of variety”, GRIPS Discussion paper 16-14, August.
- Latorre, María C. 2009. “The economic analysis of multinationals and foreign direct investment: A review”. *Hacienda Pública Española/Revista de Economía Pública*, vol. 191, pp. 97-126.
- Latorre, María C. and Hosoe, Nonuhiro. 2016. “The role of Japanese FDI in China”. *Journal of Policy Modeling*, vol. 38, pp. 226-241.
- Latorre, María C. and Yonezawa, Hidemichi. 2017a. “A general equilibrium analysis of FDI growth in Chinese services’ sectors”, forthcoming in *China Economic Review*.
- Latorre, María C. and Yonezawa, Hidemichi. 2017b. “Stopped TTIP? Its potential impact on the world and the role of neglected FDI”, MPRA Paper No. 77162, 1 March 2017, forthcoming in *Economic Modelling*.
- Latorre, María C., Olekseyuk, Zoryana and Yonezawa, Hidemichi. 2017. “Trade and FDI-related impacts of Brexit: A world-wide perspective”, paper presented at the 20th Annual Conference on Global Economic Analysis, West Lafayette, Indiana, USA, June 7-9, 2017
- Melitz, Marc J. 2003. The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. *Econometrica*, 71(6), 1695–1725.
- Minford, P., S. Gupta, V. Le, V. Mahambare and Y. Xu. 2016. *Should Britain leave the EU? An economic Analysis of a troubled Relationship*, second edition, IEA.
- Narayanan, G. Badri, Aguiar, Angel. and McDougall, Robert (Eds.) 2015a. Global Trade, Assistance, and Production: The GTAP 9 Data Base, Center for Global Trade Analysis, Purdue University.
- OECD. 2016. “The economic consequences of Brexit: A taxing decision”, OECD Economic Policy Paper No. 16.
- Olekseyuk, Zoryana. 2016. “Modeling of FDI in business services: additional effects in case of Ukraine’s European integration”. *The Journal of International Trade & Economic Development*. 25 (7), 1010-1043
- Olekseyuk, Zoryana and Balistreri, Edward. 2017. “Trade liberalization gains under different trade theories: A case study for Ukraine”. *Journal of European Economics*. forthcoming.
- Ortiz, Gabriela and Latorre, María C. 2017b. “A first quantitative approach to a hard and soft Brexit”, paper presented at the 20th Annual Conference on Global Economic Analysis, West Lafayette, Indiana, USA, June 7-9, 2017
- Pain, N. and Young, G. (2004. “The macroeconomic impact of UK withdrawal from the EU”. *Economic Modelling*. vol. 21, pp. 387-408.
- Price Water House Coopers (2016. “Leaving the EU: Implications for the UK economy”, March.
- Sampson, Thomas, Dhingra, Swati, Ottaviano, Gianmarco and Van Reenen, John. 2016. “How ‘Economists for Brexit’ manage to defy the laws of gravity”, VOXeu, available at: <http://voxeu.org/article/how-economists-brexit-manage-defy-laws-gravity>
- Tarr, David G. 2013. Putting Services and Foreign Direct Investments with Endogenous Productivity Effects in Computable General Equilibrium Models. Chap. 6 in: Dixon, P.B., & Jorgenson, D.W. (eds), *Handbook of Computable General Equilibrium Modeling*, vol. 1, Part A. Elsevier, pages 303–377.

Table 1. Trade and GDP structure in the UK in 2020 (in percentage)

	% Shares in total			% Share going to (coming from) REU		% Share of production	
	Value Added	Exports	Imports	in Exports	in Imports	Exported	Imported
1.Agriculture	1.1	0.8	2.1	71.3	48.7	12.40	30.81
2.Other primary	2.1	3.8	7.0	68.0	11.4	38.01	56.09
3.Food	2.7	4.1	6.1	57.9	74.7	14.46	23.16
4.Textiles	0.9	1.8	5.4	62.3	30.3	23.24	48.69
5.Wood and paper	2.0	2.1	3.5	48.7	62.0	11.95	21.66
6.Chemicals	2.5	18.2	14.8	55.1	57.9	40.68	39.93
7.Metals	1.5	6.5	9.9	40.1	35.2	36.65	51.22
8.Motor vehicles	1.0	7.7	8.4	47.8	84.3	52.24	58.71
9.Other transport	0.9	4.1	2.9	32.7	36.6	44.63	40.96
10.Electronics	0.5	3.1	5.2	58.5	41.5	50.54	66.13
11.Other machinery	2.6	12.3	10.7	35.6	54.7	49.47	50.19
12.Other manufactures	1.2	2.3	3.3	38.0	36.9	19.72	29.59
13.Construction	5.2	0.4	0.3	34.0	37.6	0.90	0.73
14.Water Transport	0.5	0.5	0.6	42.0	56.7	8.82	46.15
15.Air Transport	0.4	3.0	2.7	34.4	51.2	46.49	49.30
16.Communications	3.5	0.7	1.0	72.9	50.0	4.72	6.96
17.Finance	4.3	5.8	2.2	44.2	37.0	23.38	12.26
18.Insurance	1.6	1.5	0.3	16.9	52.6	10.41	3.28
19.Business services	15.6	14.0	5.7	50.7	35.3	15.99	7.58
20.Personal services	3.3	1.7	1.5	44.4	46.6	7.38	8.34
21.Other services	46.6	5.5	6.3	33.4	43.9	2.00	2.79
All manufactures	23.0	66.4	77.5	48.2	49.9	27.81	33.27
All services	75.9	32.8	20.4	43.7	42.7	7.23	5.90
Total	100.0	100.0	100.0	46.9	48.4	14.31	15.47

Source: Authors' estimations based on Narayanan et al. (2015) and in IMF (2016) for the projections.

Table 2. Impact on macroeconomic aggregates (% change difference with respect to initial levels).

	Soft Brexit			Hard Brexit	
GDP					
	REU	UK		REU	UK
NTBs	-0.10	-0.82	NTBs	-0.18	-1.49
FDI	-0.04	-0.48	FDI	-0.08	-0.94
total	-0.14	-1.30	Tariffs	-0.06	-0.33
			total	-0.32	-2.65
Private consumption					
NTBs	-0.15	-0.96	NTBs	-0.27	-1.77
FDI	-0.07	-0.70	FDI	-0.14	-1.35
total	-0.21	-1.66	Tariffs	-0.08	-0.25
			total	-0.50	-3.32
Private Consumption in \$billions 2020					
NTBs	-14.428	-19.032	NTBs	-26.962	-34.977
FDI	-6.578	-13.898	FDI	-13.589	-26.713
total	-21.005	-32.840	Tariffs	-7.808	-4.913
			total	-48.913	-65.650
Wages					
NTBs	-0.13	-0.98	NTBs	-0.23	-1.77
FDI	-0.03	-0.38	FDI	-0.07	-0.76
total	-0.16	-1.35	Tariffs	-0.11	-0.93
			total	-0.38	-3.06
Capital remuneration					
NTBs	-0.14	-1.06	NTBs	-0.24	-1.93
FDI	-0.04	-0.63	FDI	-0.08	-1.18
total	-0.18	-1.69	Tariffs	-0.11	-0.92
			total	-0.39	-3.59
Aggregate exports					
NTBs	-1.28	-5.74	NTBs	-2.24	-10.04
FDI	-0.04	0.01	FDI	-0.06	0.08
total	-1.32	-5.72	Tariffs	-1.19	-5.51
			total	-3.03	-13.27
Aggregate imports					
NTBs	-1.57	-5.18	NTBs	-2.77	-9.00
FDI	0.01	-0.07	FDI	0.02	-0.01
total	-1.56	-5.25	Tariffs	-1.40	-5.12
			total	-3.63	-12.08

Source: Authors' estimations.

Table 3. Estimations for the capacity to recover in other markets the lost trade within the Brexit bloc (% changes with respect to the initial data)

	% of REU exports to the UK which is recovered:				% of UK exports to REU which is	
	with REU exports to the rest of partners		with intra-REU exports		recovered: with UK exports to third nations	
	Soft	Hard	Soft	Hard	Soft	Hard
All manufactures	42.3	44.7	26.5	25.9	15.8	9.8
All services	56.5	95.5	8.6	13.1	19.9	12.7
Total	42.5	46.6	24.6	24.6	15.8	9.8
	% of REU imports coming from UK which is recovered:				% of UK imports coming from REU which is	
	with REU imports from the rest of partners		with intra-REU imports		recovered: with REU imports from the rest of partners	
	Soft	Hard	Soft	Hard	Soft	Hard
All manufactures	44.4	40.1	29.5	33.2	22.1	27.6
All services	-22.1	-32.1	6.4	8.1	-14.2	-10.3
Total	36.1	31.1	26.8	30.3	20.5	26.5

Source: Authors' estimations.

Table 4. Comparison of recent studies on the impact of Brexit

	Aichele and Felbermayr (2015) impact on real income				Booth et al. (2015) impact on GDP				Ciuriak et al. (2015) impact on GDP				Dhingra et al. (2017) Impact on private consumption				HM treasury (2016a) impact on GDP		HM treasury (2016b) impact on GDP			Jafari and Writz (2017) impact on GDP		Minford et al. (2016) impact on GDP		Latorre et al. (2017) impact on GDP				Ortiz and Latorre (2017) impact on GDP				OECD (2016) impact on GDP		Price Water House Coopers (2016) Impact on GDP	
	Soft		Hard		Soft	Hard	FTA/EU+ROW+Dereg		Soft		Hard		Soft		Hard		UK		UK	UK	UK	Soft		Hard		Soft		Hard		Hard		Soft	Hard				
	REU	UK	REU	UK	REU	UK	REU	UK	REU	UK	REU	UK	REU	UK	REU	UK	EEA	FTA	WTO	Hard	UK alone	REU	UK	REU	UK	REU	UK	REU	UK	REU	UK	UK					
Impact	-0.1	-0.64	(-0.36;-0.24)	(-2.8;-1.54)	-0.81	-2.23	0.64	1.55	-0.24	-0.97	-0.65	-2.54	-0.32	-1.34	-0.82	-2.66	-3.60	-6.00	-3.80	-6.20	-7.50	-4.60	4.00	-0.14	-0.32	-1.30	-2.65	-0.07	-0.50	-0.14	-1.15	-1.0	-3.3	-1%	-3.5		
Overall approach	New Quantitative trade model (NQTM)				CGE & savings through deregulation				CGE				NQTM				VAR and NiGEM		Gravity and NiGEM macroeconomic model			CGE		CGE		CGE				CGE and NiGEM		GGE					
Sectoral effects considered																																					
Sectoral productivity shocks á la Melitz																																					
Imperfect competition&variety effects																																					
Perfect competition																																					
Value chains																																					
Barriers considered																																					
Tariffs																																					
Non-tariff barriers to trade																																					
Non-tariff barriers to FDI																																					
Rules of origin																																					
Macro shocks																																					
FDI																																					
Migration																																					
EU budget																																					
Exchange rate																																					
Changes in unemployment rate																																					
Risk premia/Uncertainty																																					

Source: Authors' summary.